

CONCISE EXPLANATORY STATEMENT

for the
Amendments
to the
Model Toxics Control Act
Cleanup Regulation
Chapter 173-340 WAC

Appendix D

Calculations for Method A Cleanup Levels

DEPARTMENT OF ECOLOGY

February 9, 2001

TO:

Interested Persons

FROM:

Pete Kmet, Senior Environmental Engineer

Toxics Cleanup Program

SUBJECT:

Calculations for Table 720-1

Method A Ground Water Cleanup Levels

Attached are several spreadsheets providing background information leading to the Method A ground water cleanup levels in Table 720-1. These tables include:

Table 1:

A "quick summary" illustrating the current Method A ground water cleanup levels, proposed ground water cleanup levels and a brief explanation of the reasoning for the new Method A values. The values that are proposed to be changed are highlighted with boxes.

Table 2:

A detailed compilation of the information considered in the development of the Method A ground water cleanup levels. This includes: The current federal or state drinking water standard (MCL), the Method B drinking water value for each substance (both as a carcinogen and noncarcinogen), the practical quantitation limit, the pure substance solubility limit, and other relevant information such as natural background and odor thresholds, where available.

Table 3:

Provides the assumptions used in calculating the Method B drinking water values for noncarcinogens.

Table 4:

Provides the assumptions used in calculating the Method B drinking water values for carcinogens.

720h cover.doc

				V		1
		*				
						ļ
				•		
						İ
•						
						1
						3
	•					
				•		
				•		
						1
						İ
						ļ
						ı

Table 1: Quick Summary - Basis for Method A Groundwater Table Values

Parameter	CAS No.	Current Method A	άΣ	Basis for
		non.	Įôn	Cleanup Level
Arsenic Benzene	7440-38-2	2	2	Natr'l bkgdMCL exceeds allowable risk.
		,	n	ואנרי
Senzo(a)Pyrene. Cadmium	50-32-8 7440-43-9	none 5	0.1 5	MCL. adjusted to 1 X 10-5 risk. This can also be used as the total toxic equivalents for all cPAHs. See WAC 173-340-708(8).
T Chromium	1, 0, 1			
Ohromium VI	18540-27-3	22	20	Method B-based on Chromium VI. If just Or (III) is present, can use 100 und
Chromium III	16065-83-1	none	none	'In an
DOT	0000			
1,2 Dichloroethane	30-23-3 107-06-2	0.1	5.3	Method B (current Method A value appears to be in error)
Ethylbenzene	100.41.4	6	T	***
Ethylene dibromide (EDB)	106-93-4	0:01	0.0	MCL Method B adjusted to PQL-MCL exceeds allowable risk.
Lead	7439-92-1	5		MCL
Lindane	58-89-9	0.2	0.2	MCL
Methylene chloride	75-09-2	۲.	T	N.
Mercury (inorganic)	7439-97-6	2	2 0	MCI.
MTBE	100101			
Naphthalenes	91-20-3	none	8 2	Lower limit of EPA Advisory level Method B for naphthalene. This is a total of all naphthalene 1-Method Parthylogog 9 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
PAHs(carcinogenic)(1)		,	٦	month individual to the many individual to the matter.
PCB mixtures	na 1336-36-3	0.1	0.1	Replaced by Benzo(a)Pyrene, above. Method B adjusted to POL (MC) expends MTCA allowable to POL (MC) expends MTCA allowable to POL (MC).
				This is a total for all PCBs.
l erachioroemylene (PCE) Toluene	127-18-4 108-88-3	ა 40	1000	MCI. MCI.
TDL (total)			Г	
(ional)	14280-30-9	1,000	none	Replaced with TPH for specific products.
Gasoline GRO w/o benzene GRO with benzene	6842-59-6		1,000	Equation 720-3, assuming no benzene is present in gasoline contaminated water.
Desei Heavy Oils Electrical Insulating Oil				Equation 720-3. Equation 720-3.
		-	T	17.00.0 / T.D.O.
1,1,1 Trichloroethane Trichloroethylene	71-55-6 79-01-6	200	200 IV	MCL.
The state of the s			T	
Xylene (total)	75-01-4 1330-20-7	22 02	0.2 1000	MCL adjusted to 1 X 10-5 risk. Not to exceed total TPH for gasoline & aesthetic considerations (odor)
Gross Alpha Particle Act		15 pCi/l	15 DC// W	J.W.
Gross Beta Particle Act.				MCL (4 mrem/yr equals 50 pCi/l)
Radium 226 & 228 Radium 226		5 pCi/l	S PCI/I	MC.
		2 PCW	5	7.

. 0

Basis for Method A Ground Water Table Values	Water Table Vali	nes						
					MTCA		Solubility	
Farameter	CAS No.	ਲੂ V	Method B	Method B	Risk @ MCL	Pol	Limit	Other
	- 1	ug/l (1)	Carc. ug/l (2)	NonC.ug/l (3)	HO @ MCL (4)	ng/l (5)	(9) J/gn	-
Arsenic	7440-38-2	ሜ	0.058	4.8	8.6×10-4/10	2 (SW7060)		TO THE PROPERTY OF THE PROPERT
Benzene	71-43-2	S	1.5	24	3.3X10-6/0.21	1 (SW8260B)	1,750,000	1,100 (odor)
Benzo(a)Pyrene	50-32-8	0.2	0.012		1.7X10-5	O O SWR270C SIM	18	
Cadmium	7440-43-9	5		8.0	0.62	0.1 (SW7131)	2.	The state of the s
T Chromium	7440-47-3	8			2.1	-5 (SM/6010A)		and the state of t
Chromium VI	18540-29-9	none		84		2 (SW719E)		
Chromium III	16065-83-1	none		24,000		5 (SW6010A)		
рот	50-29-3	none	0.26	8.0		0.1 (SW8081)	25	
1,2 Dichloroethane	107-06-2	2	0.48		1X10-5	1 (SW8260B)	8,520,000	- Address - Addr
Ethylbenzene	100-41-4	700		800	0.88	1 (SWR260B)	169 000	120 (2007)
Ethylene dibromide (EDB)	106-93-4	0.05	0.00051		9.7X10-5	0.01 (EPA504.1)	4.000.000	(2000)
Lead	7439-92-1	zero/15				O (CIAPAOA)		100
Lindane	58-89-9	0.2	0.067	48	3X10.6/0 04	0.1 (EDAE04.1)	000 3	S (natr I bkgd)
Mothylone chieside	0.00				10000000	(1.400-1)	0,000	
Mediylerie Cilioride	75-09-5	2	5.8	480	8.6X10-7/0.1	1 (SW8260B)	13,000,000	And the state of t
welculy (morganic)	438-87-6	7		4.8	0.4	0.1 (SW7470)		Address of the second s
MTBE	1634-04-4	20-40				1 (SW8260B)	50.000.000	5 - 40 (odor)
Naphthalene	91-20-3	попе		160		1 (SW8260B) (10)	31,000	15 (odor)
PAHs(carcinogenic)(8)	na	0.2	0.012		1.7X10-5	0.02 (SW8270C SIM)	4	
PCB mixtures(9)	1336-36-3	0.5	0.044	0.32	1.14X10-5/1.6	0.1 (SW8082)	12 to 57	
(1) Maximum contaminant level from 40 CFR 141.61 and WAC 246-290-310 except for lead and MTBE. MTBE is an FPA Advisory range	from 40 CFR 14	11.61 and W/	AC 246-290-310	except for lead ar	MTBE MTBE is	n FPA Advisony range		
Lead is the MCL goal of zero and the EPA action level from 40 CFR 141.80 for which no more than 10% of samples can exceed at the tan	nd the EPA actio	n level from	40 CFR 141.80 f	or which no more	than 10% of sample	s can exceed at the tan		The second secon
(2) Value calculated using equation 720-2 and cancer potency factor from IRIS or HEAST	ation 720-2 and c	ancer poten	by factor from IR	IS or HEAST.				
(3) Value calculated using equation 720-1 and reference dose from IRIS or HEAST [Except for benzene which uses a Rid from the NCEA]	ation 720-1 and r	eference dos	e from IRIS or H	EAST [Except for	benzene which uses	a Rid from the NCEAL		
(4) Risk posed by MCL, calculated using equations 720-1 and 720-2. Non carcinogen related values are highlighted with bolding.	ted using equation	ons 720-1 an	d 720-2. Non ca	arcinogen related	values are highlighte	d with bolding.		the state of the s
(5) From Manchester Laboratory.	ż							The state of the s
(6) Source: EPA Soil Screening Guidance: Technical Background Document.	Guidance: Tech	ınical Backgr	ound Document	. EPA/540/R-95/1	EPA/540/R-95/12B. May, 1996, except EDB and PCB's	ept EDB and PCB's		
from ATSDR Toxicological Profiles; and, MTBE from USGS final draft report on	iles; and, MTBE	from USGS	final draft report	on fuel oxygenate	fuel oxygenates, March, 1996			The state of the s
(7) Odor threshold is median of values reported in literature. Background values	values reported	in literature.	Background valu	ses for As and Pb	from PTI, 1989.			The state of the s
(8) The cPAH values shown are based on benzo(a)pyrene.	e based on benzo	o(a)pyrene.		j'				
(3) For FCDS, the honcardhogenic risk is based on the Hid for Arochlor 1254.	enic risk is based	on the Htd 1	or Arochlor 1254		ic risk is based on th	The carcinogenic risk is based on the most potent CPF in IRIS.	IS.	
(10) Use SW 62/UC to measur	e all three types	of naphthaler	le.					the state of the s

	70%. A. W.
	•
	,

met 2/9/01	
ared by P. K	
Prep	

Basis for Method A Ground Water Table Values	Water Table Val	san							
					MTCA		Solubility		П
Parameter	CAS No.	MCL	Method B	Method B	Risk @ MCL	PQL	Limit	Other	Τ
			(2)	NonC.ug/l (3)	HQ @ MCL (4)	ug/l (5)		(<u>/</u>) //bn	Π
Tetrachloroethylene (PCE)	127-18-4	5	0.86	80	5.8X10-6/0.06	1 (SW8260R)	T		
Toluene	108-88-3	1,000		1,600	0.62	1 (SW8260B)	526,000	500 (odor)	T
TPH (total)	14280-30-9	none				,			
Gasoline	6842-59-6	agou				A CONTRACTOR			
GRO w/o benzene	33	2		1 000		(XD-H-H-NN) OCZ	~100,000	340 (odor)	1
GRO with benzene				800				The particular and the second	Ţ
Diesel		none		200		250 (NWTPH-Gx)	<1 000-5 000	200 (2002)	Т
Heavy Oils		none		200		500 (NWTPH-Dx)	<1,000-6,300	500 (000)	T
Electrical Insulating Oil		none		200		500 (NWTPH-Dx)	-1,000-1,700	2.500 (odor)	T
									П
1.1.1 Trichloroethane	71.55.6	000		0001	0000				
Fichiomothydono	200	3 1		יאטי	0.028	1 (SW8260B)	1,330,000		
Vinyl Chlorida	75.04.4	n c	4.0		1.3X10-6	1 (SW8260B)	1,100,000	The state of the s	
Adam (total)	4-10-C/	7	0.023		8.7X10-5	0.01 (SW8260B SIM)	2,760,000		Π
Aylerie (wai)	1330-50-7	10,000		16,000	0.62	3 (SW8260B)	176,000	760 (odor)	Π
Gross Alpha Particle Act.		15 pCi/l				4 nCiA		A 11 11 11 11 11 11 11 11 11 11 11 11 11	
Gross Beta Particle Act.		4 mrem/vr				and t		U.25-3 PCW (natr'l bkgd)	П
Radium 226 & 228		5 pCi//				1 DOM -		3-9 pCi/l (natr'l bkgd)	Т
Radium 226		700				טיביטי איטיביט		0.3 pCi/l (natr'l bkgd)	7
		2000				,		<0.3 pCi/l (natr'l bkgd)	П
(1) Maximum contaminant level from 40 CFR 141.61 and WAC 246-290-310.	from 40 CFR 14	41.61 and W/	\C 246-290-310.						7
(2) Value calculated using equation 720-2 and cancer potency factor from IRIS or HEAST.	tion 720-2 and c	ancer potenc	y factor from IRI	S or HEAST.					7
(3) Value calculated using equation 720-1 and reference dose from IRIS or HEAST. Basis for TPH values is characterin a May 18, 1999 memory stands basis	tion 720-1 and R	reference dos	e from IRIS or H	EAST. Basis for	TPH values is docum	nented in a May 18, 100	O momo hy Story D	440	T
Gasoline whenzene: Based on equation 720-3 using dissolved phase composition derived with 4 phase model adjusted for benzene being present at the MCL of 5 ppg	n equation 720-3	S using dissolv	ved phase comp	ostion derived wit	h 4 phase model adi	usted for benzene being	n present at the MCI	of 5 PPR	1
Gasoline w/o benzene: Based on equation 720-3 using dissolved phase composition derived with 4 phase model and assuming no benzene is present in water.	on equation 720	1-3 using diss	olved phase corr	position derived	with 4 phase model a	ind assuming no benzer	ne is present in wate		Т
Diesei: Based on equation 720-3 using dissolved phase compostion derived with 4 phase model and in water/diesel partitioning experiment.	-3 using dissolve	ed phase con	postion derived	with 4 phase mox	del and in water/dies	el partitioning experimer	ut.		Τ
Heavy Cil. Based on equation 720-3 using dissolved phase composition derived with 4 phase model and in water/diesel partitioning experiment.	720-3 using diss	solved phase	compostion deriv	ved with 4 phase	model and in water/o	lesel partitioning experi	ment	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	Ţ
will read on: based on equation /20-3 tising dissolved phase composition derived with 4 phase model and in water/mineral oil partitioning experiment.	/zv-3 using diss	solved phase	compostion den	ved with 4 phase	model and in water/i	mineral oil partitioning ex	xperiment.		Ι
For its pose by Mich. Carculated Using equations 720-1 and 720-2. Non carcinogen related values are highlighted with bolding.	red using equation	ons 720-1 an	d 720-2. Non ca	rcinogen related	values are highlighte	d with bolding.			Π
(S) Commercial Indianal Discourse of Landing Control of Commercial Control of Commercial Control of Commercial Control of	oratory, except r.	adionuclides	Trom Ecology's !	Nuclear Waste Pri	ogram.			The state of the s	
(v) Source: Er A Sul Screenling Guidance: Lechnical Background Document. EPA/540/R-95/12B. May, 1996, except TPH from various sources.	p wiene based	nnicai Backgr	ound Document	EPA/540/R-95/	(2B. May, 1996, exc	ept TPH from various so		The value for total xylenes	
(7) Odor threshold is median of values reported in literature. Background for radionicides from Ecolomics Nuclear Wash Background	values reported	in literature	Background for	radioningides from	n Ecologica Miclear	0i. 2 (May, 1998). Worth Drogon			Т
					manner of Change	Table 1 ogsmin		The Advisoration of the Artist Control of th	٦

			1		
					,
				•	ļ
					į
					,
			•		Ì
					ì
				i	-
					}
•					
•					
					ļ
					İ
					ļ
			÷		-
					ļ
	•				

Table 2: Summary Table for Method A Ground Water Values in Table 720-1

	Current	Proposed	Basis for
Parameter	Method A	Method A	Proposed
	l/gu	l∕gu.	
Arsenic	5	5	ktoka karangan kanangan kanangan pengangan mengangan kanangan kanangan mengangan pengangan pengangan pengangan Natri bkod-MCL exceeds allowahie risk
Benzene	5	S	MCL
Benzo(a)Pyrene	none	0.1	Method B cleanup level for B(a)P. The total toxic equivalents of all cPAHs cannot exceed this value. See WAC 172, 240, 708/11
Cadmium	5	5	MCL
T Chromium	20	05	Method B-based on Chromium VI.
Chromium VI	none	none	
Chromium III	none	none	
рот	0.1	0.3	Method B (current Method A value appears to be in error)
1,2 Dichloroethane	£		WCL
Ethylbenzene	8		MC_
Ethylene dibromide (EDB)	0.01	0.01	Method B adjusted to PQLMCL exceeds allowable risk.
Lead	5	15	WC.
Lindane	0.2	0.2	MC
Methylene chloride	5	5	WCL
Mercury (inorganic)	2		WCT
MTBE	none	8	Lower limit of EPA Advisory level
Naphthalene(s)	none	160	Method B for naphthalene. This is a total of all naphthalene, 1-Methyl naphthalene & 2-Methyl Naphthalene in the water.
PAHs (carcinogenic)	0.1	none	Replaced by Benzo(a)Pyrene, above,
PCB mixtures	0.1	0.1	Method B adjusted to POL (MCL exceeds MTCA allowable HQ and cancer risk). This is a total for all PCBs.
			The state of the s
1,			
	-		
The state of the s			

Prepared by P. Kmet 2/9/01

			·
•			
	·		
			, many

Table 2: Summary Table for Method A Ground Water Values in Table 720-1

	Without William		
	Current	Proposed	
Parameter	Method A	Method A	Datas of Parameter Datas of Para
the country in the control of the country of the co	ľgn	₩	Cleanup Level
Tetrachioroethylene (PCE) 5	5	5	WC.
Toluene	5		MCL
TPH (total)	1,000	none	Replaced with TPH for specific products.
Gaeolina			
GRO w/o benzene		1 000	Enistion 730.9
GRO with benzene		-	Equation 720-3
Diesel			Equation 720-3.
Heavy Oils		ļ	Equation 720-3.
Electrical Insulating Oil		Ы	Equation 720-3.
A 4 4 1 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1			
1,1,1 Inchioroemane	200	200	MCL
I nchloroethylene	5	5	WCL
Vinyl Chlonde	0.2	0.2	MCL adjusted to 1 X 10-5 risk.
Xylene (total)	ଷ	1,000	Not to exceed maximum allowable total TPH for gasoline & aesthetic considerations (odor). This is the total of m, o & p xylenes.
Gross Alpha Particle Act	15 pCi/	15 00:1	MA The constraint and a second and the second and t
Gross Beta Particle Act	4 mrem/vr	4 mrom/rr	W.C. It is anicipated ranol tucide creatury standards will be subject to future review.]
Radium 226 & 228	5 pCi/l	5 001	5 DOM MCI
Radium 226	3 pCi/l	3 рСіл	MCL.
		j	

Prepared by P. Kmet 2/9/01

		HARMOND TO THE PARTY TO SALES AND THE SALES
		A.A. M. A.A. M
		, , , , , , , , , , , , , , , , , , , ,

		Tark Art.

Risk Calculations-Noncarcinogenic Effects of Drinking Water Ingestion	nogenic Effect	s of Drinking W	ater Ingestio	5							
		Reference	Avg. Body	Unit Conv.	Hazard	Drinking H2O	Inhalation	Drinking H2O	Method B	MCI (3)	@ CH
Parameter	CAS No.	Dose (1)	Weight	Factor	Quotient	Ing. Rate	Corr. Factor	Fraction	Noncarc(2)	וווסבונס)	MCI (A)
		(mg/kg-day)	(kg)	(bш/bn)	(sseltiun)	(liter/day)	(mittess)		(//Gn)	(y6n)	(unitless)
Arsenic	7440-38-2	0.0003	16	1,000		1.0	-	10	α,	Ç	Ç
Benzene	71-43-2	0.003	16	1,000	-	1.0	2	1.0	24	3 2	0.2
Cadmium	7440-43-9	0.0005	16	1,000		1.0	,	1.0	8.0	5	0.6
T Chromium	7440-47-3	not available								5	
Chromium III	16065-83-1	1.5	16	1.000		10	-	O F	24,000	3	
Ohromium Vi	18540-29-9	0.003	16	1,000	-	1.0		0.1	24,000	none	
DDT	50-29-3	0.0005	16	1,000	-	1.0	-	10	08	0000	
1,2 Dichloroethane	107-06-2	not available								2 2	
Ethylbenzene	100-41-4	0.1	16	1,000	-	1.0	2	1.0	800	700	60
Emylene dibromide (EDB)	106-93-4	not available								0.05	
Lead	7439-92-1	not available								70th / 15	
Lindane	58-89-9	0.0003	16	1,000	-	1.0	1	1.0	4.8	0.2	0.04
Methylene chloride	75-09-2	90.0	16	1,000	-	1.0	2	1.0	480	5	0.01
Mercury (inorganic)	7439-97-6	0.0003	16 ′	1,000	-	1.0	1	1.0	4.8	2	0.4
MTBE	1634-04-4	not available								00,00	
Naphthalene	91-20-3	0.02	16	1,000	-	1.0	2	1.0	160	04-02 0000	
cPAH Mixtures	na	not available									
Benzo[a]anthracene	56-55-3	not available									
Benzo[b]fluoranthene	205-99-2	not available									
Benzo[k]fluoranthene	207-08-9	not available									
Benzo[a]pyrene	50-32-8	not available								0.2	
Chrysene	218-01-9	not available									
Dibenzo[a,h]anthracene	53-70-3	not available									
Ideno[1,2,3-cd]pyrene	207-08-9	not available									
(1) Source of RfDs is EPA's IRIS database except for benzene which	IS database exc	pept for benzene		s from EPA's NCEA	Ä		-				
(2) Value calculated using equation 720-1 and default assumptions in	ation 720-1 and	default assumpt	tions in that e	that equation.							
(3) Maximum contaminant level from 40 CFR 141.61 and WAC 246-290-310. Except for MTBE which is not an MCL but the EPA Advisory range.	from 40 CFR 1	141.61 and WAC	, 246-290-31(Except for	MTBE which	th is not an MCL	. but the EPA A	dvisory range.			
For lead, this is the MCL goal of zero and an EPA action level from 40	of zero and an E	PA action level		141.80, for w	thich no mo	re than 10% of 1	water samples o	CFR 141.80, for which no more than 10% of water samples can exceed at the tap.	e tap.		
(4) MCL divided by Method B value. Bolded values indicate MCL exceeds MTCA requirement that HQ not exceed 1.0.	ralue. Bolded v.	alues indicate M	CL exceeds I	MTCA require	ment that F	IQ not exceed 1	.0.				

		•		
				iww.

Table 3: Drinking Water - Method B Calculations for Noncarcinogens

The second secon			ater Indestion				_				
				-							
		Reference	Avg. Body	Unit Conv.	Hazard	Drinking H20	Inhalation	Drinking H2O	Mothod B	(6) 1014	
Parameter	CAS No.	Dose (1)	Weight	Factor	Quotient	Ing. Rate	Corr. Factor	Fraction	Noncarc(9)	INICE(S)	
		(mg/kg-day)	(kg)	(Bш/Bn)	(unitless)	(liter/day)	(mittess)	(unitless)	(na/l)	(/bri)	(Initless)
	1336-36-3	not available		_		_			, <u>S</u>		
High Risk & Persistence		not available								0.5	
Low Risk & Persistence	·	not available									
Lowest Risk & Persistence		not available									
	12674-11-2	0.00007	16	1.000	-	10	+	10	,		
	12672-29-6 n	not available					•	2		C.O.	0.4
	11097-69-1	0.00002	16	1,000	-	10	-	C	000	ı	,
Arochlor 1260		not available				2	-	2:	0.32	0.5	9.1
Tetrachloroethylene (PCE)	127-18-4	0.01	16	1 000	+	0					
	108-88-3	250	2 4	200	- -	0.7	7	0.1	80	5	0.1
		7:0	2	000,	-	O	N	1.0	1,600	1,000	9.0
ane	71-55-6	6.0	16	1,000	-	1.0	2	10	7 200	000	000
Inchloroethylene	79-01-6	not available				-		2:	202,1	200	0.00
Vinyl Chloride	75-01-4	oldelieve ton								0	
	1	nor available						***		2	
	1330-20-7	2.0	16	1,000	-	1.0	0	10	7000	000	
m-Xylene	108-38-3	not available)	J	2	000,01	10,000	9.0
	95-47-6	not available									
p-xylene		not available									
Gross Alpha Particle Act.		not available									
Gross Beta Particle Act.		not available								15 PC//	
Radium 226 & 228		not available								4 mremyr	
Radium 226		not available								o bow	
(1) (1) (1) (1) (1) (1) (1) (1) (1) (1)				-						2000	
(1) Source of RfDs is EPA's IRIS database except for 1,1,1 TCE, which is from HEAST	atabase exce	pt for 1,1,1 TCI	=, which is fro	m HEAST						-	
(2) Value calculated using equation 720-1 and default assumptions in	ั 720-1 and d	efault assumpti	ons in that ec	that equation.				,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,			
(3) Maximum contaminant level from 40 CFR 141.61 and WAC 246-290-310	m 40 CFR 14	1.61 and WAC	246-290-310								<u> </u>
[(4) MCL divided by Method B value. Bolded values indicate MCL exceeds MTCA requirement that HQ not exceed 1.0.	Bolded valt	ues indicate MC	SL exceeds M	TCA requirer	nent that H	2 not exceed 1.	Ö.				

		Permanen
·		,
		Timorei
		700

						-							
rish calculations-Carcinogenic Effects of Drinking Water Ing.	genic Effec	ts of Drinki	ng Water In	gestion									
						Cancer							
Description		Risk	Avg. Body	Lifetime	Unit Conv.	Potency	Drinking H ₂ O	Duration	Inhalation	Drinking H.O	Method B	(6)	€ 76:0
rarameter	CAS No.		Weight		Factor	Factor	Ing. Rate	of Exposure	10	Fraction	Mediod D	NCE(S)	LISK @
		(conitiess)	ر(kg) ((years)	(gm/gu)	(kg-day/mg)	(liter/day)	(years)		(unitless)	(lin/l)	(July)	MCL(4)
Arsenic		7440-38-2 0.000001	2	75	8		00	6	•				3
Benzene	71-43-2		70	75	1,000	0.029	2.0	30	- ~	1.0	0.058	50	857
Cadmium	7440-43-9					not available				2	16:1	n	, n
T Chromium	7440-47-3											ç	
Chromium III	16065-83-1					of available						100	
Chromium VI	18540-29-9	6				not available						none	
рот	50-29-3	0.000001	20	75	1.000	0.34	0.6	08	,			none	
1,2 Dichloroethane	107-06-2	0.00001	70	75	1,000	0.091	2.0	8 8	- 0	0.0	0.26	non	
Ethylbenzene	100-41-4					1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1			7	2:	0.48	S.	10
Ethylene dibromide (EDB)	106-93-4	0,000001	70	75	1 000	not available	000				cosco	700	
Lead	7,400,004				33,1	3	2.0	30	7	1.0	0.00051	0.05	97
Lindane	78-80-92-1	20000	Î	į		not available						zero / 15	
	6-60-00	0.0000.0	0/	2)	90	1.3	2.0	30	1	1.0	0.067	0.2	3.0
Methylene chloride	75-09-2	0.000001	70	75	1,000	0.0075	2.0	30	6	0	1		
Mercury (inorganic)	7439-97-6					not available			3	5.	0.0	2	0.9
MTBE	1634-04-4					not a milable						7	
Naphthalene	91-20-3		-			not available						20-40	
CPAH Mixtures	ŝ					ior available						none	
Benzolalanthracene	11a												
Benzolhiftioranthene	200					not available							
Benzolkifuoranthene	207-08-9					not available							
Benzo[a]pyrene	50-32-8	0.000001	70	75	000	not available	o o	-					
Chrysene	218-01-9				T	not available	7.7	6	-	1.0	0.012	0.2	17
Dibenzo[a,h]anthracene	53-70-3	٠				not available							
Ideno 1,2,3-cd]pyrene	207-08-9					not available							
77444													
(1) Source of Cancer Potency Factor is the oral slope factors from E	Factor is the	oral slope	factors from	EPA's IR	IS databas	PA's IRIS database, except for Lindane which is from HEAST	indane which i	s from HEAS					
(2) Value calculated using equation 720-2 and default assumptions in that equation	uation 720-2	and default	assumption	s in that e	quation.								
(s) Maximum contaminant level from 40 CFR 141.61 & 141.62 and	el from 40 C	FR 141.61 &	₹ 141.62 and	1 WAC 24	6-290-310	WAC 246-290-310 except for lead and MTBE. MTBE is an EPA Advisory range.	and MTBE.	MTBE is an El	PA Advisory r	ande.			
(1) Lead is the interpretation of Zelo and the EPA action level from 40 CFR 141.80 for which no more than 10% of samples can exceed at the tab	ero and the t	-PA action I	evel from 40	OFR 141	.80 for which	ch no more tha	in 10% of sam	ples can exce	ed at the tab.				
(*) MCL united by Method B Value. Bolded values indicate MCL greater than MTCA acceptable risk of 1X10-5 [i.e. >10]	Value. Bolde	ed values in	dicate MCL	greater th	an MTCA a	coeptable risk	of 1X10-5 [i.e.	.>10].					
The state of the s								,					

· ·						
(
		·				20
			·			7000
		·				
	,					
				·		

Hisk Calculations-Carcinogenic Effects of Drinking Water Ingestion	genic Effects	of Drinki	ng Water Ir	gestion									
						Cancer							
		Risk	Avg. Body L		fetime Unit Conv.	Potency	Drinking H2O	Duration	Inhalation	Orinking Loo	Notherd D	(0)	
Parameter	CAS No.		Weight		Factor	Factor	Ing. Rate	of Exposure	C	Fraction	Wietriod B	MCL(3)	S S
		(nuitless)	(kg)	(years)	(gm/gu)	(kg-day/mg)	(liter/day)	(vears)		(uniffeed)	Valcinogen (Ital)	(020)	MCL(4)
PCB mixtures	1336-36-3				_		_					(65)	(SS)
High Risk & Persistence		0.00001	70	75	1.000	00	0.0	08		,		0.5	
Low Risk & Persistence		0.000001	2	75	1 000	70	0.0	8 8	_	0.[0.044	0.5	=
Lowest Risk & Persistence		0.000001	70	75	1 000	20.0	0.0	8	_ -	0,1	0.22	0.5	2.3
Arodor 1016	12674-11-2					oldelieve ton	0.2	25		1.0	1.25	0.5	0.40
Arochlor 1248	12672-29-6	-				not available						0.5	
Arochlor 1254	11097-69-1	-				not available							
Arochlor 1260						not available						0.5	
						II OCCUPATION				***	6600	•	
Letrachioroethylene (PCE)	127-18-4	0.000001	2	75	1,000	0.051	2.0	30	2	10	98.0	u	6
al anelle	108-88-3					not available					8	200	0
1,1,1 Trichloroethane	71-55-6					ot official						000,1	
Trichloroethylene	79-01-6	0 000001	22	. 32	000	ilot available					****	500	
		0.000	2	0/	00.	רנטים	2.0	30	2	1.0	4.0	w	6.
Vinyl Chloride	75-01-4	0.000001	70	7.5	1,000	1.9	2.0	8	2	10	0 003	,	0.7
Xylenes	1330-20-7					not or mileble					0.020	2	6
m-Xylene	108-38-3					not available						10,000	
o-xylene	95-47-6					not available					****		
p-xylene						not available							
Gross Alpha Particle Act						and and and and and and and and and and					***		
Gross Beta Particle Act						not available					****	15 pCi/l	
Radium 226 & 228						not available				•	****	4 mrem/vr	
Badium 226					_	not available						5 pCi/l	
						not available						3 рСіЛ	
(1) Source of Cancer Potency Factor is the oral slope factors from E	Factor is the	oral slope	factors fron	FPA's IR	Special	evoont for t	two of law of the	17.4					
(2) Value calculated using equation 720-2 and default assumptions in that equation	lation 720-2 s	ind default	assumption	is in that e	duation.	', except lot	adacinosoeusy.	ene, urchioro	inylene and v	nyl chloride wh	n that equation.	AST.	
(3) Maximum contaminant level from 40 CFR 141.61 and WAC 246-290-310.	el from 40 CF	R 141.61 a	and WAC 2	16-290-310									
[(4) MCL divided by Method B value. Bolded values indicate MCL greater than MTCA acceptable risk of 1X10-5 [1 e s.10]	value. Bolde	d values in	dicate MCL	greater th	an MTCA a	ceptable risk	of 1X10-5 lie	101					
								2					

	AND COMMERCE OF THE PROPERTY O
	·
-	

	;
	:
	m10 1110 1110 1110 1110 1110 1110 1110
	termina e
	Treatment of the state of the s
•	

DEPARTMENT OF ECOLOGY

February 9, 2001

TO:

Interested Persons

FROM:

Pete Kmet, Senior Environmental Engineer Pkn 4 Toxics Cleanup Program

SUBJECT:

Calculations for Table 740-1; Method A Soil Cleanup Levels

for Unrestricted Land Uses

Attached are several spreadsheets providing background information leading to the Method A soil cleanup levels in Table 740-1. These tables include:

Table 1:

A "quick summary" illustrating the current Method A soil cleanup levels. proposed Method A soil cleanup levels, and a brief explanation of the reasoning for the new Method A values. The values that are proposed to be changed are highlighted with boxes.

Table 2:

A detailed compilation of the information considered in the development of the Method A soil cleanup levels. This includes: The Method B direct contact values for soil ingestion and soil ingestion plus dermal (skin) absorption (for both carcinogenic effects and noncarcinogenic effects), the Method B soil leaching values using the 100 X ground water rule and the proposed 3 and 4 phase models, the proposed terrestrial ecological evaluation values, values from other laws, the practical quantitation limit, natural background, and other relevant information.

Table 3:

Describes the assumptions and equation used to calculate the Method B values assuming soil ingestion (for carcinogens).

Table 4:

Describes the assumptions and equation used to calculate the Method B values assuming soil ingestion (for noncarcinogens).

Table 5:

Describes the assumptions and equation used to calculate the Method B values assuming concurrent soil ingestion plus dermal (skin) absorption (for carcinogens).

Table 6:

Describes the assumptions and equation used to calculate the Method B values assuming concurrent soil ingestion plus dermal (skin) absorption (for noncarcinogens).

Table 7:

Describes the assumptions and equations used to calculate soil concentrations protective of drinking water using the proposed 3 phase leaching model.

Tables 8-12

4-Phase model results summary sheets for 2 brands of fresh gasoline and these same gasolines using various weathered compositions.

740hcover.doc

•			
			[
			}
			(
			1
			Ì
			1
			}
			}
		•	1
			-
		•	{
			ĺ
			1
			}
			\
			}
]
			}
	•		ļ
			ĺ
•			
			1
i			}
			}
			-
			1
			İ
			ĺ

Table 1: Quick Summary - Basis for Method A, Table 740-1, Unrestricted Land Use Soil Values

		Current Method A	Proposed	
Hazardous Substance	CAS Number	Cleanup Level	Cleanup Level	
		mg/kg	mg/kg	Basis for Standard
Arcanic	710000		SA NEW TOTAL SAFETY	
Benzene	7143-2	0.00	8 8	Soil ingestion using equation 740-2, and leaching using 3-phase model, adjusted for natural background (1).
		2	0.03	Protection of drinking water - based on both 3 and 4 phase models.
Benzo(a)Pyrene	50-32-8	none	0.1	Soil ingestion using equation 740-2. This can also be need as the total togic carriers.
Cadmium	7440-43-9	2	2	Protection of drinking water, adjusted for PQL.
Chromium (total)	7440.47.9	0007		
Chromium VI	18540-29-9	0.001	none •	Heplaced by values for Cr III and Cr VI.
Chromium III	16065-83-1		n 6	Protection of drinking water-3 phase model.
			2002	Frogetation of unitarity water-3 phase model.
DOT	50-29-3	-		Soil indestion using equation 740.2
Ethylbenzene	100-41-4	20.0	9	Protection of drinking water-3 phase model.
Ethylene dibromide (EDB)	106-93-4	0.001		Protection of drinking water-3 phase model, adjusted for POI.
Lead	/439-92-1	250.0	250	Soil ingestion. See 1991 responsiveness summary for explaination of calculation. (1)
lindana	0000		7	
Methylene chloride	75.00.0	- 6	0.01	Protection of drinking water-3 phase model, adjusted for PQL.
	7-00-07	6.0		Protection of drinking water-3 phase model.
Mercury (inorganic)	7439-97-6	+		Protection of drinking water. 3 whose model
MTBE	1634-04-4	none	0.1	Profession of drinking water—Shake model
10 0 14 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1				
PAHs (carcinogenia)	91-20-3	none		Protection of drinking water-3 phase model. Total of all naphthalene. 1-methyl naphthalene and 2-methyl parawkalene.
		1.0	none	Replaced by Benzo(a)Pyrene, above.
PCB Mixtures	1336-36-3	-		THE DATE
Tetrachloroethylene	127-18-4	0.5	- 00	Arvar, this is a rotal value for all PCBs in the soil sample.
				OCCUPATION WATER TO DITASE TROOP.
Toluene	108-88-3	40.0		Protection of drinking water-3 phase model
1,1,1 Inchloroemane	71-55-6	20	2	Protection of drinking water-3 phase model.
Trichloroethylene	79-01-5	30	800	Problem and Company of the Company o
Xylenes	1330-20-7	20.0		Trotectori of oritinal Water-3 phase model.
				The country of the co
TPH (total)	14280-30-9			
Gasoline range organics	6842-59-6			
GRO with benzene		100		Protection of drinking water4 phase model, assuming weathered passiline managing
GRO w/o benzene		\$		Protection of drinking water-4 phase model assuming incompanion of protection of drinking water-4 phase model assuming incompanion of the protection of the
Diesel Range Organics		500		Protection of drinking water-residual saturation
Electrical Insulating Mineral Oil		200	2000	Protection of drinking water-residual saturation for diesel.
		(=) 22-	1	From a uniformy water-residual saturation
(1) Ecology decision not to chan	ige at this time.	Ecology intends to	o review and, if	(1) Ecology decision not to change at this time. Ecology intends to review and, if appropriate, undate these values in a future rejerced.
(O) Challens has a last a second		The same of the same	C CALCON SEC.	Appropriate, update trese values in a future rulemaking.

⁽¹⁾ Ecology decision not to change at this time. Ecology intends to review and, if appropriate, update these values in a future rulemaking. (2) Ecology has also issued a fact sheet (#95-157-TCP) allowing the use of 2000 mg/kg at electrical substations and switchyards. (3) To use this value no benzene must be present in the soil and the total of ethyl benzene, toluene & xylene must be less than 1% of the gasoline mixture.

. .

Table 2: Summary Table for Method A Soil Cleanup Values in Table 740-1

Method A Soil Cleanup Levels -for Unrestricted Land	-for Unrestrict	ted Land Uses									
		- Control									
		Mother			Dermal +	Dermal +	Leaching	100 X			
Hazardous Substance	CAS Number Cleanum	Cleanin I evel	Carcinogen	Ingestion	Ingestion	Ingestion	3-Phase	Ground water	Ш		
		ma/ka (1)		ma/ka (3)	marka (A)	Noncarc.	M ode	C/U level		Other	
Arconic		THE PERSON NAMED IN		The second second		(c) Sym	mg/kg (5)	mg/kg (7)	mg/kg (8)	mg/kg (9)	
Benzena	N	20.0	0.67	24	0.62	22	2.9	0.5			Section Sectio
		0.5	8	240	34		0.028	0.5		0.028	
Benzo(a)Pyrene	50-32-8	none	0.14		0.10		0 23/1 9 (11)	100			
Cadmium	7440-43-9	2.0		88		74	0.69	200			
Chromium (total)	7440-47-3	100.0					3	C.O			
Chromium VI	18540-29-9			240		420	ţ	ı			
Chromium III	16065-83-1			120,000		45.000	2000	n Ç		400	
DDT	50-29-3	1.0	5.0	40	7.0			2			
Ethylbenzene	100-41-4	20.0		8.000	51	2,400	4.7	0.03			
Ethylene dibromide (EDB)	100.001	100				00*,	0	9			
Lead	7/30.00.1	1000	210.0	101,010,010	0.011		0.00005	0.001			
	1-76-66+1	250.0		250/3/0(10)			3,000	1.5			
Lindane	58-89-9	1.0	0.77	24	0.65	20	0.0062	000			\prod
Metnylene chloride	75-09-2	0.5	130	4,800	130	4,800	0.022	0.5			T
Mercury (inorganic)	7439-97-6	10		76							
MTBE	1634-04-4	none		17		2	2.1	0.2			
Nanhthalan	0.00						0.085	2			
Le (Apprise Line)	91-20-3	none		1,600		1,200	4.5	16			
A A I S (CALCINOGENIC)(11)		1:0	0.14		0.10		0.23/1.9 (11)	0.01			
PCB Mixtures (12)	1336-36-3	1.0	0.5/2.5/14	1.6/5.6	0.4/1.8/10	1 2/4 1	3 4/0 0	100			
l etrachloroethylene	127-18-4	9.5	20	800	18	740	0.053	200			ľ
Toluene	108-88-3	40.0		16,000		000	3 1	3			T
1,1,1 Trichloroethane	71-55-6	20.00		20000		000'GL	7.3	100			
Ab Carothi done	3	207		, 75,000		72,000	1.6	8			
The more trible re-	79-01-5	0.5	9		84		0.033	0.5			
Aylenes	1330-20-7	20.0		160,000		150,000	9.1	100			
(1) From WAC 173-340-740 Table 2 [1/26/96 zavision]	196/06 ray	icion									T
(2) Calculated using equation 740-2	21.00.00	1									
(3) Calculated using equation 740-1	j -				-						Γ
(4) Calculated using equation 740-5. Except for petroleum	5. Except for p	petroleum mixter	poor ton son	and the second							Ţ
(5) Calculated using equation 740-4. Except for petroleum	4. Except for	petroleum mixtu	ree not used	in setting de	mixtures, not used in setting deanup levels since defaults not changed for other pathways.	defaults not c	hanged for of	her pathways.			
(6) Calculated using equation 747-1 and number of percentain mixtures, included in seting declarible levels since defaults not changed for other pathways.	1 and propose	d Table 720.1 o	ires, not used	in second clea	Intrinstances, not used in setung cleanup levels since defaults not changed for other pathways.	defaults not c	hanged for of	her pathways.			
(?) Calculated using 1991 method of 100 X teshio 250-1 around and independent Except for Cr III used	of 100 X table	720-1 cm 120-1 5	יייים אמופון	clearing revers	Except for Cr (i)	used 100 pp	b and for PAH	s used Methoo	d B value for	B(a)P.	Γ
(8) Vapor values not calculated.	0 100 v care	יי טווטטוני וייסאו	Vater Geariup	level. Except	for Cr III used 10	O ppb.					T
(9) Benzene from 4 phase leaching model, assuming part of weathered passiline misture. Chromitim 1/1 - 1	a model, assun	ning part of wea	thered geoff	omisting of	L of W. constitution						
) 1st value using IEUBK model	with 200 mg/ds	av soil innection	rate and is a	leo value dog	monthall vi is du	st value docur	nented in 199	1 MTCA respo	nsiveness su	ımmary.	
(11) Based on benzo (a) pyrene, First value for 3-phase model results is resing the Method B promote an in 1991 responsibless summary. 2nd value using IEUBK model with EPA defaults.	irst value for 3-	phase model re	Sellts is lising	the Method E	Ground supply of	responsivene	ss summary;	and value usin	g IEUBK moo	lel with EPA defaults.	
in proposed Table 720-1.		-			אוסחות אמוכו כון	callup level, ti	le second val	ne is using the	Method A va	aiue	
(12) PCB values based on various arochlors and IRIS values for PCB mixtures.	arochlors and	IRIS values for	PCB mixtures			+					
						-			-		abla
r oo values based on various	arochiors and	IHIS values for	PCB mixtures	6							

,			
	·		

Table 2: Summary Table for Method A Soil Cleanup Values in Table 740-1

Method A Soil Cleanup Levels -for Unrestricted Land U	-for Unrestric	ted Land Uses								
		Current		- lomon						
		Mathed A		- Dellial +	Leaching		100 X			
Hazardous Cuhatanas	: 0	Method A	Ingestion	Ingestion	Using	Residual	Ground water			
ומדמו מסחים פתחסומו וכב	CAS Number	CAS Number Cleanup Level	Noncarc,	Noncarc.	4-phase Model	Saturation	C/U level	Vanor		
		mg/kg (1)	mg/kg (2)	mg/kg (3)	mg/kg (4)	mg/kg (5)	mg/kg (6)	mg/kg (7)		
TPH (total)	14280-30-9									
Gasoline range organics	6842-59-6	100								
GRO with benzene			4 700	4 700	1 / 22 40 20	900,				
GRO without benzene				3	1,2510,20	000,	8	unknown		
Diesel Range Organice		300			105	1,000	8	unknown		
Heavy Oile (8)		202	3,900	3,000	No upper fimit	2,000	8	>10.000		
leavy Oils (o)		200	3,900	3,000	No upper limit	2.000	50	10000		
Erecurca msulating Mineral Oil		200 (9)	7,800	5,800	No upper limit	4,000	100	Not volatile	-	
(1) From WAC 173-340-740 Table 2 [1/26/96 revision].	le 2 [1/26/96 re	vision].				-				
(2) Calculated using surrogates. See 1/29/99 Steve Robb	See 1/29/99 S	teve Robb memo	6							
(3) Calculated using surrogates and equation 740-4. See 1	and equation 74	10-4 See 1/29/0	(29/99 Steve Bohh memo	nomou d						
(4) Calculated using 4 phase model. For GRO with henzen	del. For GRO w	ith henzene 1et	of the second	CILCUITY.	, , , , ,					
For GRO without benzene as	Stimes no ben	TODO PROCEST IN	value assuit	es resu gas	134 value assumes resnigas (3% benzene); 2nd values assume weathered gas (~0.1% benzene)	f values ass	ume weathere	d gas (~0.1% be	inzene)	
For diesel heavy als and mixed all the person in gasoline mixture and material benzene, toluene and xylene are less than 1% of the dasoline mixture	and all and and	ZCITE PIESEIL III	gasoline mix	ure and mat	ethyl benzene, tolu	ene and xyle	ene are less th	an 1% of the ga	Soline mixture	
(s) Basicling contracts on a sure military on a sure military on a sure only if the soil is above the water table	licial Oll, 110 up	per umir means	HI of 1 neve	r exceeded.	This is true only if t	he soil is ab	ove the water	Pable		
(s) Chronical activation of Coarse Solls from Coen and Mercer for gas and diesel and BPA study for mineral oil.	Solls from Coc	en and Mercer fo	r gas and die	sel and BPA	study for mineral o	ii.				1
(b) Calculated using 1991 method of 100 X table 720-1 prop	d of 100 X table	720-1 proposed	d ground wate	posed ground water cleanup level.	rei.					
(8) Rased on diasel communities.	d. The current Method A		of 100 ppm t	hought to be	protective for vapo	r pathway.	Diesel vapors	based on quality	value of 100 ppm thought to be protective for vapor pathway. Diesel vapors based on qualifative absorpations at the Elika	
O) Explore has also in a									The case validity at sites by PLIP	
(9) Loudy has also issued a fact sheet (#95-157-TCP) allo	1 sneet (#95-15	7-TCP) allowing	the use of 2(000 mg/kg at	wing the use of 2000 mg/kg at electrical substations and switchyards.	ns and switt	hyards.			
										_

	·
	(
	·
	·
	·
	•
	,
	J.
	j.
	j
1	

	7
٠	ō
3	Ę
C	ĭ
į	Š
Decompany	ם מכטיב

meurod A soil Cleanup Levels -for Unrestricted Land Uses	als -for Unre	stricted Land U	ses		327			5		:
	Ecological				2000			Office		
	Simplificat	ı								
Hazardous Substance	Evaluation	Indicator	Most Stringent	Controlling						
	maka (1)	Concentration	Non-Eco Path	Non-Eco	ARARs	Por	Background Mothers	Mothed &	Proposed	Basis
	(1) System	mg/kg (2)	mg/kg	athway	ma/ka	ma/kn (3)	Dino in the	A Domain	Standard	for
Arsenic	20	7	100				(+) (A)	тдукд	mg/kg	Standard
Benzene			7.0	ingestion		1 (SW7060)	7 & 20	8	00	
Bonzo(e)D			0.03	Leaching	0	0.005 (SW8260B)		4	3 8	Matural background. (5)
Delizo(a)r-yrene	30	12	0.1	Indoction		, , , , , ,		0.0	0.03	Protection of drinking water-4 phase model
Cadmium	25	4	0.69	ling-sugar		0.05 (SW82/0C)		none	0.1	Ingestion (7)
Chromium (total)	42	\$		Code IIII		z (SW6010A)		2.0	2	Leaching adjusted for DOI 763
Chromium VI	!	anis		-0.0		2 (SW6010A)	42	100		(a) (a) (a) (a) (a) (b) (b) (b) (b) (c) (c) (c) (c) (c) (c) (c) (c) (c) (c
Chromitum III			19	Leaching		1 (SW3060A)		3		
			2,000	Leaching		2 (SW6010A)			6	Protection of drinking water-3 phase model.
Tag	-	0.75	00			(V) (V) (I)			2000	Protection of drinking water-3 phase model
Ethylbenzene			6.3	uonsabu		0.05 (SW8081)	2.2	1.0	33	Indestion
Ethylene dibromide (EDD)			- - -	reaching	0	0.005 (SW8260B)		20	8	Protection of disciple
l ead			0.00005	Leaching	0	0.005 (SWR260R)			,	occupi of difficing water-3 phase model.
	220	20	250	Indestion		50/9//60104	1	- O.O.	0.005	Leaching, adjusted for PQL
Lindane	10	ď	00000			CO (SWOOLIDA)	-1	520	250	Ingestion (5)
Methylene chloride	2		0.0062	Leaching		0.01 (SW8081)		10	,	
			0.022	Leaching	Ö	0.005 (SW8260B)		2 4		Leaching, adjusted for PQL
Mercury (inorganic)	6	0.1	21	Paridoo !				C	20.02	Protection of drinking water-3 phase model.
MIBE		565	0.085	Leaching		0.1 (SW7471)	0.07	1.0	2	Protection of dealism success
Naphthalenes			2001	Leacilling	0	0.005 (SW8260B)		none		Protection of drinking water 3 phase model.
PAHs (carcinogenic)	ć	200	4.5	Leaching		0.5 (SW8260B)			\prod	or mining water to priase model.
(2006)	000	27	0.1	Ingestion	O	0.05 (SW8270C)			7	Protection of drinking water3 phase model. (9)
r CD MIXTURES	2	0.65	0.0	- Saching				2	2019	Heplaced with benzo(a)pyrene.
etrachloroethylene			0 05	Leaching	2	U.U4 (SW8082)		1.0	1	ARAR (8)
Toluene			200	Leaching	ő	0.005 (SW8260B)	3 (3)	0.5	0.05	Protection of dainking water 2 at
1.1.1 Trichloroethana	+	200	7.3	Leaching	ō	0.005 (SW8260R)		Ş	П	during water to priase mode.
aliminacionicio			1.6	Leaching	0	0.005 (SWR260R)		3 8		Protection of drinking water-3 phase model.
Trichloroethylene			0.033			(20070.10)		8	2	Protection of drinking water-3 phase model.
Xylenes		rce	30.0	Leaching	Ö.	0.005 (SW8260B)	5.52	0.5	0.03	Protection of danking water of
		200	6	reaching	0.0	0.015 (SW8260B)		22	Τ	Protection of drinking water5 phase model.
							2041			occasi of difficulty water-5 phase model,
(1) Value from Table 749-2 for unrestricted land use.	inrestricted la		For reference only, not used		n developing Mostrad A					
(2) Most stringent indicator value from Table 749-3.	e from Table	749-3. For refer	For reference only, not used in	d in developin	developing Method A value	A values.				
(3) From Manchester Lab					Y DOINGE S	values.			-	
(4) For arsenic, 1st value from upper 90% for WA State, documented in report #94.	pper 90% for	WA State, docu	mented in report #	04-11E and 9.	- Joseph				-	
(5) Ecology decision not to change at this time. Ecology intends to review and if any	ge at this tim	e. Ecology inten	ds to review and	f appropriet	ing value Iro	n a 1989 report b	/ PT! Environm	ental Service	es. All other	and any value from a 1989 report by PTI Environmental Services. All others upper 90% in WA State from some 4.04.447
(b) For cadmium, there are two possible PQLs; 0.1 PPM using SW7131 and a pand in the cadmium, there are two possible PQLs; 0.1 PPM using SW7131 and a pand in the cadmium, there are two possible PQLs; 0.1 PPM using SW7131 and a pand in the cadmium, there are two possible PQLs; 0.1 PPM using SW7131 and a pand in the cadmium, there are two possible PQLs; 0.1 PPM using SW7131 and a pand in the cadmium, there are two possible PQLs; 0.1 PPM using SW7131 and a pand in the cadmium of the c	possible PQL	s: 0.1 PPM usin	0.SW7131 and 2.E	DDM injury	update mes	ming Caronale mese Values in a future rulemaking.	re rulemaking.			13, and 13, and 13, and 15, and 15,
(7) This can also be used as the	total toxic en	Hivalente for all	DAME OF THE	A GUISD WILL	WOUTUAL IN	e later has been u	sed since this i	s the more	at Ajuommo	tool fact mothers
(8) Cleanup level is sum of all PCBs. ABAB is for high economic and all pcbs. 340-708(8).	CBs ARAB	of for high goons	TARIS. See WAC	173-340-708	(8)		-		, in 101	Cleanup level is sum of all PCBs. ARAB is for high some of the part of the par
(9) This is a total of all naphthalene 1-Methyl naphthalane 8 0 11.	ane 1-Methy	discontinuor se	aricy areas with no	cap, from 40	CFR Part 7	61.61 (EPA rule g	overning dispos	al and clear	OC OC	
	inch i inchih	יים אוויוים ובווה מי	-wetnyi Naphthale	ene. Also, use	SW 8270C	Also, use SW 8270C to measure all three types of narbithalone	ee types of par	hthalono	2	containingted racinges under TSCA).
	1						-	-		
							+	+	+	
								_	_	

				100
÷				
		·		
				,
	•			
			~	
				, ,
				101.5

-
0
6
~
w
듑
9
Ε
\mathbf{z}
7
œ
>
۵
~
×
Σ.
ā
õ
5
กิ
_

d Land Uses	Most Stringent Controlling Current Proposed Basis	100 23 to 28 Leaching 5 (NWTPH-Gx) 0 100 30 Protection of drinking water (4) 100 200 200 100 Protection of drinking water (4) 200 200 200 200 200 200 200 200 200 200 Residual Saturation 4000 Leaching 100 (NWTPH-Dx) 0 200 2000 Residual Saturation	(1) Value from Table 749-2 for unrestricted land use. For reference only, not used in developing Method A values. (2) Most stringent indicator value from Table 749-3. For reference only, not used in developing Method A values. (3) From Manchester Lab. (4) Based on 4-phase model results for weathered gasoline with 0.1% benzene, a typical value for gasoline contaminated sites. (5) Based on 4-phase model results for weathered gasoline assuming no benzene present in soil and that ethyl benzene, at least than 140, 44 tha
d Land Uses			Se. For reference only, not used in de 3. For reference only, not used in dev gasoline with 0.1% benzene, a typica gasoline assuming no benzene prese
Method A Soil Cleanup Levels -for Unrestricted Land Uses	Hazardous Substance Evaluation Conc mg/kg (1) mg/Kg (1) mg/H (total)	ange organics 200 ith benzene 200 ge Organics 460 (6) 460	(1) Value from Table 749-2 for unrestricted land use. For reference only, not used in (3) From Manchester Lab. (4) Based on 4-phase model results for weathered gasoline with 0.1% benzene, a ty (5) Based on 4-phase model results for weathered gasoline assuming no benzene p (6) Based on diesel commonstration.

Risk Calculations-Carcinogenic Effects of Soil Ingestion	enic Effects of	Soil Ingestion											
		Risk	Ava Body	ifatime	Thirt Court	Cancer							
Parameter	CAS No.		Weight	٠,	UTIL COIN.	Potency	G.I. Abs.	Soil	Duration	Fredillency	Mothod		
		(unitless)	(kg)	F	ractor (110/mg)	Factor	Fraction	Ing. Rate	of Exposure	of Contact	Carcinogen	AFAH (3)	Hisk @
Arsenic (5)	Š.	₩.			(file)	(kg-day/mg)	(nuitless)	(mg/day)	(years)	(unifless)	Ing (may)		AFAH(4)
Benzene	/440-38-2	_1	16		1,000,000	1.5	•				(I/II)	(mg/kg)	(unitless)
	/1-43-2	0.000001	16	75	1,000,000	0.029	2 5	2002	9	-	0.67		
Cadmium	7440-43-9						2	200	9	-	34		
T Chromium	7440-47-3					not available							
Chromium III	16065-83-1												
Chromium VI	18540-29-9					not available							
DOT						not available							
Ethylbenzene	50-29-3	0.000001	16	75	1,000,000	0.34	0+	000					
	100-41-4					not available	?!	33	9	-	2.9		
Ethylene dibromide (EDB)	106-93-4	0.000001	16	×	1000								
Lead	7439-92-1			2	000,000,1	8	1.0	. 200	9	-	0.012		
Lindane	20 00 0					not available							
Methylene chloride	75-00-3	0.00000	16	75	1,000,000	1.3	1.0	200	ď				
	7-60-57	LOCOCO	16	75	1,000,000	0.0075	1.0	200	٥	-	0.77		
Mercury (inorganic)	7439-97-6							3	o	-	133		
MTBE	1634-04-4					not available				 -			
Naphthalene	300					not available							
	81-20-3					not available							
cPAH Mixtures	na												
Benzo[a]anthracene	56-55-3												
Benzo[b]fluoranthene	205-99-2					not available					88		
Benzolkifluoranthene	207-08-9			+		not available							
_	50-32-8	0.000001	18	34	00000	not available							
Chrysene	218-01-9		2	2	000,000,1	7.3	1.0	200	9	-	0.14		
Dibenzo[a,h]anthracene	53-70-3					not available							
Ideno[1,2,3-cd]pyrene	207-08-9			-		not available							
						not available							
(1) Source of Cancer Potency Factor is the oral slowe factor.	actor is the oral	done forest											
(2) Value calculated using equation 740-2 and default assumptions in that	tion 740-2 and d	ofacilit acciment	Uncreasing	S database	e, except for L	S database, except for Lindane which is from HEAST	from HEAS	<u> </u>		+			
(3) Applicable, relevant and appropriate requirement	Propriate requiren	nent	ு ட	duanon.						+			
(4) ARAR divided by Method B	Value in column L	K Boldod vol.											
(5) The MTCA CLARC tables currently use a Glabsorthion fraction of 0.4	rrently use a GI	absorbtion frac	ar I.	HAH exce	eds MTCA rec	NRAH exceeds MTCA requirement that risk not exceed 1 X 10-5 [i.e. >10]	sk not excer	3d 1 X 10-5	i.e. >10].				
			,	I II III III	a is no longe.	may number is no longer mought to be valid and 1.0 is used here.	alid and 1.0	is used here					
							_						

ļ ·

Page (7)

Prepared by P.Kmet 11/2/99

, . • Ļ

Risk Calculations-Noncarcinogenic Effects of Soil Ingestion	cinogenic E	fects of Soil	ndestion								
		Reference	Avg. Body	Unit Conv.	Hazard	Soil	G.I. Abs.	Frequency	Method B	(e) GVGV	@ C
Parameter	CAS No.		Weight	Factor	Quotient	Ing. Rate	Fraction	of Contact	Noncaro(0)	(6) UNUX	3000
		(mg/kg-day)	(kg)	(bш/bn)		(mg/day)	(unitless)	(unitless)	(ma/ka)	(ma/ka)	(Initless)
Arsenic (5)		0.0003	16	1,000,000	-	200	7	· ·))) h	
Benzene	71-43-2	0.003	16	1,000,000	-	2002	10	10	24		
Cadmium	7440-43-9	0.001	16	1,000,000	+	200	1.0	10	043		111111111111111111111111111111111111111
T Chromium	7440-47-3	not available							8		
Chromium III	16065-83-1	1.5	16	1,000,000	-	200	10	10	120,000		777
Chromium VI	18540-29-9	0.003	16	1,000,000	1	200	1.0	1.0	240		
DDT	50-29-3	0.0005	16	1,000,000	-	200	10	10	9		
Ethylbenzene	100-41-4	0.1	16	1,000,000	_	200	0	10	8 000		
Ethylene dibromide (EDB)	106-93-4	not available							200,0		***************************************
Lead	7439-92-1										
Lindane	58-89-9	0.0003	16	1 000 000	•	900					
Methylene chloride	75-09-2	90.0	16	1,000,000	-	200	2	1.0	24		
			2	200,000,1	-	202	2.	1.0	4,800		
Mercury (Inorganic)	/439-97-6	0.0003	16	1,000,000	1	200	1.0	1.0	24		
MIBE	1634-04-4	not available							ţ		
Naphthalene	91-20-3	0.02	16	1,000,000	-	200	10	10	4 800		
cPAH Mixtures	Па	not available						2:-	000,1		
Benzofalanthracene	56-55-3										
Benzo[b]fluoranthene	205-99-2										
Benzo[k]fluoranthene	207-08-9	not available				-					
Benzo[a]pyrene	50-32-8	not available		-							
Chrysene	218-01-9	not available									
Dibenzo[a,h]anthracene	53-70-3	not available									
Ideno[1,2,3-cd]pyrene	207-08-9	not available									
(1) Source of RfDs is EPA's IRIS database except for	RIS databas		nzene whic	benzene which is from EPA's NCEA	A's NCEA						
(2) Value calculated using equation 740-1 and default	uation 740-1		sumptions	assumptions in that equation	ion.						
(3) Applicable, relevant and appropriate requirement.	ppropriate r										
(4) ARAH divided by Method B value in column K.	B value in α		ed values in	~	exceeds	JTCA requ	irement th	Bolded values indicate ARAR exceeds MTCA requirement that HQ not exceed 1.0	ceed 1.0.		
(2) Charles currently use a chapsorption traction of 0.4.	con lealing us	e d di absorbi	on Iraciion (ı i	numper is	no longer	thought to	be valid and	I hat number is no longer thought to be valid and 1.0 is used here.	6	
					_						

3		

Table 4: Soil Ingestion -- Method B Calculations for Noncarcinogens

Risk Calculations-Noncarcinogenic Effects of So	cinogenic E	ffects of Soil	il Indestion								
		Reference	Avg. Body	Unit Conv.	Hazard	io.	G.I. Ahe	Trong Con	3 C 1 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7		
Parameter	CAS No.	Dose (1)	Weight	Factor	1	Ind Rate	Fraction	of Contact	Negocial	AHAH (3)	9 OH
		(mg/kg-day)	(kg)	(gm/gn)	7-	(mg/day) (unitless)	(unitless)	(unitless)	(ma/ka)	(ma/ka)	AHAH (4)
PCB mixtures	1336-36-3	not available						,	(B. h)	ביינו ליינו	(CERTIFICATION)
High Risk & Persistence		not availabl								1.0	
Low Risk & Persistence											
Lowest Risk & Persistence											
Aroclor 1016	12674-11-2	0.00007	16	1,000,000	-	200	-	10	C	,	
Arochlor 1248	12672-29-6	12672-29-6 not available					2	5.[9.0	1.0	0.2
Arochlor 1254	11097-69-1	0.00002	16	1,000,000	-	200	10	0+	•	,	
Arochlor 1260		not available					?	2	ρ.	0.1	9.0
Tetrachlomethylene (PCE)	197 19 1	700		000							
Toliono	450 00 0	0.01	9	1,000,000	+-	200	1.0	1.0	800		
	108-88-3	0.2	16	1,000,000	-	200	1.0	1.0	16.000		
1.1.1 Trichloroethane	71.55.6	0.0	4	000 7					00.0		
Trichlorothylono	10.00	8.0	٥	000,000,	1	200	1.0	1.0	72.000		
a la conocina de la c	9-01-6	not available									
Xylenes	1330-20-7	0.0	45	4 000		000					
m-Xylene	108-38-3	not available	2	200,000,	-	3	2	1.0	160,000		
o-xylene	95-47-6	not available									
p-xylene											
											7
(4) Source of Diff.											
(1) Source of RIDS IS EPA'S IMIS database except for	HIS databas	e except for 1,	1,1,1, TCE which is from HEAST.	ich is from F	EAST.						
(2) Applicable along equation / 40-1 and default	uation /40-1	and default as	assumptions in that equation.	n that equati	on.						
(4) ABAB divided by Method Byseling in column V. B.	ppropriate re	equirement. Sc	Source for PCBs is 40 CFR Part 761.61(a)(4)(i)(A)	Bs is 40 CF	R Part 761	.61(a)(4)(i	(A).				
Standard Dyamon II Column IV. Bolded values Indicate ARAH exceeds MTCA requirement that HQ not exceed 1.0	2		an values in	Jicale Arah	exceeds	MICA red	uirement th	at HQ not ex	ceed 1.0.		
				_							

			i
)
			77.67
			7,760,70
			T T T T T T T T T T T T T T T T T T T
			700000
			7.776
		·	

Table 5: Method B Calculations for Carcinogens for Soil Ingestion plus Dermal Contact

Risk Calculations-Carcinogenic Effects of Soil Ingestion + Dermal Contact	genic Effects	s of Soil Inc	jestion + D	ermal Cont	act						-					
							-				 -	1	1			
Down motor		Risk	되	Averaging	Exposure	Exposure	Soil	G.I. Abs.	le O	Init Com	S. inforce	Adhousemen	1			
raiameter	CAS No.		Weight	Time	Frequency		9	Fraction	=			Adherence	_	G.I. Abs. Conv.	Dermal	Method B (3)
		(unitless)	(kg)	(days)	-		(mg/day) (unitless)	-	(kg-dav/mg)	(nm/mu)	+	molom ² day	ADS. Fraction		CPF (2)	Carcinogen
Arsenic	7440-38-2 0.000001	0.00000	16	<u>.</u>	365		200	-83-			12	III TOTAL	(uriliness)	(unitiess)	(kg-day/mg)	(mg/kg)
Benzene	71-43-2	0.000001	16	+	385	9	3 8	0 0	5.000	1,000,000	2,200	0.2	0.03	0.95	1.6	0.62
Cadmium	7440-43-9							11	ш.	2,000,000	2,200	0.2	0.0005	0.80	960.0	84
T Chromium	7440-47-3						#		riot available		1					333
≡ c	16065-83-1														3569	
	18540-29-9							<u>⊏</u> ĝ	not available							3
DDT	50-29-3	0 000001	31	27 275	100			Ħ								
Ethylbenzene	1	200000	2	0/0/17	g g	9	200	0	_	1,000,000	2,200	0.2	0.03	0.70	0.49	27.
	++						+	٥	not available						10.22	i
Eurylene dibromide (EUB)	-	0.000001	9	27,375	365	9	200	1.0	85	1 000 000	2 200	60	000			
Lead	7439-92-1							T	aple		2,500	7.0	0.03	0.80	8	0.011
Lindane	58-89-9	0.000001	46	37 975	200		100		11						21	500
Methylene chloride	1	0.000001	\dagger	27.375	200	٥	300	0.5	1	→	2,200	0.2	40.0	0.50	26	0.85
Moroune Granamia	++		\parallel	0.00	202	٥	3	1.0	0.0075	1,000,000	2,200	0.2	0.0005	0.80	0.0094	38.5
Mercury (Horganic)	7439-97-6							Ĭ	not available						3	3
MIDE.	1634-04-4							=	not available							
Naphthalene	91-20-3								200						224	<u>- ₽4-</u>
ADAL Michigan						1		č	not available							ASA:
Description of the second	na							-	1						53	
Benzolalanthracene	56-55-3							į	not evaluable	+	+				<i>(25)</i>	ee.
Pericologinoranmene	205-99-2							=	not available		-	-				2020
Bonzolalarono	+							2	not available	+					gië.	-2-
Chambridge	+	100000	16	27,375	365	9	200	1,0	4	1 000 000	2000	6			XE!	1824
Cirysene	218-01-9				-			†	3		3	O.K	0.13	0.89	8.2	0.10
Ulbenzola, nanthracene	53-70-3		-	-		-		¥ \$	A granitation						GE	202
Ideno[1,2,3-cd]pyrene	207-08-9	-			-	+		=	rior available						226	300
				-			+	Ĕ	not available						35	8
					+		+	-								5
(1) Source of Cancer Potency Factor is the oral slope factors from EPA's IRIS database.	Factor is the	oral slope t	actors from	EPA's IRIS	database, e	except for Lindane which is from HEAST	ndane whi	ch is from t	LEACT	1						
(2) Dermal CPF = Oral CPF/ Gl abs conversion factor. The Gl abs factor is chemical so	abs conver	sion factor.	The Glabs	tactor is ct	omina ena	Afr. Coo.	7 coper	7 - 4 - 0								
(3) Calculated using equation 740-5 and default assumptions.	740-5 and de	fault assum	ptions.	2	900	- Oct 6	duanoil /4	10- TOT GE!	aults and 1/2	5/99 memo	for chemic	al specific fac	Journ. See equation / 40-5 for defaults and 1/25/99 memo for chemical specific factors used here.			
	•			-		-	+	+	+		+	1				
						1	1	1				_	-			

			,	
			·	
	y.			

Table 5: Method B Calculations for Carcinogens for Soil Ingestion plus Dermal Contact

Action Exposure Exposure Soil G.I. Abs Oral Unit Conv. Surface Adherence Dermal G.I. Abs. Conv.	Exposure Soil G.I. Abs. Oral Unit Conv. Surface Adherence Dermal (Virs) (modday) (rand) (modday) (modday) (unitless) (rand) (unitless) (near Carculations—Carcinogenic Enects of Soil Ingestion + Dermal Contact	IS Of SOIL IN	gestion + [Jermal Con	tact		1									
Characteristics Continuous	Continue Continue		T	Ave Book		\pm		+									
Duriation Ing. Hate Fraction CPF (1) Factor Area Factor Abs. Fraction Factor Cyrs	Outside Fraction CPF (1) Factor Alea Factor Abs. Fraction Factor CPF (2) Common CPF (1) Factor CPF (2) Common CPF (1) Common CPF (1) Common CPF (1) Common CPF (2) Common CPF (2) Common CPF (2) Common CPF (2) CP	CAS No	Ť	Moinh		. 1	Exposine		G.I. Abs.	Ora	Unit Conv.		Adherence	Dermal	G.L. Abs. Conv		Mathod B (2)
(Vrss) (mg/day) (unitless) (kg-daymg) (unitless) (unitless) (unitless) (unitless) (unitless) 6 200 1.0 2.0 1,000,000 2,200 0.2 0.14 0.81 6 200 1.0 0.07 1,000,000 2,200 0.2 0.14 0.81 6 200 1.0 0.07 1,000,000 2,200 0.2 0.14 0.81 6 200 1.0 0.07 1,000,000 2,200 0.2 0.04 0.80 6 200 1.0 0.051 1,000,000 2,200 0.2 0.03 0.80 6 200 1.0 0.071 1,000,000 2,200 0.2 0.03 0.80 6 200 1.0 0.011 1,000,000 2,200 0.2 0.03 0.80 7 0.011 1,000,000 2,200 0.2 0.03 0.80 8 200 1.0	Continues Cont		:	NACIOIII	_	S	Duration		Fraction	97 (3)	Factor	-	Factor	Abs Fraction		L	יאפרויסר בי
6 200 1.0 2.0 1,000,000 2,200 0.2 0.14 0.81 6 200 1.0 0.4 1,000,000 2,200 0.2 0.14 0.81 6 200 1.0 0.4 1,000,000 2,200 0.2 0.14 0.81 6 200 1.0 0.051 1,000,000 2,200 0.2 0.14 0.81 6 200 1.0 0.051 1,000,000 2,200 0.2 0.03 0.80 6 200 1.0 0.051 1,000,000 2,200 0.2 0.03 0.80 7 10 20 1.0 0.051 1,000,000 2,200 0.2 0.03 8 200 1.0 0.011 1,000,000 2,200 0.2 0.03 8 200 1.0 0.011 1,000,000 2,200 0.2 0.03 8 200 1.0 0.011 1,000,000 2,200 0.2 0.03 8 200 1.0 0.011 1,000,000 2,200 0.2 0.03 9 200 1.0 0.011 1,000,000 2,200 0.2 0.03 9 200 1.0 0.011 1,000,000 2,200 0.2 0.03 9 200 1.0 0.011 1,000,000 2,200 0.2 0.03 9 200 1.0 0.011 1,000,000 2,200 0.2 0.03 9 200 1.0 0.011 1,000,000 2,200 0.2 0.03 9 200 1.0 0.011 1,000,000 2,200 0.2 0.03 9 200 1.0 0.011 1,000,000 2,200 0.2 0.03 9 200 1.0 0.011 1,000,000 2,200 0.2 0.03 9 200 1.0 0.011 1,000,000 2,200 0.2 0.03 9 200 1.0 0.011 1,000,000 2,200 0.2 0.03 9 200 1.0 0.011 1,000,000 2,200 0.2 0.03 9 200 1.0 0.011 1,000,000 2,200 0.2 0.03 9 200 1.0 0.011 1,000,000 2,200 0.2 0.03 9 200 1.0 0.011 1,000,000 2,200 0.2 0.03 9 200 1.0 0.011 1,000,000 2,200 0.2 0.03 9 200 1.0 0.011 1,000,000 2,200 0.2 0.03 9 200 1.0 0.011 1,000,000 2,200 0.2 0.03 9 200 1.0 0.011 1,000,000 2,200 0.2 0.03	6 200 1.0 0.4 1,000,000 2,200 0.2 0.14 0.81 2.5 0.00 2,200 0.2 0.14 0.81 0.49 0.00 2,200 0.2 0.14 0.81 0.49 0.00 2,200 0.2 0.14 0.81 0.49 0.00 0.2 0.0 0.2 0.14 0.81 0.49 0.00 0.2 0.0 0.2 0.14 0.81 0.084 0.00 0.2 0.0 0.2 0.14 0.81 0.084 0.00 0.2 0.0 0.2 0.14 0.81 0.084 0.00 0.2 0.0 0.2 0.14 0.81 0.084 0.00 0.2 0.0 0.2 0.14 0.81 0.084 0.00 0.2 0.0 0.2 0.14 0.81 0.084 0.00 0.2 0.0 0.2 0.0 0.2 0.0 0.2 0.0 0.2 0.0 0.0		- 6	(kg	(days)	(days/yr)	(yrs)	mg/day)	<u> </u>	(ka-dav/mo)	(na/pn)	1	nalom2 dans	(conjector)	1	(אור (א	Carcinogen
6 200 1.0 0.4 1,000,000 2,200 0.2 0.14 0.81 6 200 1.0 0.4 1,000,000 2,200 0.2 0.14 0.81 6 200 1.0 0.07 1,000,000 2,200 0.2 0.14 0.81 not available	6 200 1.0 0.4 1,000,000 2,200 0.2 0.14 0.81 2.5 6 200 1.0 0.4 1,000,000 2,200 0.2 0.14 0.81 2.5 6 200 1.0 0.07 1,000,000 2,200 0.2 0.14 0.81 0.084	1336-36-3	Pace de Louis	- Charles of the Control of the Cont			C. C. C. C. C. C. C. C. C. C. C. C. C. C		К-			10	gen day	(dilluess)	(unitiess)	(kg-day/mg)	(mg/kg)
6 200 1.0 2.0 1,000.000 2,200 0.2 0,14 0,81 0.00 0.00 1.0 0.04 1,000,000 2,200 0.2 0,14 0,81 0.01 0.07 1,000,000 2,200 0.2 0,14 0,81 0.01 0.02 1,000,000 2,200 0.2 0,14 0,81 0.01 0.051 1,000,000 2,200 0.2 0,03 0,80 0.00 1.0 0,051 1,000,000 2,200 0.2 0,03 0,80 0.01 0.01 1,000,000 2,200 0.2 0,03 0,80 0.01 0.01 1,000,000 2,200 0.2 0,03 0,80 0.01 0.01 1,000,000 2,200 0.2 0,03 0,80 0.01 0.01 1,000,000 2,200 0.2 0,03 0,80 0.01 0.01 1,000,000 2,200 0.2 0,03 0,80 0.01 0.01 1,000,000 1,000,000 1,000,000 1,000,000	6 200 1.0 2.0 1,000.002 2,200 0.2 0.14 0.81 2.5 6 200 1.0 0.07 1,000.00 2,200 0.2 0.14 0.81 0.891			16	27.375	200	6	6	,	1					TO STATE AND ADDRESS OF THE PARTY OF THE PAR		
6 200 1.0 0.4 1.000,000 2.200 0.2 0.14 0.81 6 200 1.0 not available 1.000,000 2.200 0.2 0.14 0.81 6 200 1.0 0.051 1,000,000 2.200 0.03 0.80 6 200 1.0 0.051 1,000,000 2.200 0.03 0.80 6 200 1.0 0.011 1,000,000 2.200 0.2 0.03 0.80 7 1.0 0.011 1,000,000 2.200 0.2 0.03 0.80 8 200 1.0 0.011 1,000,000 2.200 0.2 0.03 0.80 9 1.0 0.011 1,000,000 2.200 0.2 0.03 0.80 1 1.0 0.011 1,000,000 2.200 0.2 0.03 0.80 1 1.0 0.011 1,000,000 2.200 0.03 0.03 0.8	6 200 1.0 0.05 1.000,000 2.200 0.2 0.14 0.81 0.49 not available not ava		0.00001	18	27 375	395	0 (3 8	0.1	1	1,000,000	2,200	0.2	0.14	0.81	25	98.0
6 200 1.0 0.07 1,000,000 2,200 0.2 0.14 0.81 not available not available for 200 1.0 0.051 1,000,000 2,200 0.2 0.03 0.80 not available for 200 1.0 0.051 1,000,000 2,200 0.2 0.03 0.80 not available not availabl	6 200 1.0 0.07 1,000,000 2,200 0.2 0,14 0.81 0.084 not available not available not available 0.051 1,000,000 2,200 0.2 0.03 0.80 0.064 6 200 1.0 0.051 1,000,000 2,200 0.2 0.03 0.064 6 200 1.0 0.011 1,000,000 2,200 0.2 0.03 0.014 6 200 1.0 0.011 1,000,000 2,200 0.2 0.03 0.014 7 not available not available not available not available not available not available . 8 not available not available 9 not available not available 1 not available 2 <td< td=""><td>8</td><td>00000</td><td>2 4</td><td>67,073</td><td>202</td><td>٥</td><td>200</td><td>1.0</td><td>7</td><td>1,000,000</td><td>2,200</td><td>0.2</td><td>0.14</td><td>800</td><td>940</td><td>3</td></td<>	8	00000	2 4	67,073	202	٥	200	1.0	7	1,000,000	2,200	0.2	0.14	800	940	3
not available not availabl	6 200 1.0 0.051 1,000,000 2,200 0.2 0.03 0.80 0.064 6 200 1.0 0.051 1,000,000 2,200 0.2 0.03 0.80 0.064 6 200 1.0 0.011 1,000,000 2,200 0.2 0.03 0.80 0.014 6 200 1.0 0.011 1,000,000 2,200 0.2 0.03 0.80 0.014 Contraction of available of the contraction of the con	+		2	6/6/72	200	9	8	٦	0.07	1,000,000	2,200	0.2	0.14	180	0.0864	9
not available not availabl	Doct available Doct	3 00 07301			1					ot available						1	2
6 200 1.0 0.051 1,000,000 2,200 0.2 0.03 0.80 not available	6 200 1.0 0.051 1,000,000 2,200 0.2 0.03 0.80 0.064 6 200 1.0 0.051 1,000,000 2,200 0.2 0.03 0.80 0.064 6 200 1.0 0.011 1,000,000 2,200 0.2 0.03 0.80 0.014 Contavalable not available not available not available not available respectific. See equation 740-5 for defaults and 1/25/99 memo for chemical specific factors used here.	12072729			-			_	Ę	not available							
6 200 1.0 0.051 1,000,000 2,200 0.2 0.03 0.80 not available	6 200 1.0 0.051 1,000,000 2,200 0.2 0.03 0.80 0.064 6 200 1.0 0.011 1,000,000 2,200 0.2 0.03 0.80 0.014 6 200 1.0 0.011 1,000,000 2,200 0.2 0.03 0.80 0.014 7 not available not available not available not available and vinyl chloride which are from HEAST. • except for tetrachloroethylene, trichlorothylene and vinyl chloride which are from HEAST.	1-90-7801								ot available							
6 200 1.0 0.051 1,000,000 2,200 0.2 0.033 0.80 6 200 1.0 0.011 1,000,000 2,200 0,2 0,03 0,80 not available not available not available not available not available not available not available not available not available not available except for tetrachloroethylene, trichlorothylene and vinyl chloride which are from HEAST. not available not available	6 200 1.0 0.051 1,000,000 2,200 0.2 0.03 0.03 0.064 6 200 1.0 0.011 1,000,000 2,200 0.2 0.03 0.80 0.014 6 200 1.0 0.011 1,000,000 2,200 0.2 0.03 0.80 0.014 1 not available not availa									ot available							
6 200 1.0 0.051 1,000,000 2,200 0.2 0.03 0.80 not available not availab	b 250 1.0 0.051 1,000,000 2,200 0.2 0.03 0.80 0.064 6 200 1.0 0.011 1,000,000 2,200 0.2 0.03 0.80 0.014 6 200 1.0 0.011 1,000,000 2,200 0.2 0.03 0.80 0.014 6 200 1.0 0.011 1,000,000 2,200 0.2 0.03 0.80 0.014 6 200 1.0 0.011 1,000,000 2,200 0.2 0.03 0.80 0.014 7 1.0 1.0 1,000,000 2,200 0.2 0.03 0.80 0.014 8 1.0 1.0 1,000,000 2,200 0.2 0.03 0.80 0.014 9 1.0 1.0 1,000,000 2,200 0.2 0.03 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 <td>-</td> <td>0.000001</td> <td>45</td> <td>37 97E</td> <td>300</td> <td></td> <td></td> <td>Ħ</td> <td>11</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	-	0.000001	45	37 97E	300			Ħ	11							
6 200 1.0 0.011 1,000,000 2,200 0,2 0,03 0,80 normaliable not available	6 200 1.0 available 0.2 0.03 0.80 0.014 In not available	Н	2000	2	61,013	SS	٥	25	1		1,000,000	2,200	0.2	0.03	08.0	0.064	18
6 200 1.0 0.011 1,000,000 2,200 0.2 0.03 0.80 not available not available not available not available not available segment and vinyl chloride which are from HEAST.	6 200 1.0 0.011 1,000,000 2,200 0.2 0.03 0.80 0.014 Inot available not available not available not available for tetrachloroethylene, trichlorothylene and vinyl chloride which are from HEAST. Except for tetrachloroethylene, trichlorothylene and vinyl chloride which are from HEAST.	74 55 6							-	or available		1					
b 200 1.0 0.011 1,000,000 2,200 0.2 0.03 0.80	b 200 1.0 0.011 1,000,000 2,200 0.2 0.03 0.80 0.014	79-01-6	0,00004	4	250 50	150			\dashv								
except for tetrachloroethylene, trichlorothylene and vinyl chloride which are from HEAST.	except for tetrachloroethylene, trichlorothylene and vinyl chloride which are from HEAST. except for tetrachloroethylene, trichlorothylene and vinyl chloride which are from HEAST.	,	1000000	0	676,72	8	و	8	1.0			2,200	0.2	0.03	080	7,000	70
95-47-6 95-47-6 not available not available not available not available Percentage and viny chloride which are from HEAST.	108-38-3 95-47-6 not available	1330-20-7						+		ot delicated					8	410.0	9
95-47-6 not available not available not available not available and some statement of the control of the contro	95-47-6 Includation in the control of the control	108-38-3						1	- '	of cavallable						2720	
ency Factor is the oral slope factors from EPA's IRIS database, except for tetrachlorcettrylene, trichlorothylene and vinyl chloride which are from HEAST.	Practor is the oral slope factors from EPA's IRIS database, except for tetrachloroethylene, trichlorothylene and vinyl chloride which are from HEAST. 740-5 and default assumptions.	95-47-6			†	-		+		or available						-	
ency Factor is the oral slope factors from EPA's IRIS database, except for tetrachlorcettrylene, trichlorothylene and vinyl chloride which are from HEAST.	Y Factor is the oral slope factors from EPA's IRIS database, except for tetrachloroethylene, trichlorothylene and vinyl chloride which are from HEAST. Gl abs conversion factor. The Gl abs. factor is chemical specific. See equation 740-5 for defaults and 1/25/99 memo for chemical specific factors used here.							+	E 6	ot available							
ency Factor is the oral slope factors from EPA's IRIS database, except for tetrachloroethylene, trichlorothylene and vinyl chloride which are from HEAST. PFI Gl abs conversion factor. The Gl abs. factor is chemical specific. See equation 740-5 for defaults and 105/09 memor for phenical and conference of the property of the conversion factor.	Y Factor is the oral slope factors from EPA's IRIS database, except for tetrachloroethylene, trichlorothylene and vinyl chloride which are from HEAST. Gl abs conversion factor. The Gl abs, factor is chemical specific. See equation 740-5 for defaults and 1/25/99 memo for chemical specific factors used here.								-	מאמיום						A-13	
ency Factor is the oral slope factors from EPA's IRIS database, except for tetrachloroethylene, trichlorothylene and vinyl chloride which are from HEAST. PFI Gl abs conversion factor. The Gl abs. factor is chemical specific. See equation 740-5 for defaults and 105/09 memor for phanical and conference of the phanical specific.	Y Factor is the oral slope factors from EPA's IRIS database, except for tetrachloroethylene, trichlorothylene and vinyl chloride which are from HEAST. Gli abs conversion factor. The Gli abs. factor is chemical specific. See equation 740-5 for defaults and 1/25/99 memo for chemical specific factors used here.				-				-	+	1	-					
ency Factor is the oral slope factors from EPA's IRIS database, except for tetrachlorcetrylene, trichlorothylene and vinyl chloride which are from HEAST. PFI Gl abs conversion factor. The Gl abs. factor is chemical specific. See equation 740-5 for defaults and 10-709 month for chamical modes.	Y Factor is the oral slope factors from EPA's IRIS database, except for tetrachloroethylene, trichlorothylene and vinyl chloride which are from HEAST. Gil abs conversion factor. The Gil abs. factor is chemical specific. See equation 740-5 for defaults and 1/25/99 memo for chemical specific factors used here.							-	+	+					1		
ency Factor is the oral slope factors from EPA's IRIS database, except for tetrachloroethylene, trichlorothylene and vinyl chloride which are from HEAST. PFI GI abs conversion factor. The GI abs. factor is chemical specific. See equation 740-5 for defaults and 1950a memor for planning modified.	Y Factor is the oral slope factors from EPA's IRIS database, except for tetrachloroethylene, trichlorothylene and vinyl chloride which are from HEAST. Gil abs conversion factor. The Gil abs. factor is chemical specific. See equation 740-5 for defaults and 1/25/99 memo for chemical specific factors used here.							+	1								
ency Factor is the oral stope factors from EPA's IRIS database, except for tetrachloroethylene, trichlorothylene and vinyl chloride which are from HEAST. PFI GI abs conversion factor. The GI abs. factor is chemical specific. See equation 740-5 for defaults and 105/09 month for chaminal and 105/09 months.	Y Factor is the oral slope factors from EPA's IRIS database, except for tetrachloroethylene, trichlorothylene and vinyl chloride which are from HEAST. Gl abs conversion factor. The Gl abs. factor is chemical specific. See equation 740-5 for defaults and 1/25/99 memo for chemical specific factors used here.							+				+					
sency Factor is the oral stope factors from EPA's IRIS database, except for tetrachlorcethylene, trichlorothylene and vinyl chloride which are from HEAST. PF/ Gl abs conversion factor. The Gl abs. factor is chemical specific. See equation 740-5 for defaults and 105/99 month for chaminal and the chaminal and th	Y Factor is the oral slope factors from EPA's IRIS database, except for tetrachloroethylene, trichlorothylene and vinyl chloride which are from HEAST. Gl abs conversion factor. The Gl abs. factor is chemical specific. See equation 740-5 for defaults and 1/25/99 memo for chemical specific factors used here.						+		+	+	1						
lency Factor is the oral slope factors from EPA's IRIS database, except for tetrachlorcethylene, trichlorothylene and vinyl chloride which are from HEAST. PFI Gl abs conversion factor. The Gl abs. factor is chemical specific. See equation 740-5 for defaults and 1/25/99 memor for chemical and the character.	y Factor is the oral stope factors from EPA's IRIS database, except for tetrachloroethylene, trichlorothylene and vinyl chloride which are from HEAST. Gl abs conversion factor. The Gl abs. factor is chemical specific. See equation 740-5 for defaults and 1/25/99 memo for chemical specific factors used here.				 -							+					
PF/Gl abs conversion factor. The Gl abs, factor is chemical specific. See equation 7.40-5 for defaults and 10-709 months from the chemical and the chemical specific.	Gl abs conversion factor. The Gl abs, factor is chemical specific. See equation 740-5 for defaults and 1/25/99 memo for chemical specific factors used here.	ency Factor is the	e oral stope	factors from	I EPA'S IRIS		except for te	trachloroe	sthylene, tri	chlorothylene	and wind o	dorido um	- de care de	1040			
	740-5 and default assumptions.	PF/ GI abs conve	ersion factor.	. The Glab	s. factor is c	hemical spe	cific. See e	Squation 7.	40-5 for de	farily and 1/2	2/00 2002	opino mari					
ation 740-5 and default assumptions.		ation 740-5 and d	lefault assun	nptions.	-	-			3	7/1 N IN 1/2	Main com		a specific fac	Tors used her	ည်		
							+	1	+	+	1	1					

		•
		·

Table 6: Method B Calculations for Noncarcinogens for Soil Ingestion plus Dermal Contact

Risk Calculations-Noncarcinogenic Effects of Soil Ingestion + Dermal Contact	genic Effects o	of Soll Inges	tton + Derm	al Contact												
						" 			+							
Daramotor		Hazard	Avg. Body	Averaging	ļ.,,	Exposure	Oral Ref.	Soil	G.i. Abs.	Linit Conv	1 Con 1	Journal	1	-		
a contact	CAS No	ndex	Weight		Frequency	Duration	Dose (1)	Ing. Rate	-	Factor	Factor	Ben (3)	And	8 .	Dermal Abs.	Method B
	The state of the s		(kg)	(days)	(days/yr)	(years)	(mg/kg-day)	(ma/dav)	(millage)	(magan)	(mothoga)	(2) 2011	200	racior	Fraction	Noncarc(2)
	7440-38-2	1	16	Ķ	365	A STATE OF THE STA	TOTAL STREET,			STATE OF THE PARTY	(Semina)	(трика-аау)	(m)	(mg/cm ⁻)	(unitiess)	(mg/kg)
Benzene	71-43-2	-	16	\top	385	9	5000	3 8	- -	1,000,000	0.95	0.00029	2200	0.2	0.03	8
Cadmium	7440-43-9	-	16		356	П		3	-	000,000,	0.80	0.0024	2,200	0.2	0.0005	
TChromiten	7440 47.0			2011	3	•	0.001	800	•-	1,000,000	0.025	0.000025	2,200	0.2	0.001	7.4
1100	274047	,					not available	-								
	19099-84-1	-	16	2,190	365	9	1.5	200	-	1,000,000	0.013	000	2000	000	3	
	18540-29-9	-	9	2,190	365	9	0.003	500	-	1,000,000	200	0.000075	222	700	5 6	44,571
וממ	50-29-3	1	16	2,190	365	9	0.0005	200	 -	4 000			2	7.5	0.01	821
Emylpenzene	100-41-4	1	16	2,190	365	9	0.1	38	- -	000,000	0.70	0.00035	2,200	0.2	0.03	37
Ethylene dibromide (EDB)	106-93-4					#		200	-	300,000,	0.80	0.080	2,200	0.2	0.03	7,390
Lead	7430.02.4	+					not available		L				 			
	1-70 000 /	†					not available									
Lindane	58-89-9	-	16	2.190	365	4	0,0003	Ş							re r	
Methylene chloride	75-09-2	-	16	2 100	365) 4	200	3 8	-	000,000,	0.50	0.00015	2,200	0.2	200	20
Mercary (inomanic)	7400 001 0				3	,	0.00	3	-	1,000,000	0.80	0.048	2,200	0.2	0.0005	4 793
MTRE	0-/8-804/	-	92	2,190	365	9	0.0003	200	-	1,000,000	200	100000	2000			
	1034-04-4					-	not available		-			0.00002.	2220	7	10.0	18
Naphthalene	91-20-3	-	16	2.190	365	y	600	000							672	ica)
cPAH Mixtures	2				} }	\parallel	o'O'E	200	-	1,000,000	0.89	0.018	2,200	0.2	0,13	1211
Benzolalanthracene	56.55.0					-	not available			-						
Benzolbilitoranthene	205.00		1				not available	-						+	230	et a co
Benzolkifluoranthene	207-08-0	1				-	not available							+		2543
Benzo[a]pyrene	50-32-8	1		+	-	-	not available								25 E	elio la
Chrysene	218-01-9				+	7	not available	-						-		-3986
Dibenzola, hlanthracene	59.70.3		†			-	not available							-		
Ideno[123-cd]nyrana	207.700	1				-	not available							1		Gar
	E-07-707	† 				-	not available						+		898/9	100
	-				1	-							-		a -	
(1) Source of oral RfDs is EPA's IRIS database except for benzene which is from EPA's NO	RIS database ex	cent for ber	Zene which	c from EDA's	ATOM							-	-			T
(2) Dermal RID = Oral RID X Gi at	3s. conversion to	actor The G	ahe factor	opposite of	V											
(3) Calculated using equation 740-4 and default assumptions.	-4 and default a	ssumptions.	ממוסו		Specific: See	equation 74	0-4 for defaults	and 1/25/99	memo for c	hemical spe	offic factors u	sed here.				
	-				1	-		+								
					-	1			-	-				-	+	T

·					
			·		
		·			
				K.	
	•				

Table 6: Method B Calculations for Noncarcinogens for Soil Ingestion plus Dermal Contact

		Method B	Noncarc(2)	/man()	(IIIQ/Kg)	The state of the s					ř		1.2	5200		739	14,781	100	71,901	582		147,806		220	23						
1		ă	Fraction	(noblect)	(dinass)					,	5	,	0.74			0.03	0.03	2000	6,000,5		30,0	0.03									
		Adherence	Factor	(mayom ₂)						00	ţ	0	2		į	70	02	50	7'0		5	70									
		Surface	Area	(ma/cm ²)	듅					2200		9000	3		0000	270	2200	0000	2,400		2000	2									
		Cerma	HIG (2)	(ma/ka-day)	THE NEW YORK					0.000057		0.000016	010000		00000	0000	0.70	070	3		4.6	2									
		긱	ractor	(unitless)						0.81		180			280	300	8	0.80			0.80										
	I Init Cons	5000	Tacio	(mg/kg)	NAME OF TAXABLE PARTY.					1,000,000		1,000,000			1,000,000	000	300,000,	1,000,000			1,000,000										
	G. Ahe	_	+	(mittess)						-		-			-	-	•	-			-										
	Soil	ateg not		(mg/day)	A CHARLES AND A CHARLES					200 200		200			88	2		200			800										
	Oral Ref.	Dose (1)		(mg/kg-day)	oldelione ton	ייטו פאמיומרוש	not avaitable	not available	not available	0.00007	not available	0.00002	not available		.0.01	02		6:0	not available		2.0	not available	not available	not available							
	Exposure	Duration	10000	Cedis	The state of the s					9		9		ļ	9	9		9			9								on 740-4.		
	Exposure	Frequency	(and Marry	(dimension)	The state of the s					365		365			8	365		8			8							NCEA.	See equation 740-4		
al Contact	Averaging	Time	(daye)	San Maria						2,190		2,190	-	0070	Z,130	2,190	90,0	2,130		20.0	2,130	-				†		s from EPA's	nical specific		
stion + Derm	Avg. Body	Weight	(ka)						,	٩	,	92		45	2	16	4	2		40	0			-			10000	inzene wnich	factor is cher	-	
of Soil Inge	Hazard	Index	(unitiess)	13						-	,			·	-	-		-		-							No.	io io idenza	tactor. This	assumptions	
genic Effects		CAS No.		A	1336-36-3				10677 11 0	12672-20-E	11007 60 1	1-60-76011		127-18-4	0000	108-88-3	71-55-6	20.02	9	1330.20.7	00000	100-00-0	0-/#-06				BIS dampage	ווים תמומאמים	tos. conversion	A and detault.	
Risk Calculations-Noncarcinogenic Effects of Soil Ingestion + Dermal Contact	Dougest	raidilleter			PCB mixtures	High Risk & Perststence	Low Risk & Persistence	Lowest Risk & Persistence		3		Arochlor 1260		Tetrachloroethylene (PCE)	Tolisono	priprior	1,1,1 Trichloroethane	Trichloroethylana	Dipol (moo) company	Xylenes	m-Xvlene	O-xylene	o colored	p-xyierie			(1) Source of oral BDs is EDA's IBIS dambass source for	(2) Domai DD - One DD V Ci	(2) Defined RID = Ural RID X (s) abs. conversion factor. This factor is chemical specific.	(3) Carculated Using equation /40.4 and detault assumptions.	

			·	

·				
				-

			·	
				•
		4		
				į
				Year
			•	
·				

3-Phase Model Results										į		
		Og H ₂ O							-			
	CAS No.	C/U Level	Bulk Density	Soil Water	Soil Air	ì	25	50,	72	Dilution	Soil	
		(mg/l) (1)		 	12	(20/00)	(ml/a) (3)	(%) (%)	(a) (b)	ractor	C/U Level	
PCB Mixtures 1336-36-3	1336-36-3		3	185	-35-				-8-	(diriginals)	(шд/кд) (ө)	
Arochlor 1016	12674-11-2	0.0001	15	0.3	0 13	0 110	107 005	ò	į			
Arochlor 1260		.L.	15	03	2 5	0410	107,703	0.1%	701	20	0.21	
Totrachiomothy (DOE)	7 07 107		2	2.5	2	20.103	022,422	% [:0	222	20	1.65	
Tolliene	12/-18-4	0.005	1.5	0.3	0,13	0.754	265	0.1%	0.265	20	0.053	
	108-88-3	0.1	1.5	0.3	0.13	0.272	140	0.1%	0.140	20	7.27	
Trichlorocthane	71-55-6	0.2	1,5	0.3	0.13	0.705	135	0.1%	0.135	20	158	
alleliane de la la la la la la la la la la la la la	9-10-67	0.005	1.5	0.3	0.13	0.422	94	0.1%	0.094	20	0.033	
Xylenes	1330-20-7	1.0	1.5	0.3	0.13	0.279	233	0 1%	0 233	30		
m-xylene	108-38-3	1.0	1.5	0.3	0.13	0.301	196	0 1%	3 6	2 6	4 2	
o-xylene	95-47-6	1.0	1.5	0.3	0.13	0.213	241	0.1%	0.241	8 8	1000	
p-xylene		10	1.5	0.3	0.13	0.314	311	0.1%	0.311	200	10.78	
											2	T
								-			ži.	
(1) Ground works also									•			
If the Mother A county level used for calculation. Fro	ised for calci	ulation. Fro	m proposed ta	ble 720-1 exc	Sept for Cr II	used 0.1 n	ng/l and for	PAHs us	ed Method	om proposed table 720-1 except for Cr III used 0.1 mg/l and for PAHs used Method B value for B/a)P		
(2) From an institut 77.1 Box 2.2.1 Box 2.2.1 Box 3.2.1	r cleanup lev	Vel for B(a)F	of 0.1 ug/lis l	ised, the soil	cleanup lev	el becomes	1.94 mg/kg	for B(a)F	-			
(3) Source: Soil Screening Guidance: Technical Background Document, EPA/540/R-95/12B. May,	ance. Techn	ical Backon	ance: Lechnic	H EDA/SAOV	d Documer	it. EPA/540	/R-95/12B.	May, 1996	96			
EDB values from ATSDR Toxicological Profile (TP 91/13)	xicological P	rofile (TP 9	1/131	1010	1.33/ (25. I	//dy, 1990. L	Suondeex	are:				
MTBE from USGS final draft report on fuel oxygenates (March, 1996)	report on fu	el oxygenate	es (March, 199	(9)								
Arochlor values for Henry's constant and solubility limit from ATSDR Toxlicological Profile (Dec. 1998); Arochlor Koc from FPA 1994 draft of soil sociological sociological Profile (Dec. 1998); Arochlor Koc from FPA 1994 draft of soil sociological Profile (Dec. 1998); Arochlor Koc from FPA 1994 draft of soil sociological Profile (Dec. 1998); Arochlor Koc from FPA 1994 draft of soil sociological Profile (Dec. 1998); Arochlor Koc from FPA 1994 draft of soil sociological Profile (Dec. 1998); Arochlor Koc from FPA 1994 draft of soil sociological Profile (Dec. 1998); Arochlor Koc from FPA 1994 draft of soil sociological Profile (Dec. 1998); Arochlor Koc from FPA 1994 draft of soil sociological Profile (Dec. 1998); Arochlor Koc from FPA 1994 draft of soil sociological Profile (Dec. 1998); Arochlor Koc from FPA 1994 draft of soil sociological Profile (Dec. 1998); Arochlor Koc from FPA 1994 draft of soil sociological Profile (Dec. 1998); Arochlor Koc from FPA 1994 draft of soil sociological Profile (Dec. 1998); Arochlor Koc from FPA 1994 draft of soil sociological Profile (Dec. 1998); Arochlor Koc from FPA 1994 draft of soil sociological Profile (Dec. 1998); Arochlor Koc from FPA 1994 draft of soil sociological Profile (Dec. 1998); Arochlor Koc from FPA 1994 draft of soil sociological Profile (Dec. 1998); Arochlor FPA 1994 draft of soil sociological Profile (Dec. 1998); Arochlor FPA 1994 draft of soil sociological Profile (Dec. 1998); Arochlor FPA 1994 draft of soil sociological Profile (Dec. 1998); Arochlor FPA 1994 draft of soil sociological Profile (Dec. 1998); Arochlor FPA 1994 draft of soil sociological Profile (Dec. 1998); Arochlor FPA 1994 draft of soil sociological Profile (Dec. 1998); Arochlor FPA 1994 draft of soil soil soil soil soil soil soil soil	constant and	solubility lin	nit from ATSDI	P Toxlicologic	al Profile (C	ec, 1998); /	Arochlor Ko	c from FF	7A 1994 dr	aff of earl coronic	Constitution of	
That is: m = 51% of total sales are a weighted average of m	a weighted a	verage of m	o & p xylene t	ased on gas	oline compo	sition data f	rom TPH C	riterial W	orking Gro	1,0 & p xylene based on gasoline composition data from TPH Criterial Working Group-Volume 2 (May 1998)	ty guidance	Ť
H' for all metals expent merciny assumed = 20% Maximum With the Fig. 6 of total xylene.	HILY 35511709	o or total xy	ene, and , p =	21% of total	xylene.	1.						
(4) Based on review of data available from the literature	lable from th	e literature	and WA State sites	Citos	no full and	dance.			-			
(5) From equation 747-2 for organics. For metals, based on review of data available from the literature and MA State at the state of th	inics. For m	etals, based	on review of c	lata available	from the life	bue onthere	M/A Chata a	4				
(6) Calculated using equation 747-1 (3-phase model) with	7-1 (3-phase	model) with	th model defaults (as shown in this table) and ground water cleaning lovel change in this table)	ts (as shown	in this table	and oronn	d water de	Spiles.	- Should	1		
								מאַכוּ	TI LIMOTE S	uns table.		
									+			
									-			T

			·
r			
		·	

(mg/kg) (15) 0.000054 0.028 Sun 0.006 Mass 69.0 2000 2000 0.085 2,32 4.07 4.46 3000 2.09 0.00 0.30 0.30 0.30 0.30 0.43 (mg/kg) (13) | (mg/kg) (14) Concentration Soil Mass 0.000013 0.0062 0.0054 0.0010 2,000 2.08 2.30 0.67 0.086 0.30 0.23 0.096 0.43 0.83 2.86 3000 4.07 9 3.81 0.000013 0.0062 0.0054 0.0010 0.0044 2.8 2000 3000 0.67 2.08 ŝ 4.07 2.86 0.09 0.30 0.23 0.10 0.43 3.81 0.83 Concentration Vapor Mass (mg/m³) (11) | (mg/kg) (12) 1.73E-07 0.39 1.99E-07 0.00078 9.46E-08 7.07E-10 0.00016 2.85E-09 9.63E-10 8.07E-08 1.36E-09 0.0020 5.82E-07 1.25E-11 0.0055 1.09E-03 8.16E-06 1.11E-05 9.31E-04 1.45E-07 3.29E-05 Vapor 0.0020 0.0023 22.8 0.0067 6 7.2 ဗ္ဗ Water Mass (mg/kg) (10) 0.000048 0.000040 0.000048 0.000048 0.000048 0.000048 0.0012 0.00080 0.000048 0.020 0.020 0.060 0.008 0.20 0.020 0.40 2.8 0.64 Cohcentration Pore Water (mg/l) (7) 0.10 0.10 0.00024 0.00024 0.00024 0.00024 0.00020 0.00024 0.0060 0.0040 0.00024 0.00024 0.10 0.040 0.10 0.0 0.30 0.40 4 3.2 (mg/kg) (9) 10,628 Csat 1,076 2,831 493 3.4 1.6 1.6 1.6 1.6 1.6 17 8 **4** 4.5 F Soir? (8) NAPL S S 2/3 2/2 B/2 2 2 2 2 2 일 운 2 S 2 ટ ટ Yes ટ 2 S (mg/l) (3) Concentration Solubility 0.0250 0.0094 0.0008 0.00162 0.0016 0.00249 0.000022 1,750 50,000 13,000 4,000 169 6.8 रू Pore Water (mg/l) (7) 0.00020 0.00024 0.00024 0.00024 0.00024 0.00024 0.0060 0.0040 0.00024 0.10 0.10 0.040 0.10 2.0 0.40 1.0 3.2 4 18540-29-9 16065-83-1 7440-38-2 7440-43-9 7440-47-3 50-29-3 106-93-4 205-99-2 CAS No. 7439-97-6 1634-04-4 50-32-8 218-01-9 7439-92-1 71-43-2 58-89-9 91-20-3 75-09-2 53-70-3 207-08-9 56-55-3 g Ethylene dibromide (EDB) 3-Phase Model Results Dibenzo[a,h]anthracene Indeno[1,2,3-cd]pyrene Benzo[b]fluoranthene Benzo[kjfluoranthene Benzo[a]anthracene Methylene Chloride Mercury (inorganic) Chromium (total) Chromium VI Chromium III Benzo[a]pyrene Ethyl Benzene cPAH Mixtures Naphthalene Cadmium Chrysene Benzene Arsenic Lindane DOT ead

Table 7: 3-Phase Modeling Assumptions and Results

	•		
			•

3-Phase Model Results												
		Pore Water		NAPL		Pore Water		Vonor				
	CAS No.	Concentration	Solubility	.⊑	Csat	Concentration	Water Mace	Concentration	Vonce Man	Too	::	Sum
	Section of the sectio	(T) (l/gm)	(F) (mg/l) (3)	8	(mg/kg) (9)	(mg/l) (7)	(mg/kg) (10)	(ma/m³) (11)	(ma/kn) (12)	(mg/kg) (49)	Soil Mass	Mass
PCB Mixtures	1336-36-3			· · · · ·						(C) (S) (S)	(14)	(III) (By/Sill)
Arochlor 1016	12674-11-2	Ш	0.42	S	45	0.0020	0.00040	0.24	20 000	3	i i	
Arochlor 1260		0.0020	90.0	2	99	0.0020	0.00040	0.38	2.00E-03	2.0	12.0	0.21
Tetrachloroethylene (PCE)	127-18-4	0.10	200	۶	90	0.70	0000		0.E0E-03	<u>†</u>	1.64	1.65
Toluene	108-88-3	20	526	2 2	3 5	2 5	0.020	75	0.0065	0.0265	0.0265	0.053
1.1.1 Trichloroethane	71.55.6	10	000			2	P	2440	0.47	2.80	2.80	7.3
Trichloroethylene	79-01-6	5	0000	2	527	4.0	0.80	2820	0.24	0.54	0.54	1.58
	0	0.10	001,1	Q.	\$65	0.10	0.020	42	0.0037	0.0094	0.0094	0.033
Ayleries	1330-20-7	20	171	No	78	20	4.0	5580	0.48	A GE	99 /	,
HIT-Xyleria	108-38-3	20	161	Š	89	20	4.0	6020	0.52	8 8	9 6	- 0
o-vylene	95-47-6	20	178	ટ	82	20	4.0	4260	0.37	4.82	4 82	4.0
D VALOR		20	185	2	100	20	4.0	6280	0.54	6.22	623	2.5 8.01
				+	T							
(7) Pore water concentration = ground water cleanin level X dilution factor	ground water	r cleanin fevel	X dilution fa	1000					-			
(8) There is NAPI in the soil if the nora water consciously in the soil if the nora water consciously	the nore west	or conceptions	i longing									
(9) Csat is the soil concentration above which there is NAM.	on above water	is concentration	exceeds u	ie solubilit	y limit.							
(10) Water mass – [Pore water	Copported WI	IICII (liere is INA)	1 In the sol	T IS CAIC	ulated by sul	calculated by substituting the solubility limit for the [ground water cleanup level X DF] in equation 747-1	bility limit for th	ne [ground water	cleanup level	K DFI in equation	747-1	
(11) Vapor concentration = Pore water concentration V Hounds Concentration	re water con	Softwarer II	raction / so	I DUIK den	sity. I his is	density. This is the mass of contaminant in the water phase.	aminant in the	water phase.				
(12) Vanor mass - Napar con	No series	SOLING HOLL A LICE	ity & COITSIE									
(13) Soil concentration = Pore water concentration X Kd	water concer	son air rraction,	/ Soil bulk de	ensity. Th	is is the mas	This is the mass of contaminant in the vapor phase.	in the vapor pl	lase.				
(14) Soil mass = [Pore water concentration X Kd X soil built density] soil built density. This is the mass of	oncentration	X Kd X soil hilk	deneity! / c	21.14.10	This is	**************************************				,		
(15) Sum mass = water mass + vanor mass + color mass + vanor mass + valor mass + va	+ vanor mass	T soil mace T	hie vellen	an main and	alony. Talls I	s une mass or col	Itaminant in the	e soil phase.				
		100	A Anna er	dals ule s	on cleanup in	evel.						

. .

Table 8: 4-Phase Model Results using Fresh ARCO Gasoline

			1.811 kg/l 0.0010 Unitless 20.0 Unitless				ot existing!		in Solid: 46.11%	in NAPL: NONE
© Solid: ■ Air: D Wator: D NAPL:	1	= Q Q €	foc DF	0.30	47	0.27	NAPL phase is not existing!	Yes!	hase: 20.89%	hase: 33.00%
Soil - Mass Distribution 21% 0% 0% 16% 16% 18 Soile 33% 10 Soile	Total soil porosity: default is 0.43	Volumetric water content: default is 0.3 Initial volumetric air content: default is 0.13 Soil bulk density measured: default is 1.5 **Or. use soil bulk density commuted @eats	Fraction Organic Carbon: default is 0.001 Dilution Factor: default is 20	Soil Concentration:		HI @ Predicted G.W. Concentration:	Volumetric NAPL Content, QNAPL: NAPL Saturation (%), QNAPL/n: Type of model used for communation:	Computation completed? TPH Distribution @ 4-phase in soil pore system:	lotal Mass distributed in Water Phase: 20.89%	Total Mass distributed in Air Phase: 33.00%
	Predicted G.W.	3.49 1 0.0	0.00	5.86 18	ę.	93	0 0 0	0		47
46.1% 33.0% 20.9% NONE 100.0%	Protective Soil ppm	0.27 0.14 0.03	0.00 0.00 0.00	0.033 0.13	0.02	0.04 0.04 0.04	2000 0000 0000	00.0		06:0
Solid: Avater: NAPL:	Equilibrium Composition %	ARCO1 29.93% 15.31% 3.77%	2.56%	3.67% 14.62%	2.73%	4.15%	0.0191	0.43%	òòò	00.001
		Aliphatics EC>5-6 EC>6-8 EC>8-10	EC>10-12 EC>12-16 EC>16-21 Aromatics	Benzene Toluene	Ethylbenzene	EC>8-10 EC>10-10	EC>12.16 EC>16.21 EC>21.35	Naphthalene MTBE		100

Soil Concentration =

0.90

Gasoline composition from 9/3/98 neat product analysis conducted by Northcreek Analytical, Inc under contract to Ecology.

This is a summary sheet from an Excel program created by Hun Seak Park at the Pollution Liability Insurance Agency (PLJA) and modified by Ecology staff

For this particular composition, the allowable soil concentration is controlled by the predicted concentration of benzene (5.86 ug/l) in the ground water,

÷				
	C.			
		÷		
			,	
)		
				TO THE PARTY OF TH
·				

Table 9: 4-Phase Model Results using ARCO #5 (ARCO composition closest to 0.1% benzene)

	Control Control		1.811 kg/l 0.0010 Unitless 20.0 Unitless		_	L not existing!		in Solid: 77.18%	in NAPL: NONE
· .	2	. Š o e	foc DF	28.00	1.01	NAPL phase is not existing!	3-Phase Model Yes!	ase: 11.05%	ase: 11.76%
Soil - Mass Distribution 11% 0% 12%	Total soil porosity: default is 0.43	Volumetric water content: default is 0.3 Initial volumetric air content; default is 0.13 Soil bulk density measured; default is 1.5 *or, use soil bulk density computed @solid density2 getuan.	Fraction Organic Carbon: default is 0.001 Dilution Factor: default is 20	Soil Concentration:	Predicted Ground Water TPH (ug/l: HI @ Predicted G.W. Concentration:	Volumetric NAPL Content, QNAPL: NAPL Saturation (%), QNAPL/n:	The of model used for computation: Computation completed? TPH Distribution @ 4-phase in soil pore system:	Total Mass distributed in Water Phase: 11.05%	Total Mass distributed in Air Phase: 11.76%
·	Predicted G.W. ug/l	4.93 .22 4.6	0.58 0.00 0.00	3.29 109	. 259 . 250 308	8 <u>7.</u> 200	12 0		the second of the second
77.2% 11.8% 11.1% NONE	Protective Soil ppm	0.38 3.74 3.59	3.02 0.00 0.00	0.019 0.80	281 281	2.73 2.16 0.00	0.35	0000	00.02
Solid: Air: Water: NAPL:	Equilibrium Composition %	136%		0.066% 2.8%	10.0%	26.3%	1.27%	100 00%	S 0/ 00:001
	Aliphatics	EC>5-6-8 EC>6-8 EC>8-10	EC > 12-16 EC > 16-21 Aromatics	Benzene Toluene Ethabonean	Xylenes EC >8-10	EC>10-12 EC>12-16 EC>16-21 EC>21-35	Naphthalene MTBE	Total	Disease and the second of the

Soil Concentration =

28.00

Gasoline composition is fresh product weathered to approximately 0.1% benzene, simulated by removal of mass in dissolved and vapor phases by successive model runs. This benzene composition is typical of soil benzene concentrations found in soils at gasoline contaminated sites in WA State.

This is a summary sheet from an Excel program created by Hun Seak Park at the Pollution Liability Insurance Agency (PLIA) and modified by Ecology staff For this particular composition, the allowable soil concentration is controlled by the predicted hazard index of the gasoline mixture in the ground water

,

Table 10: 4-Phase Model Results using Fresh BP Gasoline

	. 1000		1.811 kg/l 0.0010 Unitless 20.0 Unitless				ot existing!	in Solid: 52.87%	in NAPL: NONE
	c	: Š Š £	foc DF	1.00	37	0.24	NAPL phase is not existing! N/A 3-Phase Model Yes!	ise: 14.75%	tse: 32.38%
Soil - Mass Distribution 15% 0% 15% 0% 15% 0% 15 Solid	Total soil porosity: default is 0.43	Volumetric water content: default is 0.3 Initial volumetric air content: default is 0.13 Soil bulk density measured: default is 1.5 *or, use soil bulk density committed @enit density	Fraction Organic Carbon: default is 0.001 Dilution Factor: default is 20	Soil Concentration:	Predicted Ground Water TPH (ug/l:	I'll @ Fredicted G.W. Concentration:	Volumetric NAPL Content, QNAPL: NAPL Saturation (%), QNAPL/n: Type of model used for computation: Computation completed? TPH Distribution @ 4-thase in soil page contents.	Total Mass distributed in Water Phase: 14.75%	Total Mass distributed in Air Phase; 32.38%
	Predicted G.W. ug/l	3.69 1 0.1	0.00 0.00	5.16	, ç	2 ₪	N-00-0		37
52.9% 32.4% 14.8% NONE 100.0%	Protective Soil ppm	0.28 0.17 0.05	0.00 0.00 0.00 0.00	0.029	0.02	0.06	0.09 0.00 0.00 0.02 0.00		90.6
Solid: Air: Water: NAPL:	Equilibrium Composition %	28.48% 17.2% 4.6%	%c.c	2.9%	1.7%	5.5%	9.2% 6.6% 0.0% 1.6% 0.0%) do 00 r	200.0%
	Aliphatics	元 (100年) (100年	EC >12-16 EC >12-16 EC >16-21	Benzene Toluene	Emylbenzene Xylenes	EC>8-10	EC>10-12 EC>12-16 EC>16-21 EC>21-35 Naphthalene MTBE	Total	

Soil Concentration =

1.00

Gasoline composition from 9/3/98 neat product analysis conducted by Northcreek Analytical, Inc under contract to Ecology.

This is a summary sheet from an Excel program created by Hun Seak Park at the Pollution Liability Insurance Agency (PLIA) and modified by Ecology staff For this particular composition, the allowable soil concentration is controlled by the predicted concentration of benzene (5.16 ug/l) in the ground water.

		·	

Table 11: 4-Phase Model Results for BP#4 (BP Composition closest to 0.1% Benzene)

				0.430 Uniffess			_	zo.o Unitiess			٠,		rt existing!			in Solid: 78.72%	in NAPL: NONE
				E	Š Č	£	Ş Q U	5	22.00	490	0.92		NAPL phase is not existing!	3-Phase Model	Yes!	se: 8.90%	se: 12.37%
bution	© Solid: ■ Ar. □ Water. □ NAPL.				.3 s 0.13	1.5 People downs now	e solid density=2.65kg/l;				ncentration:				re system:	Total Mass distributed in Water Phase: 8.90%	Total Mass distributed in Air Phase: 12.37%
Soil - Mass Distribution	12% 9% 0% 12% 5% 9% 12%	-	Total soil norrositus defendit soil	imotio motor octaviti s 0.43	Milital volumetric air content; default is 0.3	Soil bulk density measured: default is 1.5 *Or. use soil bulk density committed Gonfal Journal	Fraction Organic Carbon: default is 0.001 Dilution Factor: default is 20		Soil Concentration;	Predicted Ground Water TPH (ug/l:	HI @ Predicted G.W. Concentration:		Volumetric NAPL Content, QNAPL: NAPL Saturation (%), ONAPI /n:	Type of model used for computation: Computation completed?	TPH Distribution @ 4-phase in soil pore system:	Total Ma	Total
			Predicted G.W.	STATE OF THE PARTY	7.53 Ini	X	0.58 Fr. 0.00 Dil			•			92 0 AN		0 TPI		490
	78.7% 12.4% 8.9% NÓNE	100.0%	Protective Soil ppm		3.11	2.19	3.04 0.00	Oren	0.028 0.44	0.25	1.41	4.45	8.54 0.00	0.00	000	1	22:00
	Solid: Air: Water: NAPL:		Equilibrium Composition %	BP #4	2.640%	9.935%	13.808%		0.127% 2.003%	1.135%	6.427%	20.242%	0.000%	3.198%	%000.0	ò	200.000
				Aliphatics	EC >56 EC >68 EC >68	EC >8-10	而の × 16 17 18 18 18 18 18 18 18 18 18 18 18 18 18	Aromatics	Senzene Toluene	Ethylbenzene	Aydress EC >8-10	EC > 10-12	EC>16-21	Naphthalene	31.0E	Total	100

Unitless
Unitless
Unitless
Kg/l
Kg/l
Unitless
Unitless

Soil Concentration =

Gasoline composition is fresh product weathered to approximately 0.1% benzene, simulated by removal of mass in dissolved and vapor phases by successive model runs. This benzene composition is typical of soil benzene concentrations found in soils at gasoline contaminated sites in WA State.

This is a summary sheet from an Excel program created by Hun Seak Park at the Pollution Liability Insurance Agency (PLIA) and modified by Ecology staff For this particular composition, the allowable soil concentration is controlled by the predicted concentration of benzene (4.95 ug/l) in the ground water.

•		

Soil - Mass Distribution

25.5%	1.5%	100 0%
Solid: Air:	Water: NAPL:	

	% ⁷ / _{1%} 25%
72%	5%

Solid	Air	II Water	ONAPL:

Unitless
Unitless
Unitless
kg/l
kg/l
Unitless
Unitless

0.430 0.300 0.130 1.500 1.811 0.0010

c og og €

105.00

횽뮤

399

er reulicited G.W. Concentration: 1.00
0.000
4-Phase Model
Distribution @ 4-phase in soil pore system:
Total Mass distributed in Water Phase: 1.52%
Total Mass distributed in Air Phase: 0.62%

Soil Concentration =

105.00

Gasoline composition is fresh product weathered until 100 PPM in the soil will pass, simulated by removal of mass in dissolved and vapor phases by successive model runs.
This composition represents highly weathered gasoline with no detectable benzene in the soil.
This is a summary sheet from an Excel program created by Hun Seak Park at the Pollution Liability Insurance Agency (PLIA) and modified by Ecology staff.
For this particular composition, the allowable soil concentration is controlled by the predicted hazard index of the gasoline mixture in the ground water

		William I
		eronia.
		-

-	-	
-		

		TA (PERIODOLINIA)
		•
•		3

DEPARTMENT OF ECOLOGY

February 9, 2001

TO:

Interested Persons

FROM:

Pete Kmet, Senior Environmental Engineer

Toxics Cleanup Program

SUBJECT:

Calculations for Table 745-1; Method A Industrial Soil Cleanup Levels

For Industrial Properties

Attached are several spreadsheets providing background information leading to the Method A soil cleanup levels in Table 745-1. These tables include:

Table 1:

A "quick summary" illustrating the current Method A soil cleanup levels, proposed Method A soil cleanup levels, and a brief explanation of the reasoning for the new Method A values. The values that are proposed to be changed are highlighted with boxes.

Table 2:

A detailed compilation of the information considered in the development of the Method A soil cleanup levels. This includes: The Method C direct contact values for soil ingestion and soil ingestion plus dermal (skin) absorption (for both carcinogenic effects and noncarcinogenic effects), the Method C soil leaching values using the 100 X ground water rule and the proposed 3 phase model, the proposed terrestrial ecological evaluation values, values from other laws, the practical quantitation limit, natural background, and other relevant information.

Table 3:

Describes the assumptions and equation used to calculate the Method C values assuming **soil ingestion** (for carcinogens).

Table 4:

Describes the assumptions and equation used to calculate the Method C values assuming **soil ingestion** (for <u>non</u>carcinogens).

Table 5:

Describes the assumptions and equation used to calculate the Method C values assuming **concurrent soil ingestion plus dermal** (skin) absorption (for carcinogens).

Table 6:

Describes the assumptions and equation used to calculate the Method C values assuming concurrent soil ingestion plus dermal (skin) absorption (for noncarcinogens).

Table 7:

Describes the assumptions and equations used to calculate soil concentrations protective of drinking water using the proposed 3 phase leaching model.

Tables 8-12

4-Phase model results summary sheets for 2 brands of fresh **gasoline** and these same gasolines using various weathered compositions.

745hcover.doc

. r

Table 1: Quick Summary – Basis for Method A, Table 745-1, Industrial Land Use Soil Values

		Current Method A	Dropoud	
Hazardous Substance	CAS Number	CAS Number Cleanup Level		Basis
		mg/kg		National Company of the Company of t
				n desiración
Arsenic	7440-38-2	200	20	Protection of drinking water, adjusted for hardware (1)
Benzene	71-43-2	0.5	0.03	Protection of drinking water-based on porth 3 and 4 mace models
				Toronto Indiana Indiana
Benzo(a)Pyrene	50-32-8	none	2	Protection of drinking water-3 phase model
Cadmium	7440-43-9	10	N	Protection of drinking water adjissed for POI
				ן
Chromium (total)	7440-47-3	500.0	none	Replaced by values for Cr III and Cr VI
Chromium VI	18540-29-9		5	Protection of drinking water—3 nase model
Chromium III	16065-83-1		2000	Protection of drinking water-3 neason model.
				The state of the s
TOO	50-29-3	S		Protection of drinking water3 phase model
Ethylbenzene	. 100-41-4	20	9	Protection of drinking water—3 phase model
Ethylene dibromide (EDB)	106-93-4	0.001	0.005	Protection of drinking water adjusted for POI
Lead	7439-92-1	1000.0	1000	Ingestion (3)
Lindane	58-83-9	ଷ	0.01	Protection of drinking water adjusted for POI
Methylene chloride	75-09-2	0.5	_	Protection of drinking water—3 phase model
			Π	CONCIL DEBIT OF THE PROPERTY O
Mercury (inorganic)	7439-97-6	-		Protection of drinking water. 3 phase model
MTBE	1634-04-4	none		Profession of drinking water—3 phase model.
Naphthalenes	91-20-3	none	2	Protection of drinking water—3 phase model. Total of nanhthalene 1-mother mantheness of a section 1
PAHS (carcinogenic)		8	none	Replaced by benzo(a)pyrene.
PCB Mixtures	1336-36-3	10.0	10	ARAR. This is a total value for all PCPs in the soil sample
l etrachloroethylene	127-18-4	0.5	0.05	Protection of drinking water-3 phase model.
1				
	108-88-3	9	^	Protection of drinking water-3 phase model.
i, i, i incholoemane	71-55-6	8	1	Protection of drinking water—3 phase model.
Trichloroothylono	20 00		T	
Xvlenes	C-10-67	ري در و	е	rotection of drinking water-3 phase model.
Salar Salar	1-02-0551	8	o l	Protection of drinking water-3 phase model. Total of all m, o & p xylene.
TDH (total)	2 00 00077			
(iotal)	14280-30-9			
Gasoline range organics	6842-59-E			
GRO with benzene	2	100	8	references of definitions unchan
GRO w/o benzene		5	- 67	Protection of uniming water 4 triade model, assuming Weathered gasoline composition.
Diesel Range Organics		2002		Protection to unimally water—to phase model, assuming highly weathered gasoline composition.
Heavy Oils		200		Order for a minute water leaves and a second and a minute water leaves and a minute water leaves and a minute minute and a minute water leaves a minute water leaves and a minute water leaves
Electrical Insulating Mineral Oil		200 (4)		Profession of drinking water-residual samanan
,				
(1) Based on background value	in table 740-1	Foology intends	to review a	(1) Based on background value in table 740-1 Fording intende to review and it amounted with military and it amounted to the second seco

Based on background value in table 740-1. Ecology intends to review and, if appropriate, update this value in a future rulemaking.
 This can also be used as the total toxic equivalents for all cPAHs. See WAC 173-340-708(8).
 Ecology decision not to change at this time. Ecology intends to review and, if appropriate, update this value in a future rulemaking.
 Ecology has also issued a fact sheet (#95-157-TCP) allowing the use of 2000 mg/kg at electrical substations and switchyards.
 To use this value no benzene must be present in the soil and the total of ethyl benzene, toluene & xylene must be less than 1% of the gasoline mixture.

)
					è	
			·			
					·	
	•					

Table 2: Summary Table for Method A Industrial Soil Cleanup Values in Table 745-1.

Method A Soil Cleanup Levels 4or Ind	ndustrial Land Uses	Ses								
		Criment								
		Method	Incoetion	Incorporation	nerman +	Dermal +	Leaching	180×		
Hazardous Substance	CAS Number	CAS Number Cleanin Level	Carcinogen	Noperation	Indestion	Ingestion	3-Phase	Ground water	Ц	
		ma/kg (1)	1	ma/kg (3)	Cardinoden	Noncarc	M odel	C/U level	- 1	Office
Arsenic	300				+ 7 A	(c) 6y/6ur	mg/kg (5)		mg/kg (8)	(6) 6)/6W
Benzene	74 40 0	200.0	88.0	1,050	33	466	29	0.5		
	7-2-1	0.5	4,526	10,500	2,627		0.028	0.5		0.1
Benzo(a)Pyrene	50-32-8	euou	18		4.3		0.93/1.0	2		
Cadmium	7440-43-9	10.0		3,500		1,460	0.69	10.0		
Chromium (total)	7440-47-3	500.0						2.		
Chromium VI	18540-29-9			40 500		200	,			
Chromium III	16065-83-1			pure		35,726	19	to Ç		200
DDT	50-29-3	5.0	386	1 750	037		200	2		
Ethylbenzene	100-41-4	20.0	3	350,000	8	449 655	4.1	0.03		
Ethylene dibromide (ECD)	. 00 00,					CC0'0+1	ö	9		
Lead	7430 00.4	10000	1.5		0.66		0.00005	0.001		
	1-30-00-7	0000	(01)				3,000	1.5		
Lindane	58-89-9	20.0	101	1,050	83	341	0 0062	60.0		
Iwerrytene chlonde	75-09-2	0.5	17,500	210,000	10,157	121,878	0.022	0.5		
Mercury (inorganic)	7439-97-6	1.0		1 050		900	·			
MTBE	1634-04-4	none		2001		707	2.7	0.2		
Naphthalene	0 00						0.085	2		
PAHs (carcinganic)(11)	21-20-3	none		70,000		16,613	4.5	16		-
		20:0	18		4.3		0.23	0.01		
PCB Mixtures (12)	1336-36-3	10.0	66/328/1,875	70/245	14/70/401	15/50	2 1/0 0	č		
l etrachloroethylene	127-18-4	0.5	2,574	35,000	1.093	20.00	0.053	200		-
Toluene	108-88-3	40.0		000			33.5	2		
1,1,1 Trichloroethane	71-55-6	2002		000,007		297,309	7.3	9		
Trichloroethydone		200		9		bure	1.6	8		
Xvlenes	1.00.00	0.5	11,932		5,068	pure	0.033	0.5		
The second secon	/-02-0se	20.0		bure			9.1	\$		
777										
(1) From WAC 173-340-740 Table 2 [1/26/	26/96 revision].									
(2) Calculated using equation 745-2.		-								
(3) Calculated using equation 745-1.										
(4) Calculated using equation 745-5. For comparison only. Not used in setting clearup levels since defaults not changed for other nathways	or comparison or	lly. Not used in	setting cleanup l	evels since det	aults not changed	or other pathways				
(2) Calculated using equation 745-4. For comparison only. Not used in setting dearup levels since defaults not change (for other nathways)	or comparison or	ly. Not used in:	setting cleanup	evels since defa	aults not changed	or other nathways				
(6) Calculated using equation 747-1 and proposed Table 720-1 ground water cleanup levels. Except for Cr used 100 mph and for PAIHs rised Mathemate A and B professional Applications and the part of the part o	d proposed Table	720-1 ground w	rater cleanup lev	els. Except for	Cr III used 100 pp	band for PAHs us	od Mathode A a	and contain a box	0,70	
(1) Calculated using 100 X table 720-1 ground water dearup level. Except for Cr III used 100 ppb and cPAH used current Method A value	ground water dea	anup level. Exce	ept for Cr III used	1 100 ppb and c	PAH used current	Method A value		ייי אמותפא ייי	Dajr.	
(8) Vapor values not calculated				_						
(40) Value documental in 1001 and 1001	Jef; Chromium Vi	is dust value do	cumented in 199	31 MTCA respo	Chromium VI is dust value documented in 1991 MTCA responsiveness summary.	. .				
(11) Rased on henzo (s) wrong Earlanding Controlling	esponsiveness	ummary.								
(12) POB values based on various around first values for BOB and Annual Risk values for BOB and First Risk values for BOB and	hors and IRIS va	is based on Michael Mi	Strod & ground v	vater cleanup le	vel, second value	is based on Methy	od A ground wat	er cleanup leve	I for B(a)P.	
			35							
				-						

		•	
			۷
			,
			(
	·		
•			
			į

Table 2: Summary Table for Method A Industrial Soil Cleanup Values in Table 745-1.

Method A Soil Cleanup Levels for Industrial Land Uses	dustrial Land	Uses								
										T
		Current		Dermal +	Leaching		100 X			
		Method A	Indestion	Ingestion	Using	Residual	Ground water			
Hazardous Substance	CAS Number	AS Number Cleanup Level	Noncarc.	Noncarc.	4-phase Model	Saturation	CAT level	Vanor		T
<u>u</u>		mg/kg (1)	mg/kg (2)	mg/kg (3)	mg/kg (4)	mg/kg (5)	mg/kg (6)			
TPH (total)	14280-30-9									
										T
Gasoline range organics	6842-59-6	100								
GRO with benzene			210,000	150,000	1/23 to 28	1,000	80	uwouyun		
GHO without benzene					105	1,000	100	unknown	-	
Ulesel Hande Organics		88	170,000	39,000	No upper limit	2,000	50	>10.000		T
Heavy Oils (8)		200	170,000	39,000	No upper limit	2.000	250	>10.000		T
Electrical Insulating Mineral Oil		2000 (9)	340,000	70,000	No upper limit	4,000	100	Not volatile		
(4) Erom W/A 470 540 740 T-EL- 0 12										T
(1) right WAC 1/3-340-740 Table 2 1/26/	Z6/36 revision.									-
(2) Calculated using surrogates. See 1/29/99 Steve Robb memo.	/29/99 Steve Ro	bb memo.								
(3) Calculated using surrogates and equat	uation 740-4. S.	on 740-4. See 1/29/99 Steve Robb memo.	e Robb memo.							
(4) Calculated using 4 phase model. For GRO with benzene, 1st value assumes fresh gas (3% benzene): 2nd values assume weathered ras () 1% henzene)	or GRO with ben	zene, 1st value	assumes fresh ga	as (3% benzen	9); 2nd values assu	me weathered na	s (~0 1% henzer	(9)		
For GRO without benzene, assumes no benzene present in gasoline mixture and that ethyl benzene, toluene and xylene are less than 1% of the gasoline mixture	s no benzene p	resent in gasolii	ne mixture and th≀	at othyl benzen	e, toluene and xyle	ne are less than 1	% of the assolin	e mixture		
For diesel, heavy oils and mineral oil, "no upper limit" means HI of 1 never exceeded. This is true only if the soil is above the water table.	oil, "no upper lim	it" means HI of	1 never exceeded	1. This is true o	inly if the soil is abo	ive the water table		C Income		1
(5) Residual saturation for coarse soils from Coen and Mercer for gas and diesel and BPA study for mineral oil.	from Coen and	Mercer for gas a	and diesel and BP	A study for mir	reral oil.					I
(6) Calculated using 1991 method of 100 X	30 X table 720-1	proposed groun	table 720-1 proposed ground water cleanup level.	fevel.						T
(1) assoline vapors not calculated. The current Method A value of 100 ppm thought to be protective for vapor pathway. Diesel vapors based on qualitative observations at sites by PLIA	e current Methoc	d A value of 100	ppm thought to t	to protective to	r vapor pathway. C	iesel vapors base	d on qualitative	observations at	sites by Pi IA	
(a) based on diesel composition.										Ī
(a) ecology has also issued a fact sheet (#95-157-1CP) allowing the use of 2000 mg/kg at electrical substations and switchyards.	# (#95-157-TCP	allowing the us	se of 2000 mg/kg.	at electrical sul	ostations and switch	yards.				Γ
										Γ

. *

Table 2: Summary Table for Method A Industrial Soil Cleanup Values in Table 745-1.

Method A Soil Cleanup Levels for Industrial Land Uses	Land Uses		ox.	*			2			

	Ecological	Ecological								
	Simplified	Indicator	Most Stringent	Controlling				Cirrent	Dropogod	THE PROPERTY OF THE PROPERTY O
Hazardous Substance	Evaluation	Concentration	الللا	Non-Eco	ARARs	Pal	Background	Method A	Standard	
mg/kg (1) mg/kg (2)	mg/kg (1)	mg/kg (2)	mg/kg	Pathway	mg/kg	mg/kg (3)	mg/kg (4)	mg/kg	mg/kg	
Arsenic	20	7	29	3	~ ~	1 (SW7060)	78.30	3000	## F	
Benzene			0.1	Leaching		0.005 (SW8250)		0.5	3 5	Descring, adjusted for background (5)
Benzo(a)Pyrene	300	12	6	- Pachina		(OT00) (OT00)			5	rivection of directing water-4 phase model
Cadmium	36	77	890	Concining 1	1	0.03 (SW82/0)		none	2	Protection of drinking water-3 phase model (6)
Chromium (Actal)			3	reactility		Z (SW6010A)	-	10.0	~	Leaching, adjusted for PQL (7)
Chromine VI	ğ	67				2 (SW6010A)	42	500.0		THE RESERVE THE PROPERTY OF TH
Chromism III			19	Leaching		1 (SW3060A)			19	Protection of drinking water_3 phase model
			2,000	Leaching		2 (SW6010A)			2000	Protection of drinking water-3 phase model
Ethytherizene	-	0.75	4.1	Leaching		0.05 (SW8081)		5.0	4	Protection of drinking water 3 phase model
			6.1	Leaching		0.005 (SW8260)		20.0	9	Protection of drinking water—3 phase model
Ethylene dibromide (EDB)			0.00005	Leaching)	0.005 (SW8260)		0.001	0 00	l eaching adjusted for DOI
	220	118	1,000	Ingestion		5.0 (SW6010A)	- 41	1000.0	1000	Indestion (8)
Lindane	10	9	0.0062	Leaching		0.01 (SW8081)		8	200	I constitute and the second se
Iweinylene chloride			0.022	Leaching		0.005 (SW/8260)		200	200	reactifility, adjusted for PCL
Mercury (inorganic)	6	5.5	10	leaching		(22,000)		C	0.02	Protection of drinking water—3 phase model
MTBE			0.085	- Pachina		0.1 (SW/4/1)	70.0	0,1	2	Protection of drinking water—3 phase model
Naphthalanes						.uua (SW8Z6U)		none	0,1	Protection of drinking water-3 phase model
PAHs (carcinodenic)	000	ļ	4.5	Leaching		0.5 (SW8260)		none	5	Protection of drinking water 3 phase model (10)
	300	12	6.1	Leaching		0.05 (SW8270)		20.0	none	Replaced with benzo(a)pyrene.
r CB MXtures	2	0.65	0.2	Leaching	9	0.04 (SW8082)		001	Ç	ADAD (A)
l euachioroethylene			0.053	Leaching	T	0.005 (SW8260)		0.5	5 5	Arthur (9)
Toluene			7.3	onidoco		100000000000000000000000000000000000000		3	20.0	riotection of diffiking water-3 phase model
1,1,1 Trichloroethane			16	Paching		00E (SW8260)		40.0	7	Protection of chinking water-3 phase model
Frichloroethylene			<u> </u>	Similar I	2	U.UUD (SW8ZBU)		20.0	2	Protection of drinking water-3 phase model
Xvlenes			0.033	Leaching		0.005 (SW8260)	***	0.5	0.03	Protection of drinking water—3 phase model
The state of the s				Leaching		0.015 (SW8260)		20.0	6	Protection of drinking water-3 phase model
(1) Value from Table 749-2 for industrial land use. For reference only, not used in developing Method A values	. For reference only,	not used in develor	oing Method A value	8						THE PERSON AND PERSON
(2) Wildlife protection value from Table 749-3. For reference only, not used in developing Method A values	ir reference only, not	used in developing	Method A values							
(3) From Manchester Lab				-						
(4) For arsenic, 1st value from upper 90% for WA State, documented in report #94-115 and 2nd value from a 1989 report by PTI Environmental Services. All others recorded to the state of th	State, documented in	report #94-115 ar	d 2nd value from a	1989 report by	PTI Environ	mental Sanicac	All others	7,41		THE PERSON NAMED IN COLUMN TWO IS NOT THE PERSON NAMED IN COLUMN TWO IS NAMED IN COLUMN TWO IS NAMED IN COLUMN TWO IS NAMED IN COLUMN TWO IS NAMED IN COLUMN TWO IS NAMED IN COLUMN TWO IS NAMED IN COLUMN TWO IS NAMED IN COLUMN TWO IS NAMED IN COLUMN TWO IS NAMED IN COLUMN TWO IS NAMED IN COLUMN TWO IS NAMED IN COLUMN TWO IS NAMED IN COLUMN TWO IS NAMED IN COLUMN TWO IS NAMED IN COLUMN TWO IS NAMED IN COLUMN TW
(5) Based on background value in table 740-1. Ecology intends to review and, if appropriate,	cology intends to revi	ew and, if approprie	ate, update this value in a future rulemaking	e in a future ruk	emaking	michigan Colvices.	The second live	4 30% III WA	State from r	900ff # 94-115.
(b) 1/18 can also be used as the total toxic equivalents for all cPAHs. See WAC 173-340-708(8)	lents for all cPAHs.	See WAC 173-340	-708(8).		-					
(2) For Cadmium, there are two possible PQLs: 0.1 PPM using SW7131 and 2 PPM using SW6010A. The later has been used since this is the more commonly ised test mathy of End.	1 PPM using SW71	31 and 2 PPM usin	g SW6010A. The la	ter has been us	sed since th	is is the more con	et best vinour	t method		
(le) Ecology decision not to change current rule value at this time. Ecology intends to review	lue at this time. Ecol	ogy intends to revie	ew and, if appropriat	e, update this v	alue in a fu	ture rulemaking		720		
Learning level is sum of all PCBs. ARAR is for low occupancy areas with a cap, from 40 CFR Part 761.61 (EPA rule governing disposal and cleanup of PCR contaminated facilities include TSCA).	low occupancy area	s with a cap, from 4	10 CFR Part 761.61	(EPA rule gove	rning dispo	sal and cleanup of	PCB contamir	ated facilities	moder TOO	The second secon
(10) rits is a total of all napritiations, 1-Methyl naprithations & 2-Methyl Naprithations. Also, use SW 8270C to measure all three types of naprithations.	phthalene & 2-Methyl	Naphthalene, Also	o, use SW 8270C to	measure all thr	ee types of	naphthalene.) O librain)/-
The second secon										

						•	
						•	
	-						
•							
						•	
				•			
			9				
•							
						•	
		•					

Table 2: Summary Table for Method A Industrial Soil Cleanup Values in Table 745-1.

Method A Soil Cleanup Levels for Industrial Land Uses	Land Uses				-					
					-		-			
	Ecological	Ecological		ľ	+		1			
	Simplified	Indicator	Most Stringent	Controlling				1	,	
Hazardous Substance	Evaluation	Concentration	Non-Eco Path	Non-Eco	ARARs	ĮQ.	Background	Mathod	Despool	Basis
(1) mg/m	mg/kg (1)	g (1) mg/kg (2)	mg/kg	Pathway	mg/kg	mg/kg (3)	mg/kg	mg/kg	mg/kg	for Standard
TPH (total)										
					1					
Gasoline range organics										
GRO with benzene	1,000 to 12,000	1,000 to 5,000	23 to 28	Paching		S (NAVTOUS SA		60,		The state of the s
GRO without benzene	1,000 to 12,000	1,000 to 5,000	105	Leaching		S CWTPH CX		3 5	3	Protection of drinking water(4)
Diesel Hange Organics	2,000 to 15,000	2,000 to 6,000	2000	Leaching		25 (NMTPH-DV)		3 8	200	Protection of drinking water(5)
Heavy Oils (6)	2,000 to 15,000	2,000 to 6,000	2000	Surface	1			3	2002	Hesidual Saturation
Electrical Insulating Mineral Oil		2006	2007	רבים כין ווין ווי		TOO (NW I PH-DX)		200 200	2000	Residual Saturation
			200	Leaching	5	100 (NWTPH-DX)		200 (7)	4000	Residual Saturation
The state of the s		8								THE RESERVE AND THE PROPERTY OF THE PROPERTY O
					+					
(1) Value from Table 749-2 for unrestricted land use. For reference only, not used in develop	use. For reference o	nly, not used in dev	eloping Method A values	philos						
(2) Most stringent indicator value from Table 749-3. For reference only, not used in developing	-3. For reference on	by, not used in devel	loping Method A values.	ues.						
(3) From Manchester Lab.										
(4) Based on 4-phase model results for weathered gasoline with 0.1% benzene, a typical value	ed gasoline with 0.1%	benzene, a typical	value for gasofine contaminated sites	contaminated si	tes					
(3) Based on 4-phase model results for weathered gasoline assuming no benzene present in	ed gasoline assuming	no benzene preser	It in soil and that ett	of benzene to	hitene & syler	soil and that ethyl benzene tolinene & whene are less than 197 of the margin and the	100 may 100 /0	-		
(6) Based on diesel composition.							oca de des	ne illixane.		*
(7) Ecology has also issued a fact sheet (#95-157-TCP) allowing the use of 2000 mg/kg at electrical substations and switch ards.	7-TCP) allowing the	use of 2000 mg/kg a	it electrical substatic	ons and switch	vards.					
								-		THE PERSON NAMED IN THE PE
										THE PARTY OF THE P
77774										THE PERSON NAMED IN COLUMN NAM
									i	

	•		
	•		
	·		
	·		

Table 3: Soil Ingestion -- Method C Industrial Soil Calculations for Carcinogens

Risk Calculations—Carcinogenic Effects of Soil Ingestion	genic Effects or	f Soil Ingestio				-							
)								,			
		Risk	Avg. Body	Ifetime	I Init Conv	Potong	1 4 4 5						
Parameter	CAS No.		Weight		Factor	Factor	G.I. ADS.	100	Duration	Frequency	Method B	ARAR (3)	Risk @
		(nuitless)	(kg)	(years)	(bu/bn)	(ka-dav/ma)	(Imittoes)	my, nate	or Exposure	of Contact	Carcinogen		ARAR(4)
Arsenic (5)	7440-38-2	0.00001	-	8	- 000 000	, , , ,			Comp	(dilless)	(mg/kg)	(mg/kg)	(unitless)
Benzene	71-43-2		202	25	000,000	0000	0.	8 5	8	0.4	88		
Cadmium	7440,49.0				200,000,1	0.023	0.1	8	82	0.4	4,526		
-	2-24-04-7					not available							
T Chromium	7440-47-3												
Chromium III	16065-83-1					not available							
Chromium VI	18540-29-9					not available							
DDT	50-29-3	0.00001	02	75	1 000 000	700							
Ethylbenzene	100-41-4				30000	not available	2:	3	20	0.4	386		
Ethylene dibromide (EDB)	106-93-4	0.00001	02	7,5	1000								
Lead	7439-92-1		2	3	1,000,000	8	1.0	SS	20	0.4	1.5		•
المراجعة ا						rioravailable							
Mothyloso chieda	58-89-9	0.00001	2	75	1,000,000	1.3	1.0	20	2	704	107		
Metry lette Giloride	75-08-5	0.00001	20	7.5	1,000,000	0.0075	1.0	200	2	700	101		
Mercury (inorganic)	7439-97-6					not overlichle					00c'/I		
MTBE	1634-04-4					not available							
Naphthalene	91-20-3					olonim in the							
ODALIMichian						not available							
CFAH MIXIUPES	na							-	7				
benzo ajanthracene	56-55-3			-		not available							
Benzo b fluoranthene	205-99-2					not available		1					
Benzo Kituoranthene	207-08-9					not available							
Benzo alpyrene	50-32-8	0.00001	70	75	1,000,000	7.3	1.0	55	8	ì			
Cnrysene	218-01-9					not available			3	t	2		
Ulbenzola, hlanthracene	53-70-3					not available							
Ideno 1,2,3-cd pyrene	207-08-9					not available							
771111111111111111111111111111111111111								-					
(1) Source of Cancer Potency Earthr is the oral stone fractum from the	Factor is the or	al clone factor	12										
(2) Value calculated using equation 745.2 and default accumus.	lation 745.2 and	default aceur		riis database,	ise, except to	except for Lindane which is from HEAST	is from HE/	ST.					
(3) Annlicable relevant and as	Account to the Collins	uciani assui		eduanon.									
(4) ARAR divided by Method Biolic is columniated.	Phiopriale reduit	ernent.											
(5) The MTCA CLARC tables surrently use of the terms.	Currently use of	I N. Bolded V	alues Indicate	AH'AH ex	seds MTCA	AHAH exceeds MTCA requirement that risk not exceed 1 X 10-5 [i.e. > 10]	t risk not exc	sed 1 X 10	-5 [i.e. >10].				
	cancing asca	an appointed to	raction of 0.4.	Inathur	per is no long	Inat humber is no longer thought to be valid and 1.0 is used here.	e valid and 1	.0 is used	iere.				
									,				
1			-				_						

	•			
•				
	\$			
				•

Table 3: Soil Ingestion - Method C Industrial Soil Calculations for Carcinogens

Risk Calculations-Carcinogenic Effects of Soil Ingestion	genic Effects of	Soil Ingestic	-										
		i				Cancer							
Daramotor		HISK	Avg. Body	Lifetime	Unit Conv.	Potency	G.I. Abs.	Soil	Ditration	Fragiliance	O Potton	30.0	i
- बबाह्य	CAS No.		Weight		Factor	Factor	Fraction	ng Rate	of Evenoring	, constant	Meniod D	AFAH (3)	HISK @
		(nuitless)	(kg)	(years)	(bu/6n)	(kg-day/mg)	(unifless)	(mn/dav)	allocato)	ol Confact	Carcinogen	,	ARAR(4)
PCB mixtures	×—									(dilless)	(mg/kg)	(mg/kg)	(unitless)
High Risk & Persistence		0.00001	70	75	1 000 000	00	,					1.0	
Low Risk & Persistence		0.00001	70	75	1 000 000	0.7	? .	ខ	20	0.4	99	1.0	0.02
Lowest Risk & Persistence		0.00001	92	7,	000,000	÷ 6	2 (3	82	0.4	328	1.0	0.003
Arocfor 1016	12674-11-2			?	000,000	0.07	2.5	20	20	0.4	1,875	1.0	0.001
	12672-29-6					not available							
	11097-69-1					not available							
Arochlor 1260						not available							
Tetrachloroethylene (PCE)	197-18-4	00000	45	ŀ									
Toluene	108-88-3	2000	2	9	1,000,000	0.051	1.0	50	20	0.4	2.574		-
						not available							
1,1,1 Trichloroethane	71-55-6					not available							
Irichloroethylene	79-01-6	0.00001	5	75	1 000 000	O CA 4							
Vidonos				?	200,000,	110.0	0.7	8	ଷ	0.4	11,932		
Ayrenes	1330-20-7					notavailable		-					
m-Xylene	108-38-3					not available		1					_
o-xylene	95-47-6					not available							
p-xylene						not available							
						not available		•					
				1									
7,77,77,77,77,77,77,77,77,77,77,77,77,7													
77.00													
				+									
(1) Source of Cancer Potency Factor is the oral slope factors from EPA's	Factor is the ora	I stope factors	from EPA's	RIS datab	ase, except for	RIS database, except for tetrachloroethylene, tricylorothylono and ring at 11.23	Viene trichi	- Cachithan	the Section of the In-				
(2) Varue calculated using equation 745-2 and default assumptions in that	ation 745-2 and	default assun	iptions in that	equation.					use villy) Callon	ue willan are I	rom HEASI.		
(4) Applicable, relevant and appropriate requirement. Source for PCBs is	propriate require	ement. Source	e for PCBs is	40 CFR P.	40 CFR Part 761.61(a)(4)(f)(A).	4)(i)(A).							
L'1/ AVAIT UNITED DY METHOD B VAIUE IN COLUMN K. Bolded values indicate	Value in column	K. Bolded v	alues indicate	ARAH ex	eeds MTCA	ARAH exceeds MTCA requirement that risk not exceed 1 X 10-5 [i.e. > 10].	t risk not ex	ceed 1 X 10	-5 f.e. > 10].				

		Į.			
			e.		
	·				
			٠		
					2
·					7000
					,

Table 4: Soil Ingestion - Method C Industrial Soil Calculations for Noncarcinogens

Risk Calculations-Noncarcingenic Effects of Soil Inge-	cinogenic Effe	cts of Soil Inde	etion		<u> </u>						
	9	Bill man									
		Reference	Avg. Body	Unit Conv.	Hazard	Soil	G I Ahe	Fraction	Mothod	3,0	
Farameter	CAS No.	Dose (1)	Weight	Factor	Quotient	Ing. Rate	Fraction	of Contact	Nonce (a)	ARAH (3)	Ø OH
		(mg/kg-day)	(kg)	(bɯ/bn)	(mittess)	(mg/day)	(unitless)	(unitless)	(ma/kn)	(Daybar)	AHAH (4)
Arsenic (5)		0.0003	22	1,000,000	-	55	· ·)))))	n b	(mindess)
Benzene	71-43-2	0.003	70	1,000,000	-	2 2	10	0.4	1,050	****	
Cadmium	7440-43-9	0.001	70	1,000,000	-	50	0 7		000,01		
T Chromium	7440-47-3	not available				3	2	+	3,500		
Chromium III	16065-83-1	1.5	20	1 000 000	+	2	,			.0.0	
Chromium VI	18540-29-9	0.003	20	1,000,000	-	20 00	0.1	0.4	5,250,000		
DDT	50-29-3	0.0005	70	1 000 000	-	2	2 .	*:	006,01		
Ethylbenzene	100-41-4	0.1	70	1,000,000		202	2.0	0.4	1,750		
Ethylene dibromide (EDB)	106-93-4	not available							000,000		
Lead	7439-92-1	not available									
Lindane	58-89-9	00003	20	000							,
Methylene chloride	75-09-2	0.06	2/02	1,000,000	- -	05	0.	0.4	1,050		
Mercury (inorganic)	7439.97.6	0000	31	200,000,1	-	8	o. -	0.4	210,000		
MTBE	1634-04-4	not available	2	000,000,1	-	20	1.0	0.4	1,050		
Naphthalene	91-20-3	0.02	70	1,000,000		50	1.0	0.4	20,000		
cPAH Mixtures	na	not available							000,07		
Benzo[a]anthracene	56-55-3	not available									
Benzo[b]fluoranthene	205-99-2	not available									
Benzo[k]fluoranthene	207-08-9	not available							•		
Benzo[a]pyrene	50-32-8	not available									-
Chrysene	218-01-9	not available			- 						
Dibenzo[a,h]anthracene	53-70-3	not available									
Ideno 1,2,3-cd]pyrene	207-08-9	not available									
									×		
(1) Source of RfDs is EPA's IRIS database except for benzer	RIS database e	xcept for benzer	ne which is from EPA's NCEA	m EPA's NCE	Ą.						
(2) Value calculated using equation 740-1 and default assum	uation 740-1 an	l assum	ptions in that equation.	equation.							
(3) Applicable, relevant and appropriate requirement.	ppropriate requ	rement.									
(4) ARAR divided by Method B value in column K. Bolded values indicate ARAR exceeds MTCA requirement that HO not exceed 1.0	B value in colun	nn K. Bolded va	lues indicate	ARAR exceed	ds MTCA rec	uirement ti	hat HO not	exceed 1.0			
(3) Ine MICA CLARC tables currently use a Gl absorbtion fraction of 0.4.	currently use a	Gl absorbtion fr	action of 0.4.	That number	is no longer	thought to	be valid an	That number is no longer thought to be valid and 1.0 is used here	pro		

C. . . •

Table 4: Soil Ingestion - Method C Industrial Soil Calculations for Noncarcinogens

Risk Calculations-Noncarcinogenic Effects of Soil Ingestion	inogenic Effe	cts of Soil Inge	stion								
***************************************		Reference	Avg. Body	Unit Conv.	Hazard	Soil	G I Abe	Erocu Conce	Marking J.	3, 4, 4,	0
Parameter	CAS No.	Dose (1)	Weight	Factor	Ouotient	Ing Rate	Fraction	of Contract	Weinod B	AHAH (3)	HO @
		(mg/kg-day)	(kg)	(gm/gn)	(mittess)	(mg/day)	(unitless)	(unitless)	(ma/ka)	(ma/ka)	AHAH (4)
PCB mixtures	1336-36-3	not available							P		(2000)
High Risk & Persistence		not available								0,1	
Low Risk & Persistence		not available									
Lowest Risk & Persistence		not available									
Arodor 1016	12674-11-2	0.00007	20	1.000.000	-	50	0	•	0 110		William I was a second
Arochlor 1248	12672-29-6	not available				3	2	4,0	245.0	1.0	0.004
Arochlor 1254	11097-69-1	0.00002	70	1,000,000	-	50	10	70	70.7		
Arochlor 1260		not available				3	2	4:0	0.07	1.0	0.01
Tother able to the											
Tellachioroemylene (PCE)	127-18-4	0.01	20	1,000,000	-	50	1.0	0.4	35,000		
euene	108-88-3	0.2	70	1,000,000	-	50	1.0	0.4	200,007		
1,1,1 Trichloroethane	71-55-6	6.0	20	1 000 000	+	7	C				
Trichloroethylene	79-01-6	not available		22212241		3	5:	. 4.0	3,150,000		
Xylenes	1330-20-7	2.0	02	1,000,000	-	50	0 -	70	7 000 000		
m-Xylene	108-38-3	not available					?!	ŧ.	000,000,		
o-xylene	95-47-6	not available									
p-xylene		not available									
		,									
(1) Source of RfDs is EPA's IRIS database except for 1,1,1,7	RIS database e	xcept for 1,1,1, T	CE which is from HEAST	from HEAST.		-					
(2) Value calculated using equation 740-1 and default assum	uation 740-1 an	id default assum	ptions in that equation	equation.							
(3) Applicable, relevant and appropriate requirement. Source	ppropriate requ	irement. Source	for PCBs is	for PCBs is 40 CFR Part 761.61(a)(4)(i)(A)	761.61(a)(4)	(A)					
(4) ArAH divided by Method B value in column K. Bolded val	B value in colur	nn K. Bolded va	lues indicate	ues indicate ARAR exceeds MTCA requirement that HQ not exceed 1.0.	ds MTCA re	quirement th	hat HQ not	exceed 1.0.			

	٠				
,					
					-
	·				
					-
					į .

Table 5: Method C Industrial Calculations for Carcinogens for Soil Ingestion plus Dermal Contact

Risk Calculations—Carcinogenic Effects of Soil Ingestion + Dermal Contac	genic Effects o	f Soll Ingesti	on + Dermal (Contac					-							
								+								
		Risk	Avg. Body	Averaging	Exposure	Expositive	3	240								
Parameter	CAS No.		Weight	Time	Frequency	Direction	1	G.L. AUS.		Unit Conv.	Surface	Adherence	Dermal	G.I. Conv.	Demal	Method B (3)
The state of the s			(kg)	(dave)	(date ha)	(mary	-	+	+		Area	Factor	Abs. Fraction	Factor	CPF (2)	Carcinogen
Arsenic	7740.20.2			Manager Commen		STATE OF THE PARTY OF		(unmess)	(kg-day/mg)	(ng/mg)	(cm²)	(mg/cm²-day)	(nuitless)	(nuidess)	(кд-дау/тд)	(ma/ka)
Benzene	2.00.01.1		R	27,375	250	8	20	1.0	1.5	3—	2500	0.0	000			The state of the s
	7-2-7	1.00001	e P	27,375	250	20	50	1.0		+	2.500	200	2000	0.95	9.1	38.84
Cadmium	7440-43-9								not similable			-	2000	0.90	0.036	2,627
T Chromium	7440-47-3								Of available							
Chromium III	16065-83-1															
Chromium VI	18540-29-9							-	not available							
+00								-	not available							
Ethylbenzene	100-23-3	0.00001	۶	27,375	250	82	92	1.0	0.34	1,000,000	2,500	0.2	0.03	02.0		
								-	not available				3	2	Se S	157.8
Emylene dipromide (EDB)	106-93-4	0.00001	0.2	27,375	250	20	20		9	200					3.5	
Lead	7439-92-1						3	\dagger	not available	000,000,	2,500	0.2	0.03	0.80	106	0.656
Lindane	58-89-9	0.00001	22	37.0.70	650		 	11	Ц						23	Sēi
Methylene chloride	75-09-2	00000	2 5	07070	002	20	20	1.0	1.3	1,000,000	2,500	0.2	100	0.50	30	1
P. Contraction Contraction		20000	2	6/6/7	000	20	20	1.0		1,000,000	2,500	0.2	0.0005	280	2000	32.78
imercury (morganic)	7439-97-6						-		1				2000	200	10000	10,15/
MISE	1634-04-4						+		not available	1	1					
Naphthalene	91-20-3								not available		-					8,848
							_	_	not available							
CPAH Mixtures	na															
Benzo[a]anthracene	56-55-3					-	-		,	1	-					
Senzolb fluoranthene	205-99-2				1		+	=	not available							
Benzolk fluoranthene	207-08-9			1				=	not available							
Benzo[a]pyrene	50-32-8	0.00001	92	27.375	DEO	8		7	not available			•				665
Chrysene	218-01-9			200	200	8	6	0.5	7.3	000,000,	2,500	02	0.13	0.80	CB	
Dibenzo[a,h]anthracene	53-70-3			+				č	not available						9	/7.4
Ideno[1,2,3-cd]pyrene	207-08-9							ć	not available		-					25
						+		É	not available							
				+	+											
(1) Source of Cancer Potency Factor is the oral stope factors from EPA's IRIS database, except for Indexes which be the stope to the st	Factor is the ora	al slope factor.	s fromEPA's IF	3IS database	Avcent for 1 in	doing unique										
(2) Dermal CPF = Oral CPF/ G	abs conversion	n factor. The	Glahe fartur	ie chomical as	5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	יישווס אוומון	SHOW OF S	-					<u> </u>			
(3) Calculated using equation 745-5 and default accumentations	745-5 and defair	# accumotion	1	2000000	recilic vee e	quanon 745-5	tor defaults	and 1/25/99	memo for cher	nical specific	actors used	Jere				
			5	1	1	+				-						
			-	-	+	+	+	+				 	-	+	1	7
		 -		-	+	+	+	1			-		-	+		1
			-				$\frac{1}{1}$						†	+	1	
											1					

Table 5: Method C Industrial Calculations for Carcinogens for Soil Ingestion plus Dermal Contact

			Method B (3)	Carcinogen	(mg/kg)	16	14.05	70.2	401		1				1,093			5 068	300'5				AZ						
			Dermal	CP+(2)	(kg-day/mg)		2.5	0.49	0.0864						0.064			0.014		236							-		
			G.L. Conv.	Factor	(unidess)		0.81	0.81	0.81			0.81			0.80			0.80											
		Č	Abs Emails	AUS. TIRCUON	(umness)		0.14	0.14	0,14						0.03			0.03											
		Adhorence	Factor	(majora day)	(mgcii day)		0.2	0.2	0.2					3	7,0			0.2											here.
		Surface	Area	(January)			2,500	2,500	2,500					2500	20017			2,500										rom HEAST.	ed equality 19-3 to tendula and 1/2339 memo for chemical specific factors used here.
		Unit Conv	Factor	(na/ma)		000,	1,000,000	1,000,000	1,000,000					1 000 000	Don's art.			1,000,000										e which are f	remical spec
		oral	CPF (1)	(ka-dav/ma)	STATES THE STATES OF		2.0	4.0	70.0	not available	not available	not available	not available	0.051	not available	Digital Sold	not avallable	0.011	not available	not available	not available	not available						to tetraction detriviere, inchiorothylene and vinyl chloride which are from HEAST.	Se memo ror ca
-		G.I. Abs.		<u>!</u>			2 .	2,5	2,1					1.0				0,								1		oromylene a	מונס וולכאו
		ক্ট	Ing. Rate	(mg/day)		ş	3 5	8	3					20			Ç	20									1-ma 44-1-1	S for defau	יים יים יים יים
		Exposure	Duration	(STY)	_	8	3 6	25	3					20			S	20									And the same	er action ceu	
		Exposure	Frequency	(days/y		250	355	25.5						250			030	RC7									and second for t	Specific Sea	-
Contac		Averaging	Time	(kg) (days)		27,375	27.875	27.375						27,375			27.975	010,12									Cherch SIGI	r is chemical	
on + Dermal		Avg. Body	Weight	(kg)		8	2	02						70			92	2						•			re from EPA's	Glabs, facto	22
Soll Ingest		Risk		(unitless)	AND DESCRIPTION OF THE PARTY OF	0.00001	0.00001	0.00001						0.00001			0.00001										d slope factor	n factor. The	t assumption
yenic Effects of			CAS No.		1336-36-3				12674-11-2	12672-29-6	11097-69-1			127-18-4	108-88-3	71-55-6	79-01-6	1 00 000	1330-20-7	200.50	3247-6	-					Factor is the ora	abs conversion	745-5 and defau
Risk Calculations-Carcinogenic Effects of Soil Ingestion + Dermal Contac		Date	raiaireier		PCB mixtures	High Risk & Persistence	Low Risk & Persistence	Lowest Risk & Persistence	Aroclor 1016			Arochlor 1260		Totion	anano	1,1,1 Trichloroethane	Trichloroethylene	Yydenae	Aylenes m-Yydene	Carlone	CANGING	p-xytene					(1) Source of Cancer Potency Factor is the oral slope factors from EPA's IBIS database account	(2) Dermal CPF = Oral CPF/ Gl abs conversion factor. The Gl abs, factor is chemical snertific.	(3) Calculated using equation 745-5 and default assumptions.

					•	
		· .				
				·		
·			•			
3						

Table 6: Method C Industrial Calculations for Noncarcinogens for Soil Ingestion plus Dermal Contact

Risk Calculations-Noncarcinogenic Effects of Soil Ingestion + Dermai Contact	inic Effects of	Soil Ingestic	n + Dermel C	ontact												
Parameter		Hazard	Avg. Body	Averaging	Exposure	Exposure	Oral Ref.	Sol	G.I Ahs	1 loft Com.	100					
	CAS No.	xəpu	Weight	Time	Frequency	Duration	Dose (1)	nd Rate	Litter	C C C C C C C C C C C C C C C C C C C	. COM.	Dermai	Surface	Adherence	Dermal Abs.	Method B
	7	_3	(kg)	(cdays)	(cays	λη) (years)	(mg/kg-day)	(ma/dav)	(mitless)	(may/cm)	Lactor,	HTG (2)	Area	Factor	1	Noncarc(2)
Arsenic	7440-38-2	·	_ R	7.300	3,5	~			School Company			(mg/kg-day)	(сш.)	(mg/cm.)	(unitiess)	(mg/kg)
Senzene	71-43-2	-	8	7,300	250	╁	0000	200		1,000,000	0.95	0.00029	2,500	0.2	8	766
Cadmium	7440-43-9	-	ş	4004			200.5	00		1,000,000	0.80	0.0024	2,500	0.2		00+
T Chromina			\$	OUE,	7250	50	0.001	જ	-	1,000,000	0.025	0.000025	2 500	3		
3 111	7440-47-3						not available						2,000	7.0	0.00	1,460
	1-59-69-0		2	7,300	250	50	1.5	22	-	1 000 000	0.00	100				
	6-62-03-66	-	02	7,300	250	20	0.003	S		1,000,000	5000	0.020	2,500	0.2	0.01	352,726
	50-29-3	-	02	7,300	250	20	0.0005	50				0,000,0	2,300	0.2	0.01	1,226
S. HANDELIZOLES	100414	-	70	7,300	250	8	0.1	200	-	000,000	0.70	0.00035	2,500	0.2	0.03	715
Ethylene dibromide (EDB)	106-93-4					\dagger	11000			000,000,1	0.80	0.080	2,500	0.2	0.03	148,655
Lead	7439-92-1					+	riot available									
Indana						1	not available									
Methylene chloride	6-68-95	-	2	7,300	250	20	0.0003	102	+	000						
POLICIES OF THE POLICY OF THE	/3-09-2	-	2	7,300	250	29	0.06	5	-	000	300	0.00015	2,500	0.2	0.04	351
Mercury (Inorganic)	7439-97-6		٤	7 200	520					000,000,	28.5	0.048	2,500	0.2	0.0005	121.878
MTBE	1634-04-4		?	000,	200	+	0.0003	25	-	1,000,000	0.07	0.000021	2500	60		
Naphthalana	200					1	not available							1	100	252
	5-12-16	-	2	7,300	250	20	0.02	28	-	000	100					
cPAH Mbtures	20	-								000,000,	0.83	0.018	2,500	0.2	0.13	16.613
Senzo[a]anthracene	56-55-3				1		not available						+			
Benzolbifluoranthene	205-89-2						not available				-		+			
Benzolkittuoranthene	207-08-9		1		1	1	not available	-		-						
Benzolalpyrene	50-32-8		-		1		not available									
Chrysene	218-01-9			1		1	TIOT BYBIGDIE	1						-		
Dibenzo[a,h]anthracene	53-70-3						not available									
ideno(1,2,3-odipyrene	207-08-9		-			1	not maliable									
							ior available	-								
																8
(1) Source of oral RIDs is EPA's IRIS database account for home	S database avve	Total for	1 1 1 1 1 1 1					-								
(2) Dermal RfD = Oral RfD X Gl aths	to a coloredor	The College	TIC WINCH IS ITO	T CLAS NC	4			-	-			+	1			
(3) Calculated using equation 74.5-3 contracts and extension and the contract of the contract	and default age	Tie Gr.	ads. ractor is ci	nemical spect	Ilc. See equati	on 745-4 for c	defaults and 1/2!	5/39 memo fo.	or chemical st	Secffic factors	Bend here					
	מונים חווים	urplions.	-		_				-		000		1			
	1		+	+	1	-		_			-		1	1		
1			-		1	_		-	-		-	-		1		
	•															

	•		
			-

Table 6: Method C Industrial Calculations for Noncarcinogens for Soil Ingestion plus Dermal Contact

HISK COICUIGNONS-Noncarcinogenic Effects of Soil Ingestion + Dermai Contact	ic Effects of :	Soli Ingestic	n + Dermal C	Sontaci												
		Hazard	Avg. Body	Averaging	Exposure	Exmostire	Oral Ref	Soll	1							
Parameter	CAS No.	Index	Welght	Time	Frech Hench	Distration C	() esc	000	C.I. ADS.	Unit Conv.	G. Com.	Derma	Surface	Adherence	Dermal Abs.	Method B
		(1 mHlase)	1001				11000	5. 79.0	region	Factor	Factor	2 PE	Area	Factor	Fraction	Normana
PCB mktures 1336-36-3	1336-36-3		2		(unifiess)	(Vears)	(mg/kg-day)	(mg/day)	(mitless)	(mg/kg)	(unitiess)	(mg/kg-day)	(mg/cm²)	(mg/cm ²)	(mittless)	(mg/kg)
High Risk & Persistence							not available					000000000000000000000000000000000000000	_			
Low Risk & Persistence		-					not available									
Lowest Risk & Persistence							not available									
	12674-11-0	7	4				not available									
	12672.20.E	-	2	008',	250	20	0.00007	50	1	1,000,000	0.81	0.000057	2 500	cc	***	
	11007 60 4	,	i				not available				-	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	2000	7.0	5 4	52.4
,	1-80-760	-	0/	7,300	250	ଷ	0.00002	20	-	1 000 000	100	0,0000				
0001							not available					0.0000.0	2,500	0.2	0.14	15.0
Tetrachloroethylene (PCE)	127-18-4	+	22	7000	000	1										
Toluene	108-88-3	-	2	2000,7	000	8 8	0.0	S.	-	1,000,000	0.80	0.0080	2.500	00	800	44 965
				38	262	₹	0.2	c _C	-	1.000 000	080	31.0	200			000'+
1,1,1 Trichloroethane	71-55-6	-	70	7 300	010	8							200	Z	200	297,309
Trichlaroethylene	79-01-6			200	200	3	80	20	-	1,000,000	0.80	0.72	2,500	60	O OUCE	* 000 * 7 *
							not available								200.5	1,020,174
Xylenes	1330-20-7	1	2	7,300	250	8	2.0	50	ļ	000 000						
m-Xylene	108-38-3						not available		+	1,000,000	08.0	1.6	2,500	0.2	0.03	2,973,091
o-xylene	95-47-6						not available									
p-xyrene							not available	-	T							
						-			1							
(1) Source of oral RIDs is EPA's IRIS database except for benzene which is from EPA's NCEA.	database exo	apt for benze	one which is fr	om EPA's NC	EA				1	+	1					
(2) Dermal RID = Oral RID X Gl abs. conversion factor. This factor is chemical specific. See equation	conversion fac	tor. This fac	tor is chemica	al specific. Ser	ectuation 745-4	4		+	1		1					
(3) Calculated using equation 745-4 and default assumptions.	nd default ass	umptions.						+	+	1	1					

	·		
		·	

ead

ł

3-Phase Model Results									:		
		Gd H ₂ O									iai
	CAS No	C/11 evel	Bulk Doneity	Coil Motor						Dilution	Soil
		(mo/l) (1)	(a/cc) (2)	(co/co)	Soli Air	i i	88	3	꽃	Factor	C/U Level
			(S) (S)	(2):(2)	(2) (2)	(CC/CC) (3)	(ml/g) (3)	(%) (4)	(∞/g) (5)	(dimensionless)	(mg/kg) (6)
PCB Mixtures	1336-36-3										
Arochlor 1016	12674-11-2	0.0001	1.5	0.3	0.13	0.119	107 285	0 1%	107	8	
Arochior 1250		0.0001	1,5	0.3	0.13	0.189	822 422	2 1%	200	200	120
Tetrachlorothviene (PCE)	127-18-4	0005	3	S	97.0			و خ	026	2	1.65
Toluene	108-88-3	0	i r	200	0.13	0.754	265	0.1%	0.265	20	0.053
1 T		2:	3	0.0	0.13	0.272	140	0.1%	0.140	20	7.27
Trichloroothy force	71-55-6	0.2	1.5	0.3	0.13	0.705	135	0.1%	0.135	20	1.59
aradiocariyiere	9-10-6/	0.005	1.5	0.3	0.13	0.422	94	0.1%	0 004	3 6	0000
Xylenes	1330-20-7	10	4	0	ç					20	C.CO.
m-xylene	108-38-3	2 5	С п	5.0	51.0	0.279	233	0.1%	0.233	20	9.14
0-xvlene	2000	9. 4	Ç;	5.0	0.13	0.301	196	0.1%	0.196	20	8 44
D-W/one	92-14-09	1:0	۲. د:	0.3	0.13	0.213	241	0.1%	0.241	20	0 10
P-Aylene		1.0	1,5	0.3	0.13	0.314	311	%1.0	0.311	200	10.76
										2	2
											23
(1) strong water cleanup level used for calculation. From proposed table 720-1 except for Cr III used 0.1 mg/l and for PAHs used Method B value for Blayp	used for calculat	tion. From pro	posed table 720)-1 except for (Cr III used 0.1	mg/l and for P	AHs used Meth	od B value	for B(a)P		
II ute wietnod A ground water cleanup level for B(a)P of 0.1	tter cleanup level	or B(a)P of 0.1	l ug/l is used, th	ug/l is used, the soil cleanup level becomes 1.94 mg/kg for B(a)P	level become	s 1.94 ma/ka f	or B(a)P				
(2) From equation 747-1. Based on Soil Screening Guidance:	ed on Soil Screen	ing Guidance:	Technical Bac	Technical Background Document. EPA/540/R-95/12B. Mav.	ment. EPA/54	10/R-95/12B	May. 1996				
(s) Source: Soil Screening Studance: Technical Background Document. EPA/540/R-95/12B. May, 1996. Exceptions are:	idance: Technica	Background [Jocument, EPA	V540/R-95/128	May, 1996.	Exceptions at	1				
EUB Values from ATSDR Toxicological Profile (TP 91/13);	Toxicological Profi	ile (TP 91/13);									
M I BE from USGS final draft report on fuel oxygenates (March, 1996)	aft report on fuel o	xygenates (Ma	arch, 1996)								
Arochlor values for Henry's constant and solubility limit from	s constant and sol	ubility limit fror	n ATSDR Toxlic	cological Profil	e (Dec, 1998)	Arochlor Koc	ATSDR Toxlicological Profile (Dec. 1998); Arochlor Koc from EPA 1994 draft of soil screening middless	draft of eq.	Corrogning	Service of the servic	
Values for total xylenes are a weighted average of m.o & p xylene based on gasoline composition data from TPH Citterial Working Common of Advances are a weighted average of m.o & p xylene based on gasoline composition data from TPH Citterial Working Common of Advances are a weighted average of m.o & p xylene based on gasoline composition data from TPH Citterial Working Common of Advances are a weighted average of m.o & p xylene based on gasoline composition data from TPH Citterial Working Common of Advances are a weighted average of m.o & p xylene based on gasoline composition data from TPH Citterial Working Common of Advances are a weighted average of m.o & p xylene based on gasoline composition data from TPH Citterial Working Common of Advances are a weighted average of m.o & p xylene based on gasoline composition data from the properties of the properties are a weighted and the properties of the	e a weighted aver	age of m,o & p	xylene based o	on gasoline cor	mposition data	from TPH Cri	terial Working	To lo unio	Scientific y	andance	
inatis: m = 51% of total xylene; o = 28% of total xylene; and, p = 21% of total xylene,	ylene; o = 28% of	total xylene; a	and, $p = 21\%$ of	f total xylene.	-		Silving and an analysis		ne c (May 1	398).	
H for all metals except mercury assumed = zero. H' for mercury from EPA Soil Screening Guidance.	ercury assumed =	zero. H' for m	ercury from EP	A Soil Screeni	ng Guidance.						
UDI value for Koc based on 1994 Draft Soil Screening Guidance. If 1996 quidance is used. Knc = 677 934 and soil cleaning local control of the	on 1994 Draft Soil	Screening Gui	dance. If 1996	quidance is us	sed Koc = 67	7 934 and enil	Spanial cural of				
(4) Based on review of data available from the literature and WA	ailable from the life	terature and W	A State sites.			Top pur top's	dealiup level et	uais 4.07	Jg/kg.		
(5) From equation 747-2 for organics. For metals, based on revi	ganics. For metal	s, based on re	view of data av	iew of data available from the literature and WA State sites.	e literature an	d WA State sit	Se				
(b) carculated using equation 747-1 (3-phase model) with model	747-1 (3-phase mo	odel) with mod		shown in this to	able) and grou	nd water clear	defaults (as shown in this table) and ground water cleanin level shown in this table	in this table			
					- 		מינים מינים	III ans rank			
								_			

•			
	·		

3-Phase Model Results						-						
		Pore Water		NAPI		Doro Motor						
	CAS No.	Concentration	Solubility	2, ⊆	Į tes	Concentration	10/21	Vapor		Soil		Sum
			(mor/) (3)	é	(0) (0)	Wind wall	water mass	Concentration	Vapor Mass	Concentration	Soil Mass	Mass
Arsenic				2	(e) (By fam.)	(y) (v@m)	(mg/kg) (10)	(mg/m²) (11)	(mg/kg) (12)	(mg/kg) (13)	(ma/kg) (14)	(ma/kg) (15)
Bonzono	7440-38-2	•	,	n/a	•	0.10	0.020					
alleginer	/1-43-2	0.10	1,750	ON.	493	0.10	0200	000	, 0000	2.90	2.90	2.92
Cadmium	7440-43-9	0.10	•	2/2			2	0,77	0.0020	0.0062	0.0062	0.028
Chromium (total)	7440-47-3			2	•	0.10	0.020	,		0.67	0.67	0.69
Chromium VI	18540-29-9	1.0	•	0/0		,						3
Chromium III	16065-83-1	2.0	•	2/2	· ·	0.0	0.20	-		19	19	19
Tad	0000			3		2.0	0.40	*	•	2000	2.000	2000
Ethyl Benzene	50-23-3	09000	0.0250	8	10	0900'0	0.0012	00000	4 705 07			2007
	100-41-4	14	169	Ŷ	73	14	28	2000	10-20-07	2.32	2.32	2.32
Ethylene dibromide (EDB)	106-93-4	0,00000	4 000	N.	4 076		2	4252	Sp. 0	2.86	2.86	6.05
Lead	7439-92-1	0.30	3	2 2	1,0/0	0.00020	0.000040	0.0067	5.82E-07	0.000013	0.000013	0.000054
Lindana	0 00 02			5		00.0	0.060	ŧ,	•	3000	3000	3000
Methylene Chlorida	58-88-6	0.0040	6.8	ο N	11	0.0040	0.00080	0.0023	4 000 07			200
aprilono amplead	7-60-67	0.10	13,000	Š	2,831	0.10	0000	2000	1.335-07	0.0054	0.0054	0.006
Mercury (inorganic)	7439-97-6	0.040		6/2		0000	2	9.0	0.00078	0.0010	0.0010	0.022
MTBE	1634-04-4	0.40	50,000	2	10,628	0.040	0.008	19	0.0016	2.08	2.08	2.09
Naphthalene	91-20-3	3.2	7	2	Ş	2 .	2000	7.7	0.00062	0.0044	0.0044	0.085
CDAH Michiga			5	2	5	3.2	0.64	ಜ	0.0055	3.81	3.81	4 48
Benzolalanthracono	na											?
Renzo[h]@iozoath	20-00	0.00024	0.0094	S S	3.4	0.00024	0.000048	2 20E.OF	2001			
Benzolkijiomathom	205-99-2	0.00024	0.0015	٩ ا	1.8	0.00024	0.000048	1 09E-03	2.83E-09	0.09	0.086	60.0
Bonzofologione	50/-08-8	_	0.0008	S S	1.0	0.00024	0.000048	2 181 8	3.400-00	0.30	0.30	0:30
Denzolajpryene	50-32-8		0.00162	2	1.6	0.00024	0.000048	444	7.07E-10	0.30	0.30	0:30
Carysene	218-01-9	0.00024	0.0016	2	0.64	0.00024	0.000040	001100	9.63E-10	0.23	0.23	0.23
Ulbenzoja, njanthracene	53-70-3	0.00024	0.00249	2	4.5	0 00024	0.000040	8.3.E-04	8.07E-08	0.10	960.0	0.10
Indenol 1, 2, 3-cd pyrene	207-08-9	0.00024	0.000022	Yes	0.076	0.00024	0.000048	1.455-07	1.25E-11	0.43	0.43	0.43
							20000	CD-3/C-1	1.30E-09	0.83	0.83	0.83
				+								
				+								
				+	1							

Table 7: 3-Phase Modeling Assumptions and Results

			ta.	
				ļ
				İ
				ļ
				Ì
				}-
		•		
	S.			
•				1
				-

3-Phase Model Results											,	
		Dorn Weter										
	1.0.0			NAPL		Pore Water		Vapor		io.		
	CAS No.	Concentration	Solubility	.⊑	Csat	Concentration	Water Mass	Concentration	Vanor Mace	Constanting	100	EDS:
		(mg/l) (/)	(mg/l) (3) Soil	Soil? (8)	(mg/kg) (9)	(7) (J/gm)	(ma/ka) (10)	(ma/m³) (11)	(mc/kg) (19)	Concentration (40)	Soil Mass	Mass
PCB Mixtures									(ingred) (12)	(Ing/kg) (13)	(mg/kg) (14)	(mg/kg) (15)
Arochlor 1016	12674-11-2	0.0020	0.42	S	45	0000	0,000,0					
Arochior 1260		0.0020	0.08	2	99	0.0020	0.00040	0.24	2.06E-05	0.21	0.21	0.21
Tetrachlorothylene (PCE)	127-18-4	0,0	000			03000	0.0000	25.28	3.28E-05	1.64	1.64	1.65
Toluene	100.00	2.5	3 5	2	198	0.10	0.020	75	0.0065	0.0265	0.0965	0 050
	2-00-001	S	226	2	191	20	4.0	5440	0.47	280	2 80	0.033
1,1,1 Trichlorothane	71-55-6	4.0	1,330	2	527	40	000	0000		3	3	ر. / د
Inchlorocthylene	79-01-6	0.10	1.100	2	364	Ç	000	2820	0.24	0.54	0.54	1.58
Xylenes	20000				5	21.5	U.UZO	42	0.0037	0.0094	0.0094	0.033
m-wiene	7-02-0551	20	171	S	78	82	4.0	5580	87.0	00,	5	
ni-Ayelle 6 sede-e	108-38-3	82	161	ž	89	82	4.0	0000	2 2	00.4	4.00	9.1
o-xylene	95-47-6	ន	178	oN O	8	S		0200	70,0	3.92	3.92	8.4
p-xylene		20	185	2	1 5	3 8	5,4	4260	0.37	4.82	4.82	9.2
			3		3	3	4.0	6280	0.54	6.22	6.22	10.8
(7) Pore water concentration = ground water cleanup level X dilution factor	ground water cl	eanup level X dili	tion factor									
(8) There is NAPL in the soil if the pore water concentration exceeds the solitifier	the pore water of	oncentration exc	pode the	محتا مغتائط ماح								
(9) C sat is the soil concentrat	deithe cholon	A THE STREET SALE	sens nue	Situality limit								
(10) Water mass = Porce water concentrations to all users to the soil it is calculated by substituting the solubility limit for the [ground water cleanup level X DF]	Concentration	ulere is INAPL IN	me soil.	s calculate	d by substitu	fing the solubility	mit for the [grou	ind water cleanur		in equation 747-1		
(11) Vanor concentration	A COLUMNIA OF THE COLUMNIA OF	Soll water liacilo	na ilos / lui	IK density.	inis is the n	lass of contamina	nt in the water p	hase.				
(42) Wares Concentration X Henry's Constant X 100	re water concent	tration X Henry's (Constant >	1000.								
(12) Vapor mass = [Vapor concentration X soil air fraction] / soil bulk density. T	centration X soil	air fraction] / soil	bulk densi	ty. This is	the mass of c	his is the mass of contaminant in the yappr phase	Vanor phase					
(13) Soil concentration = Pore water concentration X Kd	water concentra	tion X Kd					vapor pridace.					
(14) Soil mass = [Pore water concentration X Kd X soil bulk density] / soil bulk	oncentration X K	d X soil bulk dens	sity] / soil !	ulk densin	· This is the	length . This is the mass of contaminant is the interest of the mass of contaminant is the interest of the int	and in the case of					
(15) Sum mass = water mass + vapor mass + soil mass. This value equals the	+ vapor mass + s	soil mass. This va	atte edila	the coil o	soil cleanin level	mass of contain	an un me son p	lase.				
				-	canap revel.							
			1									1
				1								
٠												

¢				
				ĺ
			-	
				i
				-
•				
			4.5	
		•		-
			:	
•				

Table 8: 4-Phase Model Results using Fresh ARCO Gasoline

			0.300 Unitless		1.811 kg/l			•		_	ot existing!		:	in Solid: 46.11%	in NAPL: NONE
اد و ي		= (ž ő	æ	foc	占	0.90	47	0.27		NAPL phase is not existing!	3-Phase Model		ase: 20,89%	ase: 33.00%
Soil - Mass Distribution 21% 0% Em Solid: Em Solid: In Watsor. In Watsor.	Total end promotive defends to a so	Volumetric water content: default is 0.3	Initial volumetric air content; default is 0.13	Soil bulk density measured: default is 1,5	Fraction Organic Carbon: default is 0.001	Dilution Factor: default is 20	Soil Concentration:	Predicted Ground Water TPH (ug/l:	HI @ Predicted G.W. Concentration:		Volumetric NAPL Content, QNAPL: NAPL Saturation (%) ONAP! //-	Type of model used for computation: Computation completed?	TPH Distribution @ 4-phase in soil pore system: Total Mass distributed in Mass December 1	Social Mass distributed in Water Phase; 20,89%	Total Mass distributed in Air Phase: 33.00%
	Predicted G.W.	500	3.49	1 0.0	0.00	0.00	5.86 18	8	S - 13	•	0 0	0	0		47
46.1% 33.0% 20.9% NONE	Protective Soil		0.27	0.03 4.03	0.02	000 000	0.033	- 0.02	0.12	0.04 0.07	0.02	0.00	0.00		06'0
Solid: Air: Water: NAPL:	Equilibrium Composition %	ARCOI	29.93%	3.77%	2.56%		3.67% 14.62%	2.73%	13.45%	4.15% 7.47%	0.0191	0.43%	_4		100.00%
		Aliphatics	10 × 5 6 6 4 6 7 6	EC>8-10	EC>10-12	EC>16-21 EC>16-21 Aromatics	Benzene Toluene	Ethylbenzene	Xylenes	EC>8-10 EC>10-12	EC>12-16 EC>16-21	EC>21:35 Naphthalene	MIBE	:	lotal

Soil Concentration =

0.90

Gasoline composition from 9/3/98 neat product analysis conducted by Northcreek Analytical, Inc under contract to Ecology.

This is a summary sheet from an Excel program created by Hun Seak Park at the Pollution Liability Insurance Agency (PLIA) and modified by Ecology staff
For this particular composition, the allowable soil concentration is controlled by the predicted concentration of benzene (5.86 ug/l) in the ground water.

		·				
					÷	
			·			
·						
·						

Table 9: 4-Phase Model Results using ARCO #5 (ARCO composition closest to 0.1% benzene)

Soil - Mass Distribution

	ı	0.430 Unitless	_		1.500 kg/l	0.0010 Unitless				_	-	not existing!	3		in Solid: 77.18%	in NAPL: NONE
		<u>د</u>	w o	ලී (2	foc	ì	28.00	774	1 01	2:	NAPL phase is not existing!	N/A 3-phase Madel	Yes!	ase: 11.05%	ase: 11.76%
12% 0% © Solid: © Solid: © Solid: © Maker: © Water: © NAPL.		Total soil porosity: default is 0.43	Volumetro water content: default is 0.3	nium vounneurc air comen; default is 0.13 Soil bulk density measured; default is 1.5	*or, use soil bulk density computed @solid density=2.65kg/l:	Fraction Organic Carbon: default is 0.001 Dilution Factor: default is 20		Soil Concentration:	Predicted Ground Water TPH (ug/):	HI @ Predicted G.W. Concentration:		Volumetric NAPL Content, QNAPL:	NAPL Sauration (%), QNAPL/n: Type of model used for computation:	Computation completed?	Total Mass distributed in Water Phase: 11.05%	Total Mass distributed in Air Phase: 11.76%
	Predicted G.W.	l/gn	4 02	8	4.6	0.58	0.00	329	. 109 59	308	89 125	ង) 0	<u>, 1</u>		774
77.2% 11.8% 11.1% NONE 100.0%	Protective Soil	шdd	0.38	3.74	3.59	3.02 0:00	000 000	0.019	0.59 0.51	2.81	3.26	2.16	800	0.35		28,00
Solid: Air: Water: NAPL:	Equilibrium Composition		1.36%	13.4%	12.8%	% 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.		0.066%	2.8% 1.8%	10.0%	11.6%	7.7%		1.27%		100.00%
		Aliobatics	EC>5-6	EC>6-8	EC >8-10	EC>12-16	Aromatics	Benzene	Ethylbenzene	Xylenes	EC>8-10 EC>10-12	EC>12-16	EC>21-35	Naphthalene MTBE		Total

Soil Concentration =

Gasoline composition is fresh product weathered to approximately 0.1% benzene, simulated by removal of mass in dissolved and vapor phases by successive model runs. This benzene composition is typical of soil benzene concentrations found in soils at gasoline contaminated sites in WA State.

This is a summary sheet from an Excel program created by Hun Seak Park at the Pollution Liability Insurance Agency (PLIA) and modified by Ecology staff

Table 10: 4-Phase Model Results using Fresh BP Gasoline

52.9%	14.8%	CONE	
Solid: Air		NAPL:	

	15% Solic Mass Distribution			
Predicted G.W.		·		
l/gu	Total soil porosity; default is 0.43	ſ	•	:
	Volumetric water content: default is 0.3	= Š	0.430	Unities
3,699	Initial volumetric air content: default is 0.13	g	0.130	Unites
0.1	Soli bulk density measured; default is 1.5	£	1.500	V
0.01	Fraction Organic Carbon: default is 0.001	<u>2</u> 0	1.811	kg
0.00 0.00	Dilution Factor: default is 20	님	20.0	Unitles
5.16	Soil Concentration:	9		
11		1:00		
2	Predicted Ground Water TPH (ug/l:	37		
10	[HI @ Predicted G.W. Concentration:	0.24		
VW			1	

Protective Soil

Equilibrium Composition

Fresh BP

Aliphatics

EC>56 EC>68 EC >8-10

28.48% 17.2% 4.6% 5.5%

EC>10-12 EC>12-16 EC>16-21

Aromatics

Benzene oluene

1.7% 8.9%

Ethylbenzene

EC >8-10

(ylenes

5.5% 9.2% 6.6% 0.0% 1.6% 0.0%

EC>10-12 EC>12-16 EC>16-21 EC>21-35 Naphthalene

888

88

NAPL phase is not existing! N/A 3-Phase Model Yes!	in Solid: 52.87%	in NAPL: NONE
Volumetric NAPL Content, QNAPL: NAPL Saturation (%), QNAPL/n: Type of model used for computation: Computation completed? TPH Distribution @ 4-phase in soil pore system:	Total Mass distributed in Water Phase: 14.75%	Total Mass distributed in Air Phase: 32,38%

Soil Concentration =

1.00

3

1.00

100.0%

Total

Gasoline composition from 9/3/98 neat product analysis conducted by Northcreek Analytical, Inc under contract to Ecology.

This is a summary sheet from an Excel program created by Hun Seak Park at the Pollution Liability Insurance Agency (PLIA) and modified by Ecology staff

For this particular composition, the allowable soil concentration is controlled by the predicted concentration of benzene (5.16 ug/l) in the ground water.

			The state of the s
,			
			The state of the s

Table 11: 4-Phase Model Results for BP#4 (BP Composition closest to 0.1% Benzene)

Soil - Mass Distribution

78.7% 12.4% 8.9% NONE

Air: Water: NAPL:

%0.001

Soid:	EAir.	C Water:	ONAPL:	
		7		%6.2

Total soil porosity: default is (2.640% 0.58 7.53 7.53 7.53 7.53 7.53 7.53 7.53 7.53		Composition	Soil	Predicted G.W.	
Secondary Seco		%	mdd	ug/l	Total soil porosity: default is 0.43
5-6 2.640% 0.58 7.53 Initial volumetric air content: 3.11 18 2.640% 2.53 14.131% 2.8 2.19 2.8 2.8 2.19 2.8 2.19 2.8 2.19 2.8 2.19 2.8 2.19 2.8 2.19 2.8 2.19 2.8 2.28 2.19	NIPNATICS	BP #4			Volumetric water content: default is 0.3
14.131% 3.11 18 Soil bulk density activities of the soil bulk density activities of the soil bulk density activities of the soil bulk density activities of the soil bulk density activities of the soil bulk density activities of the soil bulk density activities of the soil bulk density activities of the soil bulk density activities of the soil bulk density activities of the soil bulk density activities of the soil bulk density activities of the soil bulk density activities of the soil bulk density activities of the soil bulk density activities of the soil bulk density activities of the soil bulk density activities of the soil bulk density activities of the soil bulk density activities of the soil bulk density activities activities of the soil bulk density activities activities activities of the soil bulk density activities activ		2.640%	0.58	7.53	Initial volumetric air content default in 0.40
2.19 9.935% 2.19 2.8 Fraction Organic Carbon: default is 20 0.00 0.00 0.00 0.00 0.00 0.00 0.00	99 99 0	14.131%	3.11	18	Soil built density measured: defent is 0.15
13.808% 3.04 0.58 Fraction Organic Carbon; default is 20 0.00 0.00 0.00 0.00 0.00 0.00 0.00	07.8%0	9.935%	2.19	***	*Or use soil bulk denotes a contract to the contract of the co
12-16 0.00 0.00 Dilution Factor: default is 20 0.00 0.00 0.00 Dilution Factor: default is 20 0.00 0.00 0.00 0.00 0.00 0.00 0.00	C>10-12	13,808%	304	85.0	Ending Owners Of the Later of Solid density=2.65kg/l;
1.27%	C>12-16		000	000	Dingo Enda defenti Default is 0,001
Computation Computation	C>16-21	TF 5.73	000	000	Dilution Factor: detault is 20
ne 0.127% 0.28 4.95 Soil Concentration: ne 2.003% 0.44 61 Fredicted Ground Water TPH 61 es 6.427% 1.41 1.55 HI @ Predicted Ground Water TPH 62 es 6.427% 1.45 2.25 62 es 10.248% 2.25 62 6-12 20.242% 4.45 82 6-16 3.54 34 Volumetric NAPL Content, QI NAPL Content, QI NAPL Saturation (%), QINAPL Content, QI NAPL Saturation (%), QINAPL Saturation (%), QINAPL Saturation (%), QINAPL Content, QI NAPL Content, QI NAPL Saturation (%), QINAPL Content, QI NAPL Saturation (%), QINAPL CONTENT, QI NAPL C	romatics		}	200	
Computation Computation	enzene	0.127%	0.028	495	Soil Concentration:
ES 6.427% 1.41 1.55 Predicted Ground Water TPH est Section 10.248% 2.25 62 62 62 62 62 62 62 62 62 62 62 62 62	oluene	2.003%	244	3	
6.242% 1.44 1.55 HI @ Predicted G.V 2.25 62 62 62 62 62 62 62 62 62 62 62 62 62	hylbenzene	1.135%	0.25	8	Predicted Ground Water TOU (
155 1248% 2.25 62 62 62 62 62 62 62 62 62 62 62 62 62	3000	7010			I to Comment of the light.
10.248% 2.25 62 0-12 20.242% 4.45 82 2-16 16.106% 8.54 84 0.000% 0.00 0 NAPL Saturation (%), QNAPL Content, QI NAPL Saturation (%), QNAPL Content, QI NAPL Saturation (%), QNAPL Content, QI NAPL Saturation (%), QNAPL Content, QI NAPL Saturation (%), QNAPL Content, QI NAPL Saturation (%), QNAPL Content, QI NAPL Saturation (%), QNAPL Content, QI NAPL Saturation (%), QNAPL Content, QI NAPL Saturation (%), QNAPL Content, QI NAPL Saturation (%), QNAPL Content, QI NAPL Saturation (%), QNAPL Content, QI NAPL Saturation (%), QNAPL Content, QI NAPL Saturation (%), QNAPL Content, QI NAPL Saturation (%), QNAPL Content, QI NAPL Saturation (%), QNAPL Content, QI NAPL Saturation (%), QNAPL 10	0.42/%	4	155	I'll @ Predicted G.W. Concentration:	
0-12 20.242% 4.45 82 2-16 16.106% 3.54 34 6-21 0.000% 0.00 0 17-35 0.000% 0.00 0 17-36 0.000% 0.00 0 17-36 0.000% 0.00 0 18-36 0.00 0 0 19-37 0.00 0 0 10-37 0.00 0 0 10-30 0.00 0 0 10-30 0.00 0 0 10-30 0.00 0 0 10-30 0.00 0 0 10-30 0.00 0 0 10-30 0.00 0 0 10-30 0.00 0 0 10-30 0.00 0 0 10-30 0.00 0 0 10-30 0.00 0 0 10-30 0.00 0 0 10-30 0.00 0 0 10-30	0×8-10 · ·	10.248%	225	હ	
2-15 16.106% 3.54 34 Volumetric NAPL Content, QI 6-21 0.000% 0.000 0.000 0.000% 0.000 0.000% 0.70 0.70	0×10+12	20.242%	4.45		
6-21	>>12-16 >>12-16	16.106%	3.54	, Z	Volumetric NABI Contest ONABI
1.35 0.000% 0.00 0.00 halene 3.198% 0.70 3.4 Type of model used for computation completed? 0.000% 0.00 0 0 TPH Distribution @ 4-phase i	5>16-21	%0000	000	, c	NAPI Saturation (%) Only (
### 3.198% 0.70 34 Computation completed? 0.000% 0.00 0.00 0.00 TPH Distribution @ 4-phase in the completed? 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.	>>21-35	0.000%	0.00) C	The of model was for a feet of the
0.00% 0.00 0 TPH Distribution @ 4-phase i	aphthalene	3.198%	0.20		Opportunition of the computation:
	Ħ	% YOU O		ţ.	Corributation completed?
•		% ? ?	3	P	LPH Distribution @ 4-phase in soil pore system:
				0	Total Mass distributed in Water Pha
- VOUCUL	Total	100 000%	600		

22.00

490

형법

Unitless
Unitless
Unitless
kg/l
kg/l
Unitless

0.430 0.300 0.130 1.500 1.811 0.0010 20.0

e Šã 5

Predicted G.W. Concentration:	0.92	
etric NAPL Content, QNAPL:	NAPL phase is not existing!	ot existing!
Sammanor (%), CINAPLYR:	N/A	•
in node used for computation;	3-Phase Model	
	Yesi	
nsulbution & 4-phase in soil pore system:		
Total Mass distributed in Water Phase: 8.90%	%06'8 :e	in Solid: 78.72%
Total Mass distributed in Air Phase: 12.37%	e: 12.37%	in NAPL: NONE

Soil Concentration =

22.00

Gasoline composition is fresh product weathered to approximately 0.1% benzene, simulated by removal of mass in dissolved and vapor phases by successive model runs. This benzene composition is typical of soil benzene concentrations found in soils at gasoline contaminated sites in WA State.

This is a summary sheet from an Excel program created by Hun Seak Park at the Pollution Liability Insurance Agency (PLIA) and modified by Ecology staff For this particular composition, the allowable soil concentration is controlled by the predicted concentration of benzene (4.95 ug/l) in the ground water.

		4	
•			
	·		-
			110

Table 12: 4-Phase Model Results for BP #24 (least weathered composition with HI<1 at 100 PPM in the Soil)

Soil - Mass Distribution

72%

		0.430 Unitless 0.300 Unitless 0.130 Unitless 1.500 kg/l	1.811 kg/l 0.0010 Unitless 20.0 Unitless				in Solid: 25.49%	in NAPL: 72.37%
© Solid: ■ Air. © Wator: © NAPL:		- & Q €	gon: foc DF	105.00	1.00	0.000 0.03% 4-Phase Model Yes!	r Phase: 1.52%	ir Phase: 0.62%
2%	Total soil proceits defents to	Volumetric water content; default is 0.3 Volumetric water content; default is 0.3 Initial volumetric air content; default is 0.13 Soil bulk density measured; default is 1.5 "or, use soil bulk density committed @soilal density.	Fraction Organic Carbon: default is 0.001 Dilution Factor: default is 20	Soil Concentration:	Predicted Ground Water TPH (ug/l: HI @ Predicted G.W. Concentration:	Volumetric NAPL Content, QNAPL: NAPL Saturation (%), QNAPL/n: Type of model used for computation: Computation completed? TPH Distribution @ 4-chase in soil none content.	Total Mass distributed in Water Phase: 1.52%	Total Mass distributed in Air Phase: 0.62%
	Predicted G.W.	0.00 0.28	0.61 0.00 0.00	0.00		208 88 0 0 0 0		399
0.6% 1.5% 72.4% 100.0%	Protective Soil ppm	0:00 0:06 0:06	32.94 0.00 0.00	0.000	0.00 0.01 3.83	22.31 32.84 0.00 0.00 1.92 0.00		105.00
Water: NAPL:	Equilibrium Composition %	0.0% 0.1% 0.1%	31.4% 0.0% 0.0%	%0.0 %0.0	0.0% 0.0% 3.7%	21.2% 31.3% 0.0% 1.8% 0.0%)	100.0%
		Aliphatics EC>5-6 EC>6-8 EC>8-10	EC>12-16 EC>12-16 EC>16-21 Aromatics	Benzene Toluene Ethylbon-on-	Xylenes EC >8-10	EC>10-12 EC>12-16 EC>16-21 EC>21-35 Naphfralene MTBE	Total	

Soil Concentration =

Gasoline composition is fresh product weathered until 100 PPM in the soil will pass, simulated by removal of mass in dissolved and vapor phases by successive model runs. This composition represents highly weathered gasoline with no detectable benzene in the soil.

This is a summary sheet from an Excel program created by Hun Seak Park at the Pollution Liability Insurance Agency (PLIA) and modified by Ecology staff
For this particular composition, the allowable soil concentration is controlled by the predicted hazard index of the gasoline mixture in the ground water

							-
							ļ
	•						ŀ
			•				İ
						•	
							ļ
							- 1
			•				
				•			
							1-
							100
							ı
			=				
•							
					<u>\</u>		
							İ
			•				
						•	
							1
					•		
							1
			•				
		·					
							1
				•			
							ĺ
							l