Comparison of Soil Cleanup Target Levels From Chapter 62-777 (May 26, 1999) and Proposed Values (July 27, 2000 Version)#

Contaminants	SCTLs						GI Absorption		Did Tox Value Change ?
	Residential			Commercial/ Industrial					
	Factor	62-777 (mg/kg)	Proposed (mg/kg)	Factor	62-777 (mg/kg)	Proposed (mg/kg)	62-777	Proposed	
Indeno(1,2,3-cd)pyrene	-13%	1.5	1.3	25%	5.3	6.6	0.5	0.5	Yes
Iron	9%	23000	25000	19%	480000	570000	0.09	0.09	
Isobutyl alcohol	56%	4100	6400	35%	31000	42000	0.8	1	
Isophorone	59%	340	540	107%	580	1200	0.5	1	
Lead	0%	400	400	0%	920	920	**	**	
Linuron	23%	130	160	55%	2000	3100	0.5	1	
Lithium	6%	1600	1700	10%	40000	44000	1	1	
Malathion	15%	1300	1500	20%	20000	24000	0.47	0.47	
Maneb	17%	350	410	53%	5500	8400	0.5	1	
Manganese	13%	1600	1800	23%	22000	27000	0.04	0.04	
Mercury	35%	3.4	4.6	8%	26	28	0.1	0.1	
Mercury, methyl [or Methyl mercury]	25%	0.8	1	9%	5.4	5.9	0.95	0.95	
Merphos	14%	2.2	2.5	27%	41	52	0.8	1	
Methacrylonitrile	25%	0.8	1	9%	5.4	5.9	0.8	1	
Methamidophos	63%	1.9	3.1	89%	19	36	0.5	1	
Methanol	124%	5800	13000	109%	43000	90000	0.5	1	
Methidathion	45%	47	68	79%	530	950	0.5	1	
Methomyl	73%	22	38	33%	150	200	0.8	1	
Methoxy-5-nitroaniline, 2-	12%	17	19	73%	41	71	0.5	1	
Methoxychlor	14%	370	420	19%	7500	8900	0.9	0.9	
Methyl acetate	66%	4100	6800	36%	28000	38000	0.8	1	
Methyl acrylate	163%	99	260	121%	680	1500	0.5	1	
Methyl ethyl ketone [or Butanone, 2-]	35%	3100	4200	10%	21000	23000	0.8	1	
Methyl isobutyl ketone [or MIBK]	36%	220	300	7%	1500	1600	0.8	1	
Methyl methacrylate	36%	1400	1900	6%	9400	10000	0.8	1	
Methyl parathion [or Parathion, methyl]	11%	18	20	16%	310	360	0.8	0.8	
Methyl tert-butyl ether [or MTBE]	38%	3200	4400	9%	22000	24000	0.8	1	
Methyl-4-chlorophenoxy acetic acid, 2-	17%	30	35	14%	440	500	0.93	0.93	

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Methylaniline, 2-	44%	1.8	2.6	94%	3.3	6.4	0.5	1	
Methylene bis(2-chloroaniline), 4,4-	-3%	6.4	6.2	24%	17	21	0.5	1	
Methylene bromide	66%	58	96	38%	400	550	0.8	1	
Methylene chloride	6%	16	17	13%	23	26	1	1	
Methylnaphthalene, 1-	37%	68	93	9%	470	510	0.8	1	
Methylnaphthalene, 2-	38%	80	110	9%	560	610	0.8	1	
Methylphenol, 2- [or o-Cresol]	21%	2400	2900	11%	28000	31000	0.75	0.75	
Methylphenol, 3- [or m-Cresol]	16%	2500	2900	14%	29000	33000	0.75	0.75	
Methylphenol, 4- [or p-Cresol]	20%	250	300	13%	3000	3400	0.75	0.75	
Metolachlor	32%	9100	12000	67%	120000	200000	0.5	1	
Metribuzin	69%	32	54	38%	210	290	0.8	1	
Mevinphos	13%	16	18	13%	240	270	1	1	
Molinate	20%	100	120	17%	1200	1400	0.87	0.87	
Molybdenum	13%	390	440	13%	9700	11000	0.45	0.45	
Naled	15%	130	150	14%	2100	2400	1	1	
Naphthalene	38%	40	55	11%	270	300	1	1	
Nickel	209%	110	340	25%	28000	35000	0.05	0.05	
Nitrate	17%	120000	140000	0%	*	*	0.2	1	
Nitrite	12%	7800	8700	22%	180000	220000	0.2	1	
Nitroaniline, o-	-30%	5.7	4	-11%	66	59	0.5	1	
Nitroaniline, p-	-27%	5.2	3.8	-9%	56	51	0.5	1	
Nitrobenzene	29%	14	18	17%	120	140	0.8	1	
Nitrophenol, 4-	44%	390	560	80%	4400	7900	0.5	1	
Nitroso-di-ethylamine, N-	0%	0.003	0.003	0%	0.005	0.005	0.5	1	
Nitroso-dimethylamine, N-	0%	0.009	0.009	0%	0.02	0.02	0.5	1	
Nitroso-di-n-butylamine, N-	0%	0.05	0.05	14%	0.07	0.08	0.8	1	
Nitroso-di-n-propylamine, N-	-11%	0.09	0.08	0%	0.2	0.2	0.48	0.48	
Nitroso-diphenylamine, N-	6%	170	180	66%	440	730	0.5	1	

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Nitroso-N-methylethylamine, N-	100%	0.01	0.02	100%	0.02	0.04	0.5	1	
Nitrotoluene, m-	52%	210	320	33%	1800	2400	0.8	1	
Nitrotoluene, o-	43%	280	400	32%	2500	3300	0.8	1	
Nitrotoluene, p-	17%	640	750	24%	9700	12000	0.8	1	
Octamethylpyrophosphoramide	57%	83	130	86%	860	1600	0.5	1	
Oxamyl	55%	1100	1700	83%	12000	22000	0.5	1	
Paraquat	10%	310	340	38%	4000	5500	0.2	0.2	
Parathion	11%	450	500	21%	9100	11000	1	1	
PCBs [or Aroclor mixture]	0%	0.5	0.5	-5%	2.1	2	0.85	1	Yes
Pebulate	25%	1600	2000	13%	15000	17000	0.95	0.95	
Pendimethalin	28%	2500	3200	61%	36000	58000	0.5	1	
Pentachlorobenzene	67%	27	45	92%	250	480	0.5	1	
Pentachloronitrobenzene	13%	3	3.4	69%	7.7	13	0.5	1	
Pentachlorophenol	-6%	7.7	7.2	22%	23	28	0.5	0.5	
Permethrin	14%	3700	4200	42%	67000	95000	0.5	1	
Phenanthrene	10%	2000	2200	20%	30000	36000	0.5	0.5	
Phenol	11%	900	1000	10%	390000	430000	1	1	
Phenylenediamine, p-	50%	8000	12000	81%	83000	150000	0.5	1	
Phenylphenol, 2-	4%	460	480	62%	1300	2100	0.5	1	
Phorate	14%	14	16	14%	280	320	1	1	
Phosmet	14%	1400	1600	57%	21000	33000	0.5	1	
Phthalic anhydride	33%	8300	11000	11%	57000	63000	0.5	1	
Prometon	22%	980	1200	64%	14000	23000	0.5	1	
Prometryn	23%	260	320	56%	3900	6100	0.5	1	
Propachlor	29%	770	990	70%	10000	17000	0.5	1	
Propanil	30%	300	390	63%	4100	6700	0.5	1	
Propazine	33%	1200	1600	65%	17000	28000	0.5	1	
Propylene glycol	-100%	710000	*	0%	*	*	0.5	1	

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	Factor	62-777 (mg/kg)	Proposed (mg/kg)	Factor	62-777 (mg/kg)	Proposed (mg/kg)	62-777	Proposed	
Propylene oxide	-3%	3.2	3.1	15%	8.1	9.3	0.8	1	
Pydrin [or Fenvalerate]	17%	1800	2100	44%	32000	46000	0.5	1	
Pyrene	9%	2200	2400	22%	37000	45000	0.5	0.5	
Pyridine	31%	13	17	5%	95	100	0.67	0.67	
Resmethrin	14%	2200	2500	44%	39000	56000	0.5	1	
Ronnel	17%	3600	4200	49%	59000	88000	0.5	1	
Selenium	13%	390	440	10%	10000	11000	0.97	0.97	
Silver	5%	390	410	-10%	9100	8200	0.2	0.04	
Simazine	5%	7.4	7.8	62%	21	34	0.5	1	
Strontium	11%	47000	52000	0%	*	*	0.2	1	
Strychnine	29%	17	22	71%	210	360	0.5	1	
Styrene	33%	2700	3600	10%	21000	23000	1	1	
Terbacil	39%	660	920	82%	7700	14000	0.5	1	
Terbufos	36%	1.4	1.9	71%	17	29	0.5	1	
Tetrachlorobenzene, 1,2,4,5-	90%	6.3	12	96%	51	100	0.5	1	
Tetrachloroethane, 1,1,1,2-	5%	4	4.2	11%	5.7	6.3	0.8	1	
Tetrachloroethane, 1,1,2,2-	0%	0.7	0.7	9%	1.1	1.2	0.7	0.7	
Tetrachloroethene [or PCE]	-1%	8.9	8.8	6%	17	18	1	1	
Tetrachlorophenol, 2,3,4,6-	40%	1500	2100	76%	17000	30000	0.5	1	
Tetraethyl dithiopyrophosphate	26%	31	39	64%	420	690	0.5	1	
Thiram	21%	330	400	55%	4900	7600	0.5	1	
Tin	7%	44000	47000	33%	660000	880000	0.03	0.03	
Toluene	37%	380	520	8%	2600	2800	0.8	1	
Toluidine, p-	57%	1.4	2.2	105%	2.2	4.5	0.5	1	
Toxaphene	-10%	1	0.9	22%	3.7	4.5	0.63	0.63	
Triallate	32%	740	980	68%	9500	16000	0.5	1	
Tributyltin oxide	14%	22	25	43%	400	570	0.5	1	
Trichloro-1,2,2-trifluoroethane, 1,1,2- [or CFC 113]	38%	13000	18000	9%	88000	96000	0.8	1	

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	Factor	62-777 (mg/kg)	Proposed (mg/kg)	Factor	62-777 (mg/kg)	Proposed (mg/kg)	62-777	Proposed	
Trichloroacetic acid	60%	480	770	91%	4600	8800	0.5	1	
Trichlorobenzene, 1,2,3-	18%	560	660	16%	7400	8600	0.8	1	
Trichlorobenzene, 1,2,4-	18%	560	660	13%	7500	8500	0.9	0.9	
Trichlorobenzene, 1,3,5-	42%	190	270	33%	1800	2400	0.8	1	
Trichloroethane, 1,1,1- [or Methyl chloroform]	83%	400	730	18%	3300	3900	1	1	Yes
Trichloroethane, 1,1,2-	8%	1.3	1.4	11%	1.8	2	0.81	0.81	
Trichloroethene [or TCE]	7%	6	6.4	9%	8.5	9.3	0.95	0.95	
Trichlorofluoromethane	35%	200	270	15%	1300	1500	0.8	1	
Trichlorophenol, 2,4,5-	28%	6000	7700	59%	82000	130000	0.5	1	
Trichlorophenol, 2,4,6-	-3%	72	70	28%	180	230	0.5	1	
Trichlorophenoxy acetic acid, 2,4,5-	17%	590	690	14%	8300	9500	0.95	0.95	
Trichlorophenoxy propionic acid, 2, (2, 4, 5-) [or Silvex]	12%	590	660	17%	12000	14000	1	1	
Trichloropropane, 1,2,3-	100%	0.01	0.02	50%	0.02	0.03	0.8	1	
Trifluralin	-2%	94	92	27%	220	280	0.2	0.2	
Trimethyl phosphate	27%	15	19	90%	30	57	0.5	1	
Trimethylbenzene, 1,2,3-	38%	13	18	8%	89	96	0.8	1	
Trimethylbenzene, 1,2,4-	38%	13	18	8%	88	95	0.8	1	
Trimethylbenzene, 1,3,5-	36%	11	15	8%	74	80	0.8	1	
Trinitrobenzene, 1,3,5-	54%	1300	2000	86%	14000	26000	0.5	1	
Trinitrotoluene, 2,4,6-	17%	24	28	76%	55	97	0.5	1	
TRPH	35%	340	460	8%	2500	2700	0.8	0.8	
Uranium, soluble salts	-8%	120	110	74%	470	820	0.002	0.002	
Vanadium	347%	15	67	35%	7400	10000	0.03	0.03	
Vernam	76%	29	51	96%	260	510	0.5	1	
Vinyl acetate	39%	230	320	6%	1600	1700	0.8	1	
Vinyl chloride	0%	0.03	0.03	25%	0.04	0.05	0.88	0.88	
Xylenes, total	36%	5900	8000	10%	40000	44000	0.9	0.9	
Zinc	13%	23000	26000	13%	560000	630000	0.25	0.25	

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	Factor	62-777 (mg/kg)	Proposed (mg/kg)	Factor	62-777 (mg/kg)	Proposed (mg/kg)	62-777	Proposed	
Zinc phosphide	13%	23	26	20%	550	660	0.2	1	
Zineb	21%	3400	4100	55%	53000	82000	0.5	1	

Includes only chemicals that have Direct Exposure SCTLs listed in both Chapter 62-777 (May 26, 1999) and the Workshop Draft 2000).

* Contaminant is not a health concern for this exposure scenario.

** SCTLs for lead calculated using USEPA's Integrated Exposure Uptake Biokinetic (IEUBK) model using a default absorption factor

- There was general discussion regarding the uncertainties in the data used to derive the acute SCTLs. Some argued that using such limited data to make regulatory decisions with such broad impacts is not justified. Steve Roberts said that the merits of the dataset for each chemical could be evaluated and discussed by the MFG. Wilbur Mayorga indicated that the primary reason for developing this approach for the Chapter 24 regulations is that DERM felt that the GI distress should be an endpoint of concern. They were also looking for a more transparent process of getting to each acute SCTL. The application of these decision rules achieves both. He thinks that this approach would be beneficial to Chapter 62-777 but he is not suggesting a timetable.

  Barium:
  - The LOAEL acute dose of 3 mg/kg is based on symptoms of nausea, vomiting, twitching, flaccid paralysis, and cardiac arrhythmias.
  - The mode of action is apparently similar for all of these, making this a LOAEL for not only the less serious GI upset endpoint, but also for the more serious endpoints as well.
  - Using DERM's decision rules results in an application of a 100x SF making the acute RfD 0.03 mg/kg-day.
  - Another study of soluble barium was identified in which human subjects drank water containing barium at 5 or 10 ppm.
  - The study noted adverse effects in the study population. Application of a 10x SF to the NOAEL from this study (10ppm) yields an acute RfD of 0.02 mg/kg-day.
  - Both of the acute RfDs discussed are below the EPA's chronic oral RfD of 0.07 mg/kg-day. Therefore, this value is used as a lower bound and the resulting acute SCTL of 120 mg/kg remains unchanged.
  - Extended discussion followed among several group members regarding the different studies and the appropriate application of the new decision rules.
  - Chris Teaf and Bob DeMott felt that only an SF of 1x is warranted for the human drinking water study and the acute RfD should be 0.2 mg/kg-day.
  - Steve Roberts felt that the 10x SF is warranted because the barium levels that result in less serious vs. more serious exposure are not distinguishable from the data. The differential toxicity of soluble and insoluble barium was also discussed.
  - No clear consensus was reached for barium and the group decided to move on to the other chemicals.

  Cadmium:
  - There is a range of emetic doses for cadmium from 0.04 to 0.07 mg/kg. A value towards the lower end of that range (0.05 mg/kg) is the basis of the acute SCTL.
  - For the FDEP SCTL, a 1x SF (based on a management decision not to protect against the GI distress effect) was applied to give an acute SCTL of 84 mg/kg.
  - In reevaluating the data for cadmium, the ATSDR has a statement that indicates that the emetic dose (LOAEL) for cadmium is 0.07 mg/kg. Under DERM's new decision rules a 10x SF to yield an acute SCTL of 12 mg/kg.
  - Chris Teaf indicated that that dose was based on a Swedish report and set of assumptions that may or may not be valid, and that a different set of assumptions could lead to a very different estimated dose. He felt that this case illustrates the uncertainties associated with regulating relatively common chemicals in soil based on acute toxicity.

Copper:

- No changes proposed. The lower bound on the acute dose is the recommended daily intake, therefore the acute SCTL is not affected by the new decision rules.

Cyanide:

No changes proposed. The lower bound on the acute dose is the chronic oral RfD, therefore the acute SCTL is not affected by the new decision rules.

Fluoride:

- The FDEP acute SCTL is based on an acute dose of 0.5 mg/kg which is a dose that requires medical attention for GI effects in a small percentage of individuals. This was treated as a NOAEL and a 1x SF was applied to give an acute SCTL of 840 mg/kg.
- Using DERM's decision rules, a unambiguous NOAEL of 0.3 mg/kg was identified and a SF of 1x was applied.
- Results in an acute SCTL of 500 mg/kg.

Nickel:

- The FDEP acute SCTL is based on a LOAEL of 6 mg/kg for GI effects. A 10x SF plus a 3x modifying factor were selected based on professional judgment of the MFG previously. The modifying factor was added because some individuals became very ill.
- This resulted in an acute SCTL of 340 mg/kg.
- DERM wanted to ensure that nickel sensitive individuals were expressly considered in the development of their SCTLs.
- Evaluated a different study with both a NOAEL (0.5 mg absolute dose) or LOAEL (5.6 mg absolute dose) for nickel sensitivity. Application of DERM's decision rules to either of these results in an acute RfD that is lower than the EPA chronic oral RfD (0.02 mg/kg-day). This value was used as the floor and the resulting acute SCTL is 34 mg/kg.
- Some general discussion followed regarding the nature of nickel sensitivity (gender differences, prevalence in children, whether the well characterized dermal sensitivity also translated into GI distress, etc.)

Phenol:

- No changes proposed. The lower bound on the acute dose is the chronic oral RfD, therefore the acute SCTL is not affected by the new decision rules.

Vanadium:

- This is an example of a situation where the basis of the FDEP acute SCTL is ambiguous.
- Based on GI effects in a study of human volunteers but it was unclear if the dose reported in the paper (0.12 mg/kg) was a NOAEL or LOAEL.
- Using professional judgment, the MFG previously decided to call it a LOAEL but only apply a 3x modifying factor to give an acute SCTL of 67 mg/kg.
- Using DERMs decision rules, this dose was called a NOAEL, a 1x SF was applied and the resulting acute SCTL is 200 mg/kg.

- There was an extended period of discussion regarding the differences between the FDEP and DERM approaches.
- Wilbur Mayorga is recommending this approach to FDEP but is also interested in getting input and feedback from the MFG on this methodology, however, he is not suggesting that these SCTLs need to be adopted by FDEP now.
- Mike Petrovich indicated that if transparency was the main issue, a similar set of decision rules could be outlined to get to the FDEP SCTLs that the MFG has already reached consensus upon.
- Steve Roberts pointed out that risk management decisions about the nature of sensitive populations (for nickel) and consideration of transient GI distress were also significant issues.
- The discussion came around to differentiation between more and less toxic forms of particular chemicals in the tables and it was agreed that this should be addressed in some fashion.
- Bob DeMott asked for consensus on the issues discussed but the MFG was not prepared to present a consensus recommendation to adopt the DERM approach for acute SCTLs without further consideration.

2. Updates to 62-777 SCTLs – Following a lunch break, Steve Roberts presented detailed information on the changes to the Chapter 62-777 SCTLs. These can be lumped into seven general categories:
    1) Changes in GI absorption
    2) Changes in exposure assumptions (i.e., body weight, surface area, adherence factors, inhalation rates),
    3) Changes in toxicity values
    4) Chemicals added or dropped from consideration
    5) Chemical name changes
    6) Synonyms for chemicals, and
    7) Miscellaneous changes.

    The details about chemicals affected under these categories were presented and discussed at length. The full details of changes were provided in the meeting handout from the UF group.

3. Update on Arsenic Bioavailability Study – Steve Roberts presented an update on the results of the FDEP-sponsored soil arsenic bioavailability study.

- Looked at urinary and fecal excretion of arsenic (sodium arsenate) in the monkeys after I.V. injection, found that the majority of the dose is excreted in the urine (~60%) and little is excreted in feces (<1%) and total recovery is approximately 67% on average. This what you would expect to see if 100% of the dose was absorbed. This is very similar to results observed in humans.
- Looked at urinary and fecal excretion in monkeys after oral administration; found slightly different results: in urine (~50%), feces (~1-3%). Approximately 75% of the total dose was absorbed – this is the absolute bioavailability of sodium arsenate in water. This is important for determining the bioavailability in soil relative to that in water.
- When the arsenic is administered in soil the results are essentially opposite, recovery in urine is low and recovery in feces is high. The relative bioavailability ranged from 14-25% in four different soils with a range of arsenic concentrations of 101-312 mg/kg. There is still one monkey that have not been administered all of the soils.
- These are all relatively high soil arsenic concentrations, because it is difficult to measure the amounts excreted when soils at lower arsenic concentrations are administered.

- They have given a lower concentration soil (~35mg/kg) to three monkeys so far and the results do not appear to be reliable.
- They have also looked at in vitro extraction techniques on the same soils administered to the monkeys and have not yet achieved reliable results.
- Some general discussion followed regarding the effect of different soil arsenic concentrations, different soil types, and different forms of arsenic on soil bioavailability.
- There are plans to get a report out as soon as the last monkey has been given all of the different soils. It is likely that the bioavailability results will impact the next cycle of SCTL revisions.

4. Re-evaluation of the Volatilization Factor Equation - Richard Lewis presented some information on the VF model currently used in the calculation of the SCTLs.

- The VF is currently based on the Jury model which uses a specific function to describe the flux of an infinite source of volatiles from soil. This can lead to counter-intuitive results when it is applied to the calculation of SCTLs for volatile non-carcinogens.
- Best exemplified by the "twin paradox" – if twins were born on the same site and one twin left after 10 years while the other spent 30 years, the twin who spent the shorter amount of time would have a higher exposure. This is because the model assumes the mass comes out of the soil over the duration of exposure. Thus, when the duration is shorter the flux is higher and the exposure is greater.
- What happens in actuality is that when there is a volatile source in soil it reaches an equilibrium over some time frame and this has nothing to do with how long someone is at the site. There may be a better way to model this situation to calculate the SCTLs.
- An extended period of discussion followed with comments from many members of the MFG.
- Steve Roberts indicated that the default assumption inherent in the use of the VF equation for the SCTLs is that exposure begins at the time the volatile source is first measured. Thus, someone who is there for a shorter duration is there when the greatest flux occurs and has a higher exposure than someone who stays for a longer time period. If this were not being used to calculate default numbers (i.e., you know that no one will be exposed at a site until 5 years down the road) then a more site-specific number could be calculated. He also indicated that in the case of non-carcinogens, the use of an extended averaging period is not conservative. Since it is the dosing rate that is important, it could be argued that volatilization should be assumed to occur over whatever exposure period is required to produce toxicity.

5. Miscellaneous Items

- Risk-based Groundwater Cleanup Target Levels - The development of these values is not consistent with the approach used to develop the new 62-777 SCTLs. The group discussed the matter and generally decided that there was not really anything that this group could other than to advise other offices of FDEP what the Bureau of Waste Cleanup was doing in this regard so that they are not in the dark.
- Mike Petrovich brought up the issue of anthropogenic background and indicated that DERM, who was evaluating it, may have decided not to pursue it further. He thought it was an important issue and wants to ensure that it doesn't fall off the radar screen. Bob DeMott indicated that he would ask Wilbur Mayorga what DERM's plans are in this regard.
- Bob DeMott asked when the group might need to meet again and it was decided to wait to see how the upcoming rule workshop goes and plan the next meeting accordingly. There was consensus that there are currently no pressing issues facing the group.
- Chris Teaf agreed to prepare the minutes of the next meeting.

NUMBER AND EXTENT OF CHANGES IN SCTLs BETWEEN CHAPTER 62-777, F.A.C. (MAY 26, 1999) AND PROPOSED CHAPTER 62-777 UPDATE (JULY 27, 2000)

	Residential SCTL		Industrial SCTL	
	n	**%**	***n***	**%**
Decreased by:				
<5%	8	2%	0	0%
6-24%	28	8%	4	1%
25-49%	4	1%	1	0.3%
50-99%	1	0.3%	1	0.3%
100%	2	1%	3	1%
Did not change:	25	7%	17	5%
Increased by:				
<5%	3	1%	0	0%
5-24%	115	34%	134	40%
25-49%	92	27%	73	22%
50-99%	44	13%	88	26%
100-499%	15	4%	16	5%
>500%	1	0.3%	1	0.3%

PROPOSED CHANGES TO EXPOSURE ASSUMPTIONS FOR CHAPTER 62-777, F.A.C.

Parameter (units)	Receptor	62-777 F.A.C.	62-777 F.A.C. Value Reference	Proposed Value	Proposed Value Reference
Body Weight (kg)	Aggregate resident	59	Derived from weighted average of child and adult body weights using two age intervals.	51.9	Derived from weighted average of child and adult body weights using annual intervals.
	Child	15	Exposure Factors, USEPA 1991 (OSWER No. 9285.6-03).	16.8	Derived from NHANES III data using annual intervals.
	Adult/Worker	70	RAGS (part A), USEPA 1989a (EPA/540/1-89/002).	76.1	
Surface Area (cm^2/day)	Aggregate resident	3674	Derived based on data from the Exposure Factors Handbook, USEPA 1989b (EPA/600/8-89/043).	4810	Total surface area derived from NHANES III body weight data using allometric scaling; body part percentages obtained from the Exposure Factors Handbook, USEPA 1989b (EPA/600/8-89/043).
	Child	1800		2960	
	Adult/Worker	2000	Derived based on data in Dermal Exposure Assessment: Principles and Applications, USEPA 1992 (EPA/600/8-91/011B).	3500	
Adherence Factor (mg/cm^2)	Aggregate resident	0.2	Selected from range of values in Dermal Exposure Assessment: Principles and Applications, USEPA 1992 (EPA/600/8-91/011B).	0.1	RAGS (part E), USEPA 2000 Supplemental Guidance for Dermal Risk Assessment – Interim Guidance.
	Child	0.2		0.2	
	Adult/Worker	0.6		0.2	
Inhalation Rate (m^3/day)	Aggregate resident	15	Derived based on inhalation data by age and activity from the Exposure Factors Handbook, USEPA 1989b (EPA/600/8-89/043).	12.2	Derived from inhalation data by age based on metabolic requirements, Exposure Factors Handbook, USEPA 1997.
	Child	10	RAGS (part A), USEPA 1989a (EPA/540/1-89/002).	8.1	
	Adult/Worker	20	Exposure Factors, USEPA 1991 (OSWER No. 9285.6-03).	20	Unchanged

TOXICITY VALUES UPDATED IN WORKSHOP DRAFT (JULY 27, 2000)

Chemical	Value	Previous	Updated	Basis for change
Acetonitrile	RfC	5.00E-02 HEAST	6.00E-02 IRIS	Switched to IRIS value
Aluminum	RfDi	1.000E-03 NCEA	1.400E-03 NCEA	Updated NCEA value
Benzene	RfDo RfDi	0	3.0E-03 1.700E-03	Addition of non-carcinogenic tox values
Benzo(a)anthracene	CSFi	1.460E+00 extrapolated	3.100E-01*	TEF extrapolated
Benzo(a)pyrene	CSFi	3.100E+00 extrapolated	3.100E+00*	TEF extrapolated
Benzo(b)fluoranthene	CSFi	3.100E+00 extrapolated	3.100E-01*	TEF extrapolated
Benzo(k)fluoranthene	CSFi	1.46E-01 extrapolated	3.100E-02*	TEF extrapolated
Cadmium	RfDi	extrapolated	5.7E-05 NCEA	Using NCEA value
Carbon Tetrachloride	RfC	0	2.00E-03 NCEA	Using NCEA value
Chlorine	RfDi	NA	5.700E-05 NCEA	Using NCEA value
Chlorobenzene	RfDi	5.714E-03 extrapolated	1.700E-02 NCEA	Using NCEA value
Chloroform	RfDi	1.00E-02 extrapolated	8.600E-05 NCEA	Using NCEA value
Chrysene	CSFi	1.46E-02 extrapolated	3.100.E-03*	TEF extrapolated

Continued next page.

TOXICITY VALUES UPDATED IN WORKSHOP DRAFT. Continued

Chemical	Value	Previous	Updated	Basis for change
Chloromethane	CSFi	6.3E-03 extrapolated	3.500E-03 NCEA	New NCEA value, replacing IUR
Dichloroethane, 1,1-	RfDo	1.786E-01 extrapolated	1.00E-01 HEAST	Using HEAST value
Dichloropropene, 1,3-	RfDo CSFo IUR	3.00E-04 (HEAST) 1.8E-08 (HEAST) 3.7E-05 (HEAST)	3.00E-02 (IRIS) 1.00E-01 (IRIS) 4.00E-06 (IRIS)	Updated IRIS record
Hexanone, 2-	RfDi	4.00E-04 extrapolated	1.400E-03 NCEA	Using NCEA value
Indeno(1,2,3-cd)pyrene	CSFi	1.46E+00 extrapolated	3.100E-01♣	TEF extrapolated
PCBs	CSFi	3.500E-01 extrapolated	2.0E+00 IRIS	Using IRIS value
Trichloroethane, 1,1,1-	RfDo	2.00E-02 NCEA	2.8E-01 NCEA	Updated NCEA value

IRIS	USEPA's Integrated Risk Information System
NCEA	National Center for Enviornmental Assessment
HEAST	USEPA's Health Effects Assessment Summary Tables
RfDo	chronic oral reference dose
RfDi	chronic inhalation reference dose
RfC	reference concentration
CSFo	oral slope factor
CSFi	inhalation slope factor
IUR	inhalation unit risk

♣Calculation of Inhalation slope factors for all carcinogenic PAHs changed from route to route extrapolation for individual PAHs to Toxic Equivalency Factor (TEF) approach.

CHEMICALS PROPOSED TO BE ADDED OR DROPPED FROM CHAPTER 62-777, F.A.C.

Contaminant	CAS #	Change
Butyl alcohol, tert-	75-65-0	Added
Propionic acid, 2-(2-methyl-4-chlorophenoxy)	93-65-2	Added
Thallium	7440-28-0	Dropped

New EPA Dermal Guidance

Center for Environmental & Human Toxicology

Methodology Focus Group of the Contaminated Soil Forum Meeting

April 13, 2000 Gainesville, Florida

Changes

- Surface area
- Adherence factors
- Dermal absorption
- GI absorption (for route-to-route)

Surface area

- Total surface area based on data from NHANES II
- Use bivariate equation to estimate surface area from height and weight
- Based on 50th percentile values
- Area exposed is based on sum of body parts rather than percent of total surface area

Surface area

- Adult residents are assumed to wear a short-sleeved shirt, shorts, and shoes; therefore, the exposed surface area consists of the head, forearms, hands, and lower legs.
- Total surface area exposed for resident adult is 5,700 cm^2 (currently 4,371 cm^2)

Surface area

- Child resident is assumed to wear a short-sleeved shirt and shorts (no shoes); therefore, the exposed surface area corresponds to head, forearms, hands, lower legs, and feet.
- Total surface area exposed for the child resident is 2,800 cm^2 (currently 1,800 cm^2)

Surface area

- Commercial/industrial workers are assumed to wear a short-sleeved shirt, long pants, and shoes; therefore, the exposed areas include head, forearms, and hands.
- Total surface area exposed for the commercial/industrial workers is 3,300 cm^2 (currently 2,000 cm^2)

Implementation issues, SA

- Use NHANES II or NHANES III data?
- Switch to body part approach?
  - Use same basic approach?
  - If so, use the same body parts?
- Is 50th percentile the best representation of central tendency (e.g., versus mean?)
- Time averaging
  - Time intervals
  - Time-weighted averaging procedure

Time-weighted averaging

Age-Adjusted Dermal Exposure Factor

$$SFS_{adj} = \frac{(SA_{1-6})(AF_{1-6})(ED_{1-6})}{(BW_{1-6})} + \frac{(SA_{7-31})(AF_{7-31})(ED_{7-31})}{(BW_{7-31})} \qquad (3.20)$$

$$SFS_{adj} = \frac{(2800 cm^2)(0.2 mg/cm^2\text{-}event)(6 yr)}{(15 kg)} + \frac{(5700 cm^2)(0.07 mg/cm^2\text{-}event)(24 yr)}{(70 kg)}$$

$$SFS_{adj} = 360 \ mg\text{-}yrs/kg\text{-}event$$

where:

Parameter		Definition (units)	Default Value
SFS_{adj}	=	Age-adjusted dermal exposure factor (mg-yrs/kg-events)	--
AF_{1-6}	=	Adherence factor of soil to skin for a child (1 - 6 years) (mg/cm^2-event) (Referred to as contact rate in RAGS, Part A)	0.2 (EFH, 1997a)
AF_{7-31}	=	Adherence factor of soil to skin for an adult (7 - 31 years) (mg/cm^2-event) (Referred to as contact rate in RAGS, Part A)	0.07 (EFH, 1997a)
SA_{1-6}	=	Skin surface area available for contact during ages 1 - 6 (cm^2)	2,800
SA_{7-31}	=	Skin surface area available for contact during ages 7 - 31 (cm^2)	5,700
ED_{1-6}	=	Exposure duration during ages 1 - 6 (years)	6
ED_{7-31}	=	Exposure duration during ages 7 - 31 (years)	24
BW_{1-6}	=	Average Body weight during ages 1 - 6 (kg)	15
BW_{7-31}	=	Average Body weight during ages 7 - 31 (kg)	70

Adherence factors (AF)

- Based on newer empirical data
- Weighted average based on body part- and activity-specific adherence factors
  - Different parts of the body have different adherence factors. Overall adherence factor based on area-weighted average.
  - Different activities have different adherence factors. Time-weight the adherence factors based on activities appropriate for each receptor.

AF recommendations

- Adult resident is based on 50th percentile for gardeners, chosen as high-end activity. Recommended weighted adherence factor is 0.07 mg/cm^2 (currently 0.2 mg/cm^2 for aggregate resident).
- Child resident is based on 50th percentile for child playing in wet soil, chosen as high-end activity. Recommendation is 0.2 mg/cm^2 (currently 0.2 for child resident).

AF recommendations

- Commercial/industrial worker is based on the 50th percentile for the utility worker as a high-end activity. Recommended weighted adherence factor is 0.2 mg/cm^2 (currently 0.6 mg/cm^2).

Implementation issues, AF

- Switch to body part- and/or activity weighted adherence factor?
  - If so, use the same body parts?
  - If so, use the same activities? Use central tendency estimate for the activity (or activities) selected?
- Time-weighted averaging procedure for the aggregate resident

Dermal absorption (DA)

- Chemical-specific values for 10 compounds
- Defaults for other chemicals:
  - Semi-volatiles - assume 10%
  - Volatiles - assume 0%
  - Inorganics - assume 0%

Implementation issues, DA

- New assumptions regarding dermal absorption are policy decision -- not based on new data
- Differs from Region 4 defaults (will Region 4 change?)
- Decision here is a science policy call (from technical standpoint, easy to implement).

GI absorption

- Issue for route-to-route extrapolation (deriving dermal toxicity values).
- Provide specific recommended GI absorption values for about 26 chemicals.
- Recommend using default of 100% for others.
- Acknowledge that 100% assumption may underestimate risk from some chemicals.

Implementation issues

- Another science policy decision.
- Current GI absorption values based on chemical-specific information and Region 4 default assumptions.
- Change defaults? (What if Region 4 changes defaults to match this guidance?)
- Incorporate chemical-specific absorption values from guidance? Wholesale or on chemical-by-chemical basis?

Implementation summary

- GI absorption - technically straightforward (might have to choose value from range recommended in guidance).
- Dermal absorption - would have to add field to database. Otherwise, straightforward.
- Dermal adherence - variable depending upon extent of changes.
- Surface area - variable depending upon extent of changes.

Recommendations

- Leave GI and DA assumptions unchanged and address later as part of comprehensive look at bioavailability.
- Use NHANES III data; Burmaster equation for deriving surface area; body part summation as recommended in guidance; annual averaging for aggregate
- Use recommended AF from guidance
- Maintain current time-weighted averaging approach