Handout 1

Updates in Toxicity Values
MRBCA Technical Guidance

Chemicals	CAS #	Slope Factor					Reference Dose				
		Oral, SF_o (mg/kg-day)$^{-1}$		Inhalation, SF_i (mg/kg-day)$^{-1}$		Dermal, SF_d (mg/kg-day)$^{-1}$	Oral, RfD_o (mg/kg-day)		Inhalation, RfD_i (mg/kg-day)		Dermal, RfD_d (mg/kg-day)
Chemicals Listed in DHSS Comments and Updated											
1,2-Dichloropropane	78-87-5	3.6E-02	*c*	3.5E-02	*c*	3.6E-02	1.1E-03	*r*	1.1E-03	*i*	1.1E-03
1,2-Dichloropropane	78-87-5	3.6E-02	*c*	**3.6E-02**	*c*	3.6E-02	1.1E-03	*r*	1.1E-03	*i*	1.1E-03
Tetrachloroethylene	127-18-4	5.2E-02	*n*	1.0E-02	*n*	5.2E-02	1.0E-02	*i*	1.7E-01	*n*	1.0E-02
Tetrachloroethylene	127-18-4	**5.4E-01**	*c*	**2.1E-02**	*c*	5.4E-01	1.0E-02	*i*	1.7E-01	*n*	1.0E-02
Bis(2-ethylhexyl)phthalate	117-81-7	1.4E-02	*i*			1.4E-02	2.0E-02	*i*	2.0E-02	*r*	2.0E-02
Bis(2-ethylhexyl)phthalate	117-81-7	1.4E-02	*i*	**1.4E-02**	*r*	1.4E-02	2.0E-02	*i*	2.0E-02	*r*	2.0E-02
2-Methyl-4,6-dinitrophenol	534-52-1						2.0E-03	*t*	8.6E-05	*t*	2.0E-03
2-Methyl-4,6-dinitrophenol	534-52-1						**1.0E-04**	*p*	8.6E-05	*t*	**1.0E-04**
3-Nitroaniline	99-09-2	2.1E-02	*p*	2.1E-02	*r*	2.1E-02	3.0E-04	*p*	2.9E-04	*p*	3.0E-04
3-Nitroaniline	99-09-2	2.1E-02	*p*	2.1E-02	*r*	2.1E-02	3.0E-04	*p*	**3.0E-04**	*p*	3.0E-04
alpha-Hexachlorocyclohexane	319-84-6	6.3E+00	*i*	6.3E+00	*i*	6.3E+00	5.0E-04	*n*	5.0E-05	*r*	5.0E-04
alpha-Hexachlorocyclohexane	319-84-6	6.3E+00	*i*	6.3E+00	*i*	6.3E+00	5.0E-04	*n*	**5.0E-04**	*r*	5.0E-04
Chemicals Not Listed in DHSS Comments, but Updated in 2004 PRG Table											
Allyl chloride	107-05-1	2.1E-02	*c*	2.1E-02	*c*	2.1E-02	5.0E-02	*h*	2.9E-04	*i*	5.0E-02
Allyl chloride	107-05-1	2.1E-02	*c*	2.1E-02	*c*	2.1E-02	**2.9E-04**	*r*	2.9E-04	*i*	2.9E-04
Chloroform	67-66-3	3.1E-02	*c*	8.1E-02	*i*	3.1E-02	1.0E-02	*i*	8.6E-04	*n*	1.0E-02
Chloroform	67-66-3	3.1E-02	*c*	8.1E-02	*i*	3.1E-02	1.0E-02	*i*	**1.4E-02**	*n*	1.0E-02
Chloromethane	74-87-3	1.3E-02	*h*	6.3E-03	*h*	1.3E-02	2.6E-02	*r*	2.6E-02	*i*	2.6E-02
Chloromethane	74-87-3	**1.3E-02**	*t*	**6.3E-03**	*t*	**1.3E-02**	2.6E-02	*r*	2.6E-02	*i*	2.6E-02
1,3-Dichlorobenzene	541-73-1						9.0E-04	*n*	9.0E-04	*r*	9.0E-04
1,3-Dichlorobenzene	541-73-1						**3.0E-02**	*n*	**3.0E-02**	*r*	**3.0E-02**
1,4-Dichlorobenzene	106-46-7	5.4E-03	*c*	2.2E-02	*n*	5.4E-03	3.0E-02	*n*	2.3E-01	*i*	3.0E-02
1,4-Dichlorobenzene	106-46-7	5.4E-03	*c*	2.2E-02	*n*	5.4E-03	**2.3E-01**	*n*	2.3E-01	*i*	2.3E-01
1,3-Dichloropropene	542-75-6	1.0E-01	*i*	1.4E-02	*i*	1.0E-01	3.0E-02	*i*	5.7E-03	*i*	3.0E-02
1,3-Dichloropropene	542-75-6	1.0E-01	*i*	1.4E-02	*i*	1.0E-01	**2.0E-02**	*p*	**2.0E-02**	*r*	**2.0E-02**
n-Hexane	110-54-3						6.0E-02	*h*	5.7E-02	*i*	6.0E-02
n-Hexane	110-54-3						**1.1E+01**	*p*	5.7E-02	*i*	**1.1E+01**
3-Nitrotoluene	99-08-1						2.0E-02	*p*	1.0E-02	*r*	2.0E-02
3-Nitrotoluene	99-08-1						2.0E-02	*p*	**2.0E-02**	*r*	2.0E-02
Tetrachloroethylene	127-18-4	5.2E-02	*n*	1.0E-02	*n*	5.2E-02	1.0E-02	*i*	1.7E-01	*n*	1.0E-02
Tetrachloroethylene	127-18-4	**5.4E-01**	*c*	**2.1E-02**	*c*	**5.4E-01**	1.0E-02	*i*	**7.7E-02**	*t*	1.0E-02

Notes:

Chemicals and values in vold present the updates based on the DHSS comments or 2004 PRG Table.

Handout 1

Updates in Toxicity Values
MRBCA Technical Guidance

Chemicals	CAS #	Slope Factor					Reference Dose				
		Oral, SF_o $(mg/kg\text{-}day)^{-1}$		Inhalation, SF_i $(mg/kg\text{-}day)^{-1}$		Dermal, SF_d $(mg/kg\text{-}day)^{-1}$	Oral, RfD_o (mg/kg-day)		Inhalation, RfD_i (mg/kg-day)		Dermal, RfD_d (mg/kg-day)
1,2,4-Trichlorobenzene	120-82-1	3.6E-03	*c*	3.6E-03	*r*	3.6E-03	1.0E-02	*i*	1.1E-03	*p*	1.0E-02
1,2,4-Trichlorobenzene	120-82-1	3.6E-03	*c*	3.6E-03	*r*	3.6E-03	1.0E-02	*i*	**1.0E-03**	*p*	1.0E-02
Dibenzofuran	132-64-9						4.0E-03	*n*	4.0E-03	*r*	4.0E-03
Dibenzofuran	132-64-9						**2.0E-03**	***n***	**2.0E-03**	***r***	**2.0E-03**
2-Nitroaniline	88-74-4						3.0E-03	*p*	2.9E-05	*p*	3.0E-03
2-Nitroaniline	88-74-4						3.0E-03	*p*	**3.0E-05**	*p*	3.0E-03
4-Nitroaniline	100-01-6	2.1E-02	*p*	2.1E-02	*r*	2.1E-02	3.0E-03	*p*	1.1E-03	*p*	3.0E-03
4-Nitroaniline	100-01-6	2.1E-02	*p*	2.1E-02	*r*	2.1E-02	3.0E-03	*p*	**1.0E-03**	*p*	3.0E-03
n-Nitrosodimethylamine	62-75-9	5.1E+01	*i*	4.9E+01	*i*	5.1E+01	8.3E-06	*p*	8.3E-06	*r*	8.3E-06
n-Nitrosodimethylamine	62-75-9	5.1E+01	*i*	4.9E+01	*i*	5.1E+01	**8.0E-06**	*p*	**8.0E-06**	*r*	**8.0E-06**
New Chemical Added											
Perchlorate	14797-73-0						7.0E-04	*i*	7.0E-04	*r*	7.0E-04

Notes:
Chemicals and values in bold present the updates based on the DHSS comments or 2004 PRG Table.

The letters in the table represent following sources:
i - USEPA IRIS
p - USEPA PPRTV's
n - USEPA NCEA
c - CALEPA OEHHA
h - HEAST
t - TCEQ's TRRP Tier 1 PCL Table
r - Missing value; value showing is identical to a value available for another route of exposure
m -MDNR/DHHS Memo, August 12, 2004
u - Value kept from MDNR Tanks-RBCA Guidance
a - Values assigned based on the most conservative Aroclor values found in the tiered hierarchy

Handout 2

Exposure Factors
MRBCA Technical Guidance

Parameter	Symbol	Unit	Value Feb. 18, 2005	Value RAGS Part E
Averaging Time for Carcinogen	AT_c	year	70	70
Averaging Time for Non-Carcinogen	AT_{nc}	year	=ED	=ED
Body Weight:				
Resident Child	BW	kg	15	15
Resident Adult	BW	kg	70	70
Non-Residential Worker	BW	kg	70	70
Construction Worker	BW	kg	70	70
Exposure Duration:				
Resident Child	ED	year	6	6
Resident Adult	ED	year	24	24
Non-Residential Worker	ED	year	25	25
Construction Worker	ED	year	1	1
Exposure Time for Dermal Contact with Groundwater				
Resident Child	ET_d	hours/day	1	NR
Resident Adult	ET_d	hours/day	1	NR
Non-Residential Worker	ET_d	hours/day	1	NR
Construction Worker	ET_d	hours/day	1	NR
Exposure Frequency:				
Resident Child	EF	day/year	350	350
Resident Adult	EF	day/year	350	350
Non-Residential Worker	EF	day/year	250	250
Construction Worker	EF	day/year	90	90
Soil Ingestion Rate:				
Resident Child	IR_{soil}	mg/day	200	200
Resident Adult	IR_{soil}	mg/day	100	100
Non-Residential Worker	IR_{soil}	mg/day	100	100
Construction Worker	IR_{soil}	mg/day	100	100
Groundwater Ingestion Rate:				
Resident Child	IR^w	L/day	1	1
Resident Adult	IR^w	L/day	2	2
Indoor Inhalation Rate (hourly):				
Resident Child	IRai	m^3/hr	0.416	0.416
Resident Adult	IRai	m^3/hr	0.833	0.833
Non-Residential Worker	IRai	m^3/hr	0.833	0.833
Exposure Time for Indoor Inhalation:				
Resident Child	ET_{in}	hr/day	18	18
Resident Adult	ET_{in}	hr/day	18	18
Non-Residential Worker	ET_{in}	hr/day	18	18

Exposure Factors
MRBCA Technical Guidance

Parameter	Symbol	Unit	Value Feb. 18, 2005	Value RAGS Part E
Indoor Inhalation Rate (daily):				
Resident Child	IR_a	m^3/day	**7.5**	**7.5**
Resident Adult	IR_a	m^3/day	**15.0**	**15.0**
Non-Residential Worker	IR_a	m^3/day	**15.0**	**15.0**
Outdoor Inhalation Rate (hourly):				
Resident Child	IR_{ao}	m^3/hr	0.416	0.416
Resident Adult	IR_{ao}	m^3/hr	0.833	0.833
Non-Residential Worker	IR_{ao}	m^3/hr	0.833	0.833
Construction Worker	IR_{ao}	m^3/hr	0.833	0.833
Exposure Time for Outdoor Inhalation:				
Resident Child	ET_{out}	hr/day	6	6
Resident Adult	ET_{out}	hr/day	6	6
Non-Residential Worker	ET_{out}	hr/day	6	6
Construction Worker	ET_{out}	hr/day	12	12
Outdoor Inhalation Rate (daily):				
Resident Child	IR_a	m^3/day	**2.5**	**2.5**
Resident Adult	IR_a	m^3/day	**5.0**	**5.0**
Non-Residential Worker	IR_a	m^3/day	**5.0**	**5.0**
Construction Worker	IR_a	m^3/day	**10.0**	**10.0**
Skin Surface Area:				
Resident Child	SA	cm^2/day	4236	See below
Resident Adult	SA	cm^2/day	4714	See below
Non-Residential Worker	SA	cm^2/day	4714	See below
Construction Worker	SA	cm^2/day	4714	See below
Skin Surface Area for Incidental Dermal Contact with Soil:				
Resident Child	SA_{soil}	cm^2/day	4236	2800
Resident Adult	SA_{soil}	cm^2/day	4714	5700
Non-Residential Worker	SA_{soil}	cm^2/day	4714	3300
Construction Worker	SA_{soil}	cm^2/day	4714	3300
Skin Surface Area for Incidental Dermal Contact with Water:				
Resident Child	SA_{gw}	cm^2/day	4236	2800
Resident Adult	SA_{gw}	cm^2/day	4714	5700
Non-Residential Worker	SA_{gw}	cm^2/day	4714	3300
Construction Worker	SA_{gw}	cm^2/day	4714	3300

Handout 2

Exposure Factors
MRBCA Technical Guidance

Parameter	Symbol	Unit	Value Feb. 18, 2005	Value RAGS Part E
Skin Surface Area for Whole-Body Dermal Contact with Water:				
Resident Child	$SA_{gw\text{-}wb}$	cm^2/day	NR	6600
Resident Adult	$SA_{gw\text{-}wb}$	cm^2/day	NR	18000
Soil to Skin Adherence Factor:				
Resident Child	AF	mg/cm^2	1	0.2
Resident Adult	AF	mg/cm^2	1	0.07
Non-Residential Worker	AF	mg/cm^2	1	0.2
Construction Worker	AF	mg/cm^2	1	0.3
Event Frequency for Incidental Dermal Contact with Soil				
Resident Child	EV_{soil}	event/day	NR	TBD
Resident Adult	EV_{soil}	event/day	NR	TBD
Non-Residential Worker	EV_{soil}	event/day	NR	TBD
Construction Worker	EV_{soil}	event/day	NR	TBD
Event Frequency for Incidental Dermal Contact with Water				
Resident Child	EV_{gw}	event/day	NR	TBD
Resident Adult	EV_{gw}	event/day	NR	TBD
Non-Residential Worker	EV_{gw}	event/day	NR	TBD
Construction Worker	EV_{gw}	event/day	NR	TBD
Event Frequency for Whole-Body Dermal Contact with Water				
Resident Child	EV_{gw_wb}	event/day	NR	TBD
Resident Adult	EV_{gw_wb}	event/day	NR	TBD
Event Duration for Incidental Dermal Contact with Water				
Resident Child	t_{event}	hr/event	NR	TBD
Resident Adult	t_{event}	hr/event	NR	TBD
Non-Residential Worker	t_{event}	hr/event	NR	TBD
Construction Worker	t_{event}	hr/event	NR	TBD
Event Duration for Whole-Body Dermal Contact with Water				
Resident Child	t_{event_wb}	hr/event	NR	TBD
Resident Adult	t_{event_wb}	hr/event	NR	TBD

Note:
The values in bold are calculated.
NR: Not required
TBD: To be determined

Handout 3

Tier 1 Risk-Based Target Levels for Incidental Dermal Contact with Surficial Soil

MRBCA Technical Guidance

Chemical	CAS #	Tier 1 Risk-Based Target Levels for Dermal Contact with Surficial Soil by Resident (mg/kg)		
		Feb. 2005	RAGS Part E	Ratio of RAGS Part E/Feb. 2005
Carbon tetrachloride	56-23-5	1.70E+01	1.56E+02	9.18
cis-1,2-Dichloroethylene	156-59-2	3.69E+02	2.79E+03	7.56
1,4-Dioxane	123-91-1	2.00E+02	1.84E+03	9.18
Methyl ethyl ketone	78-93-3	2.22E+04	1.68E+05	7.56
Methylene chloride	75-09-2	2.94E+02	2.70E+03	9.18
Tetrachloroethylene	127-18-4	4.24E+01	3.89E+02	9.18
1,1,1-Trichloroethane	71-55-6	1.03E+04	7.82E+04	7.56
Trichloroethylene	79-01-6	1.70E+02	1.56E+03	9.18
Vinyl chloride	75-01-4	1.58E+00	1.45E+01	9.18
Pentachlorophenol	87-86-5	7.35E+00	6.74E+01	9.18
PCBs	1336-36-3	7.88E-01	7.23E+00	9.18
Atrazine	1912-24-9	9.59E+00	8.80E+01	9.18
Chlordane	12789-03-6	6.30E+00	5.78E+01	9.18
DDT	50-29-3	6.49E+00	5.95E+01	9.18
Mercury	7439-97-6	NA	NA	NA
Cyanide	57-12-5	7.39E+02	5.59E+03	7.56

Note:

NA: Not available

Ratio less than 1 implies that Tier 1 RBTLs using RAGS Part E are smaller than Tier 1 RBTLs in Feb. 2005 Draft MRBCA Technical Guidance.

Ratio greater than 1 implies that Tier 1 RBTLs using RAGS Part E are higher than Tier 1 RBTLs in Feb. 2005 Draft MRBCA Technical Guidance.

Handout 4
Feb. 18, 2005

DERMAL CONTACT WITH CHEMICALS IN SOIL

Carcinogenic effects

$$RBTL_{dcss} = \frac{TR \times BW \times AT_c \times 365}{EF \times ED \times SF_d \times 10^{-6} \times SA \times M \times RAF_d}$$

Non-carcinogenic effects

$$RBTL_{dcss} = \frac{THQ \times BW \times AT_{nc} \times 365 \times RfD_d}{EF \times ED \times 10^{-6} \times SA \times M \times RAF_d}$$

where:

$RBTL_{dcss}$	=	Risk-based target level for dermal contact of chemicals in surficial soil [mg/kg]
TR	=	Target risk or the increased chance of developing cancer over a lifetime due to exposure to a chemical [-]
THQ	=	Target hazard quotient for individual constituents [-]
BW	=	Body weight [kg]
AT_c	=	Averaging time for carcinogens [year]
AT_{nc}	=	Averaging time for non-carcinogens [year]
ED	=	Exposure duration [year]
EF	=	Exposure frequency [day/year]
SA	=	Skin surface area [cm^2/day]
M	=	Soil to skin adherence factor [mg/cm^2]
RAF_d	=	Chemical-specific dermal relative absorption factor [-]
SF_d	=	Dermal cancer slope factor [$(mg/kg\text{-}day)^{-1}$]
RfD_d	=	Chemical-specific oral reference dose [mg/kg-day]
365	=	Converts AT_c, AT_{nc} in years to days [day/year]

DERMAL CONTACT WITH CHEMICALS IN GROUNDWATER

Carcinogenic effects

$$RBTL_{dw} = \frac{TR \times BW \times AT_c \times 365 \times 1000}{SF_d \times SA \times PC \times ET \times EF \times ED}$$

Non-carcinogenic effects

$$RBTL_{dw} = \frac{THQ \times BW \times AT_{nc} \times 365 \times 1000 \times RfD_d}{SA \times PC \times ET \times EF \times ED}$$

Source: RAGS, Vol. I, Part A, 1989, p. 6-37

where:

$RBTL_{dw}$	=	Risk-based target level for dermal contact with groundwater [mg/L-H_2O]
TR	=	Target risk or the increased chance of developing cancer over a lifetime due to exposure to a chemical [-]
THQ	=	Target hazard quotient for individual constituents [-]
BW	=	Body weight [kg]
AT_c	=	Averaging time for carcinogens[year]
AT_{nc}	=	Averaging time for non-carcinogens[year]
SA	=	Skin surface area available for contact [cm^2]
PC	=	Chemical-specific dermal permeability constant [cm/hr]
ET	=	Exposure time [hour/day]
ED	=	Exposure duration [year]
EF	=	Exposure frequency [day/year]
RfD_d	=	Chemical-specific dermal reference dose [mg/kg-day]
SF_d	=	Chemical-specific dermal cancer slope or potency factor $[mg/(kg\text{-}day)]^{-1}$
365	=	Converts AT_c, AT_{nc} in years to days [day/year]
1000	=	Conversion factor from cm^3 to L [cm^3/L]

DERMAL CONTACT WITH CHEMICALS IN SOIL

Carcinogenic effects

$$RBTL_{dcss} = \frac{TR \times BW \times AT_c \times 365}{EF \times ED \times SF_d \times 10^{-6} \times SA_{soil} \times EV_{soil} \times AF \times RAF_d}$$

Non-carcinogenic effects

$$RBTL_{dcss} = \frac{THQ \times BW \times AT_{nc} \times 365 \times RfD_d}{EF \times ED \times 10^{-6} \times SA_{soil} \times EV_{soil} \times AF \times RAF_d}$$

Source: Modified from RAGS, Vol. I, Part E, 2004.

where:

$RBTL_{dcss}$	=	Risk-based target level for dermal contact of chemicals in surficial soil [mg/kg]
TR	=	Target risk or the increased chance of developing cancer over a lifetime due to exposure to a chemical [-]
THQ	=	Target hazard quotient for individual constituents [-]
BW	=	Body weight [kg]
AT_c	=	Averaging time for carcinogens [year]
AT_{nc}	=	Averaging time for non-carcinogens [year]
ED	=	Exposure duration [year]
EF	=	Exposure frequency [day/year]
SA_{soil}	=	Skin surface area available for contact with soil [cm^2]
EV_{soil}	=	Event frequency [event/day]
AF	=	Soil to skin adherence factor [mg/cm^2-event]
RAF_d	=	Chemical-specific dermal relative absorption factor [-]
SF_d	=	Dermal cancer slope factor [$(mg/kg\text{-}day)^{-1}$]
RfD_d	=	Chemical-specific oral reference dose [mg/kg-day]
365	=	Converts AT_c, AT_{nc} in years to days [day/year]

DERMAL CONTACT WITH CHEMICALS IN GROUNDWATER

Carcinogenic effects

$$RBTL_{dw} = \frac{TR \times BW \times AT_c \times 365 \times 1000}{SF_d \times SA_{gw} \times EV_{gw} \times Z \times EF \times ED}$$

Non-carcinogenic effects

$$RBTL_{dw} = \frac{THQ \times BW \times AT_{nc} \times 365 \times 1000 \times RfD_d}{SA_{gw} \times EV_{gw} \times Z \times EF \times ED}$$

For organic chemicals,

If $t_{event} < t^*$, then $Z = 2 \times FA \times K_p \sqrt{6\tau_{event} \frac{t_{event}}{\pi}}$

If $t_{event} > t^*$, then $Z = FA \times K_p \left[\frac{t_{event}}{1+B} + 2\tau_{event} \left(\frac{1+3B+3B^2}{(1+B)^2} \right) \right]$

For inorganic chemicals, $Z = K_p \times t_{event}$

where:

$RBTL_{dw}$	= Risk-based target level for dermal contact with groundwater [mg/L]
TR	= Target risk or the increased chance of developing cancer over a lifetime due to exposure to a chemical [-]
THQ	= Target hazard quotient for individual constituents [-]
BW	= Body weight [kg]
AT_c	= Averaging time for carcinogens[year]
AT_{nc}	= Averaging time for non-carcinogens[year]
SA_{gw}	= Skin surface area available for contact with water [cm^2]
EV_{gw}	= Event frequency [event/day]
ED	= Exposure duration [year]
EF	= Exposure frequency [day/year]
RfD_d	= Chemical-specific dermal reference dose [mg/kg-day]
SF_d	= Chemical-specific dermal cancer slope or potency factor $[mg/(kg\text{-}day)]^{-1}$
365	= Converts AT_c, AT_{nc} in years to days [day/year]
1000	= Conversion factor from cm^3 to L [cm^3/L]
t_{event}	= Event duration [hr/event]
t^*	= Chemical-specific time to reach steady-state [hr]
Z	= Chemical-specific dermal factor [cm/event]
K_p	= Chemical-specific dermal permeability coefficient [cm/hr]
FA	= Chemical-specific fraction absorbed in water [-]
τ_{event}	= Chemical-specific lag time [hr/event]
B	= Chemical-specific relative contribution of permeability coefficient [-]

DERMAL CONTACT WITH CHEMICALS IN GROUNDWATER

$$B = K_P \frac{\sqrt{MW}}{2.6}$$

$$\log K_P = -2.80 + 0.66 \log K_{OW} - 0.0056MW$$

If B<0.6 or B=0.6, then, $t^* = 2.4\tau_{event}$

If B>0.6 then, $t^* = 6\tau_{event} \times (b - \sqrt{b^2 - c^2})$

where,

$$c = \frac{1 + 3B + 3B^2}{3(1+B)}$$

$$b = 2 \times \frac{(1+B^2)}{\pi} - c$$

$$\tau_{event} = 0.105 \times 10^{(0.0056MW)}$$

Source: Modified from RAGS, Vol. I, Part E, 2004.

where:

MW = Molecular weight [g/mole]
K_{ow} = Octanol water partition coefficient [L/kg]

Handout 5

Tier 1 Risk-Based Target Levels for Incidental Dermal Contact with Water

MRBCA Technical Guidance

Chemical	CAS #	Tier 1 Risk-Based Target Levels for Incidental Dermal Contact with Water by Resident (mg/L)		
		Feb. 2005	RAGS Part E	Ratio of RAGS Part E/Feb. 2005
Carbon tetrachloride	56-23-5	1.06E-01	4.69E-02	0.44
cis-1,2-Dichloroethylene	156-59-2	4.82E+00	4.22E+00	0.88
1,4-Dioxane	123-91-1	6.07E+01	3.93E+01	0.65
Methyl ethyl ketone	78-93-3	2.31E+03	2.27E+03	0.98
Methylene chloride	75-09-2	8.40E+00	5.54E+00	0.66
Tetrachloroethylene	127-18-4	1.28E-01	5.26E-02	0.41
1,1,1-Trichloroethane	71-55-6	7.95E+01	5.64E+01	0.71
Trichloroethylene	79-01-6	1.41E+00	7.22E-01	0.51
Vinyl chloride	75-01-4	2.81E-02	2.06E-02	0.73
Pentachlorophenol	87-86-5	4.71E-03	1.12E-03	0.24
PCBs	1336-36-3	3.24E-04	6.34E-05	0.20
Atrazine	1912-24-9	1.34E-01	4.23E-02	0.31
Chlordane	12789-03-6	3.45E-03	5.91E-04	0.17
DDT	50-29-3	2.40E-03	4.14E-04	0.17
Mercury	7439-97-6	NA	NA	NA
Cyanide	57-12-5	7.39E+01	1.12E+02	1.51
Minimum				**0.17**
Maximum				**1.51**
Average				**0.57**

Note:

NA: Not available

Ratio less than 1 implies that Tier 1 RBTLs using RAGS Part E are smaller than Tier 1 RBTLs in Feb. 2005 Draft MRBCA Technical Guidance.

Ratio greater than 1 implies that Tier 1 RBTLs using RAGS Part E are higher than Tier 1 RBTLs in Feb. 2005 Draft MRBCA Technical Guidance.

Handout 6

Tier 1 Risk-Based Target Levels for Combined Pathway from Soil by Construction Worker

MRBCA Technical Guidance

Chemical	CAS #	Tier 1 Risk-Based Target Levels for Combined Pathway from Soil by Construction Worker (mg/kg)		
		Feb. 2005 Inhalation Rate = 0.833 m^3/hr	Alternate Inhalation Rate = 1.8 m^3/hr	Ratio
Carbon tetrachloride	56-23-5	8.54E+01	4.55E+01	0.53
cis-1,2-Dichloroethylene	156-59-2	1.28E+02	6.01E+01	0.47
1,4-Dioxane	123-91-1	3.59E+03	1.77E+03	0.49
Methyl ethyl ketone	78-93-3	5.98E+04	3.10E+04	0.52
Methylene chloride	75-09-2	1.16E+03	5.46E+02	0.47
Tetrachloroethylene	127-18-4	7.55E+02	3.72E+02	0.49
1,1,1-Trichloroethane	71-55-6	6.30E+03	2.99E+03	0.47
Trichloroethylene	79-01-6	1.47E+03	6.99E+02	0.48
Vinyl chloride	75-01-4	7.61E+01	4.22E+01	0.55
Pentachlorophenol	87-86-5	1.30E+03	1.30E+03	1.00
PCBs	1336-36-3	1.28E+02	1.25E+02	0.98
Atrazine	1912-24-9	1.51E+03	1.51E+03	1.00
Chlordane	12789-03-6	2.29E+02	2.10E+02	0.92
DDT	50-29-3	2.48E+02	2.48E+02	1.00
Mercury	7439-97-6	8.23E-01	3.81E-01	0.46
Cyanide	57-12-5	9.93E+03	9.93E+03	1.00

Note:

NA: Not available

Ratio less than 1 implies that Tier 1 RBTLs using alternate inhalation rate are smaller than Tier 1 RBTLs in Feb. 2005 Draft MRBCA Technical Guidance.

Ratio greater than 1 implies that Tier 1 RBTLs using alternate inhalation rate are higher than Tier 1 RBTLs in Feb. 2005 Draft MRBCA Technical Guidance.