Methodology Focus Group Meeting Summary

31 January 2000 - Jacksonville, FL

Prepared by Ed Zillioux

1. The Meeting Summary from 16 December 1999 was accepted without comment.

2. Comments prepared by Chris Saranko et al. of CEHT were distributed that addressed "Proposed Modifications to Identified Acute Toxicity-based Soil Cleanup Target Levels (SCTLs)" prepared by Hazardous Substance & Waste Management Research, Inc. (HSWM) on behalf of the Florida Electric Power Coordinating Group (FCG). Although acute toxicity SCTLs for barium, copper, cyanide, fluoride, nickel and vanadium were considered, considerable discussion on general issues occurred initially during the consideration of barium. The major points are captured below.
   - Mike Petrovich pointed out that there were a lot of outstanding issues that likely will not be resolved in this meeting and that we would need a plan on how to address these.
   - Steve Roberts presented overheads addressing the proposed changes and comments, pointing out that the comments were, in part, based on a reexamination of the toxicological literature pertaining to acute exposures. He commented on the magnitude of uncertainty with respect to human exposure.
   - The HSWMR proposal to incorporate bioavailability was discussed. S.R. recommended that bioavailability not be used due to the paucity of data on most substances. This was generally agreed with on a practical basis at this time but should be revisited as new data warrants.
   - Ed Zillioux pointed out that there were substantial data on certain substances such as nickel, for which both bioavailability and toxicity vary greatly with the species of nickel, and new species-specific toxicological endpoints have been developed based upon recent laboratory (NTP) and epidemiological studies. He recommended that in cases such as Ni, default SCTLs should be put forward only with appropriate caveats or specific guidance with respect to appropriate speciation studies.
   - In the same context, S.R. brought up the toxicity differences between soluble and insoluble barium.
   - A suggestion was made that using uptake data from food studies would be more applicable to soil ingestion than the use of data on uptake from water ingestion. Cadmium was cited as a precedence, where there are data available on food vs. water uptake, and that there is an explicit reference in IRIS that chromium is less toxic from food than from water ingestion. It was argued that toxicity data from studies on contaminated food should be used preferentially over data from studies on water ingestion where adequate food study data are available.
   - Richard Lewis mentioned that there is a lot of variability in soils that affects bioavailability, but this could be determined by applying physiologically-based (*in vitro*) screening tests. Steve Roberts added that we are close to being there for lead and hopefully soon for arsenic.
   - Estimates used for the amounts of soil ingested were questioned. Chris Teaf noted that the 10 g figure for a pica behavior represents a very small population, perhaps only one child. Steve Roberts pointed out that the 200 mg value used roughly corresponds to the 95^{th} percentile of the Stanek and Calabrese data on child ingestion.

Based on a discussion of these data with Ed Calabrese, Ed Zillioux reported that Calabrese considers these numbers preliminary and not appropriate to be used as the basis of regulatory actions, due, in part, to the small population size and the lack of any history on the child exhibiting pica behavior. Chris Teaf again stated that only one child had much greater intake than all the other children did in the study. Steve Roberts concluded that his extrapolation of the data indicates that normal kids eat a lot of dirt on a one-time basis.

- Use of the endpoint of gastrointestinal irritation was also discussed. Chris Teaf questioned the assumption that all G.I. irritation is derived from compounds in the soil, and suggested that the microbial effect from ingestion of soil could be the source of G.I. irritation. S.R. said that an agency policy decision had been made that some level of irritation is acceptable, but others are not so sure and suggest that a second safety factor be used to account for this uncertainty. Ligia Mora-Applegate reported that DERM is uncomfortable with acceptance of any G.I. irritability from eating 10 g of soil. Bob DeMott countered that 10 g of soil would cause some G.I. irritation no matter what or if nothing was in the soil.

3) Resolution of specific acute toxicity SCTLs:

- <u>Barium</u>
  - The threshold toxic dose of 3 mg/kg used by HSWMR was questioned because the supporting literature on soluble barium (Reeves, 1986) did not include symptomology.
  - To the objection that no safety factor was included in the HSWMR analysis for LOAEL to NOAEL extrapolation, Chris Teaf suggested using a factor of 5 which would reduce the proposed acute toxicity SCTL to 450. He did not think an additional factor of 10 would be necessary since bioavailabilty was not being considered. David Ludder and Ligia M-A. objected to the use of 450. Steve Roberts said he did not have a problem with 450 but would not go higher. Doug Jones argued for consistency in selection of SFs and would need a stated reason for selecting a SF other than 10. Ed Zillioux pointed out the precedence that IRIS sometimes uses SFs of 5 and includes justifications as appropriate. No consensus was reached on use of an alternative SF but this possibility was left open for future discussions.
  - It was decided not to recommend a change to the FDEP acute toxicity SCTL of 105 mg/kg at this time.

- <u>Copper</u>
  - An acute oral value of 0.09 (increased from the previous FDEP value of 0.07) was recommended based on recent guidance on the upper limit of the safe range of copper intakes for children. Keith Tolson cautioned that the relative bioavailability from food might be lower than from soil. However, since the acute effect of concern is gastrointestinal rather than systemic, 0.09 was carried forward without dissention.
  - The effect of using the higher acute oral value increased the recommended acute toxicity SCTL from 110 mg/kg to140 mg/kg.

- <u>Cyanide</u>
  - Chris Teaf pointed out that EPA made the explicit statement (in IRIS) that there is an amelioration effect when cyanide is ingested with food. He argued that ingestion of cyanide in a soil matrix is more comparable to ingestion in food rather than drinking water, which was the basis of the FDEP acute oral value of 0.02 mg/kg..

- Steve Roberts said that, given the steep dose-response curve of cyanide, the HSWMR acute oral value of 0.11 mg/kg is dangerously close to the lethal dose range for this element.
- The Focus Group generally agreed that FDEP's acute oral value is appropriate and, therefore, that the recommended acute toxicity SCTL for cyanide should remain unchanged at 30 mg/kg.

- Fluoride
  - UF recommended an alternative approach in calculating the SCTL by using 5 mg/kg, the standard guidance on the threshold for medical treatment, and applying a SF of 10 to account for sensitive individuals. This would result in an SCTL value of 750. Although it was acknowledged that this would cause some gastrointestinal irritation among children eating 10 g of soil in a single dose, it was pointed out that some G.I. disturbance is acceptable by policy, with the proviso that it is transient with no long term effect.
  - The UF proposal of increasing the recommended acute toxicity SCTL from 500 mg/kg to 750 mg/kg was accepted.

- Nickel
  - Although bioavailability is not being considered in the derivation of acute SCTLs at this time, it was acknowledged that studies with rats showed oral absorption of nickel (as $NiSO_4$) from water of 4% as compared to only 2% bioavailability from soils (form unknown).
  - The Group agreed to lower the reduction factor from 100 to 10x for sensitive individuals plus a 3x modifying factor for inadequate data. David Ludder asked for a written explanation of uncertainty factors and rationale for their application to be included in the Focus Group's recommendation.
  - As a result of the change in the uncertainty calculation, the recommended acute toxicity SCTL increased from 110 to 350 mg/kg.

- Vanadium
  - On the basis of two studies, Dimond et al. (1963) and Fawcett et al. (1996), the apparent threshold dose for GI toxicity from vanadium salts is about 25 mg. Adjusting for V content, this corresponds to a dose of 7.8 mg V, or 0.11 mg/kg for a 70 kg adult.
  - However, it was argued that the definitive study by Dimond et al., which administered ammonium vanadyl tartrate in a repetitive dose study, did not have controls to allow determination of whether the effect was produced by V or NH_3.
  - Owing to the probability of confounders in this study, the FDEP reduction factor of 50 was reduced to a modifying factor of 3, resulting in a recommended acute toxicity SCTL of 55 mg/kg.

4) Other Issues

- Partition Coefficients
  - The consensus of the Focus Group was that sorption partition coefficients (e.g: K_d; K_{oc}; K_m) are too variable to use as defaults in the calculation of SCTLs.

- Body Weight
  - In the National Health and Nutritional Status (NHANS) data base, the effect of body weight differences is not substantially different between men and women due to

the balancing between body weight and inhalation rate. This is shown in the mixed gender aggregate vs. women comparison. The Focus Group recommends using the latest estimates of both body weight and inhalation rate as follows:

Body Weight

Population	Old Value	New Value
Child	15 kg	17.1 kg
aggregate resident ≤ 30	59	52.5
adult worker	70	76.9

Inhalation Rate

Population	Old Value	New Value
Child	10 m^3/d	8.1 m^3/d
aggregate resident ≤ 30	15	12.2
adult worker	20	20

- Dermal Absorption

  - Bob DeMott characterized the issue as two fold: 1) how much area exposed, and 2) how many particles per unit area.
  - Steve Roberts reported that there is new EPA guidance that is going in a new direction (Region IX has already adopted it). This incorporates a surface area calculation with dermal absorption rates, and adherence factors that are body part-specific and activity based. EPA assumes exposure areas to include head, hands, forearm, lower legs and feet; except for workers, for whom only head, forearm and hands are assumed exposure areas. EPA also feels that for certain compounds data are adequate to plug in bioavailability with reference to dermal intake.
  - Considerable discussion followed over whether to adopt the new guidance:
  -- Ligia pointed out that NHANES III data are final but the statistical analysis of it is not, and that the best policy may be to set the new data aside until we see whether it is upheld. She suggested that we deal with the acute calculation now and table chronic issues until the exposure terms are resolved.
  -- David Ludder agreed with the need to exercise prudence until the numbers EPA is proposing are supported. Ligia suggested a delay of 2 to 3 months, citing DEP's commitment to FCG, FMCC and LEAF to resolve exposure issues.
  -- Doug Jones raised the issue of multiple iterations of rule revision in face of the evolving science. He suggests that a 6-month hold on exposure issues would fold in well with the RBCA rulemaking schedule, if the global RBCA bill passes.
  -- Chris Teaf pointed out that some changes to RFDs and CSFs also may need to be incorporated. He argued that we should move ahead and do what we know how to do now.
  -- Steve Roberts suggested that the soil adherence data is most appealing of the new EPA guidance. Chris said that this alone would much more carefully define the dermal pathway while avoiding, at this time, the more controversial issues such as absorbence. Steve said we could obtain and distribute the adherence factor studies to evaluate how EPA used and interpreted these data within a reasonable time, i.e., in 2 months we could have a sense of what we can do. It was agreed that we will move forward with this issue even if EPA does not. Bob DeMott said that we will reach a decision time by mid April to ensure that we reach closure by the next Contaminated Soils Forum.

5) The Methodology Focus Group meeting was adjourned.

Minutes
Methodology Focus Group Meeting

April 13, 2000
Gainesville, Florida

Prepared by Bruce Nocita

1. Bob DeMott asked for comments on the January 31, 2000 Meeting Minutes by April 21, 2000.

2. Steve Roberts presented a hand-out and summary of the new EPA Dermal Guidance document. This document is not yet official, but it is complete, and supercedes the 1992 guidance. Four areas of recommendations were first briefly summarized, and then discussed by the entire group in detail. The four topics are: Surface Area; Adherence Factors; Dermal Absorption; and, GI Absorption. Below is a summary of each of these areas of change.

Surface Area (SA)
- Uses NHANES II data.
- Surface area increases for all categories.
- Area exposed is based on the sum of body parts rather than the percent of total surface area

Adherence Factors (AF)
- Based on newer empirical data
- Uses a weighted average based on body part- and activity-specific adherence factors.

Dermal Absorbance (DA)
- The new Guidance contains chemical-specific values for 10 compounds (contained in handout)
- Defaults for other chemicals are:
  semi-volatiles – assume 10%
  volatiles – assume 0%
  inorganics – assume 0%
- These new assumptions regarding DA are a policy decision, and are not based on new data.

GI Absorption
- Specific recommended GI Absorption values for about 26 chemicals, with a default of 100% for others
- 100% assumption may underestimate the risk from some chemicals

3) An open discussion of the summary presented by S. Roberts followed. Bob DeMott proposed that the group first discuss input data:

Body Weight, Surface Area, NHANES III
- Ligia Mora-Applegate suggested we use NHANES III for both body weight and surface area.

- Keith Tolson explained that NHANES III is still being statistically evaluated, but the numbers won't change from their last presentation. Keith said that the Burmaster equation is easier to implement than the EPA method. Chris Teaf suggested that a sensibility analysis would be useful to be sure of consistence.
- **CONSENSUS** – NHANES III and the Burmaster equation will be used to calculate surface area and body weight.

4) Skin Exposure

- Bob DeMott asked LEAF about skin exposure, as this was an issue originally raised by LEAF. The current SCTLs were based, roughly, on 25% of surface area and LEAF wants specific body parts accumulated. The new EPA Dermal Guidance has body parts. The argument becomes circular, as a percentage includes body parts, and vice versa. The data for body part percentages is poor – based on a few people. We probably need to present a percentage as including body parts. (Chris Teaf thinks this can apply to Adherence Factor too) The percentage would reflect the underlying assumptions of body parts, and proper communication becomes important.
- The new exposure numbers in the EPA Dermal Guidance go up for worker, child and adult. This is because the head is added for everyone, and feet are added for the child.
- Bob DeMott wants consistency in SA and AF for the head and face. EPA considers the entire head for SA, but only the face for AF. The rest of the head is lumped with the body AF.
- Keith Tolson suggested that SA for the head be 30 –50% instead of 100%. This won't make much difference in the SCTL, but we need to be able to explain it. Steve Roberts thought AF could be re-weighted after using the whole head.
- **CONSENSUS** – the MFG recommends that skin exposure be calculated using body parts (same as EPA) with annual averaging for the first six years. Head exposure will use the whole head SA with a notation for AF regarding the head assumption.

5) Averaging

- There was a discussion of annual averaging
- **CONSENSUS** – Annual averaging will be used for the aggregate resident and for the child for body weight, SA, and inhalation rate.

6) Adherence Factor

- MFG approach is consistent with EPA.
- **CONSENSUS** – The following AF's were agreed upon

  * Aggregate resident (adult) = 0.1

  * Child = 0.2 (ages 1-7 with a footnote that ages 1-12 were considered but didn't make a difference

  * Adult worker = 0.2

7) Time Weighting Calculation

- Florida is using the more correct formula for time weighting, since it is consistent with the method used for the derivation of the cancer slope factors.
- The Florida's method yields SCTLs approximately a factor of 2 higher for carcinogens, e.g. arsenic = 0.8 mg/kg in soil versus 0.4 mg/kg.
- **CONSENSUS** – Florida will continue to use the time weighted averaging procedure consistent with the underlying cancer slope factors.

8) Dermal Absorbance

- Florida is currently using Region IV Dermal Absorbance defaults, 0.1% for inorganics and 1% for organics.
- Adopting the new EPA approach would with a default 0% absorbance for inorganics and volatiles would effectively drop out any dermal intake for all these chemicals.
- The new EPA guidance does increase the default semi-volatile dermal absorption 10-fold, and the chemical-specific value for arsenic increases 30-fold. Some others also increase.
- Chris Teaf pointed out that assuming 0 absorption for metals and volatiles was clearly a policy call and not a scientific update and that he guessed this would be a major point of controversy in the reviews of the new guidance
- Steve Roberts indicated he was not very comfortable with totally dropping the dermal component for volatiles and metals. He recommended that the MFG leave dermal absorbance numbers alone.
- **CONSENSUS** – That we table any revisions to the current values for Dermal Absorbance, retaining the current Region IV values, anticipating clarification of the issues as the EPA goes through the review/adoption of its new guidance.

9) GI Absorption for converting oral reference dose/slope factors for dermal use

- Chris Teaf stated that there is not much difference between the new EPA GI numbers and Florida's GI numbers in most cases. Florida's numbers are in some cases more conservative.
- Keith Tolson indicated that the current numbers reflected a combination of chemical-specific GI absorptions that had been specifically researched for SCTL development with default values for the remaining chemicals.
- Bob DeMott pointed out that the current default values of 80% for volatiles, 50% for semivolatiles and 20% were from Region IV.
- FDEP and the UF team were asked whether they remained confident in those chemical-specific values that had been identified. Steve Roberts responded that he felt they were the best available values and more appropriate than reverting to default assumptions.
- There was discussion about whether there was any reason to disregard the chemical-specific efforts put in by Florida other than to match the new EPA guidance.
- Ligia Mora-Applegate pointed out that we're already not adopting EPA approaches completely, so consistency with them was not a critical goal.
- **CONSENSUS** – For those chemicals that Florida has identified a specific GI absorption number, that number will be retained. For chemicals where Florida has been using defaults, but the new EPA guidance offers a chemical-specific number, this chemical-specific value should be adopted (Note: this appears to apply only for silver). For chemicals where only defaults are available from both sources, we will use the new EPA default assumption of 100% GI absorption.

10) Other Issues

- Aliki Moncrief questioned changing the SCTLs using only some of the EPA Dermal Guidance recommendations. Roger Register, Richard Lewis, and Chris Teaf explained that chapter 62-777 is just numbers, and changes will periodically be made based on new science. The MFG is not comfortable with Dermal Absorption yet.

- Bob DeMott asked if we want to recommend that FDEP have the University of Florida update the SCTLs on the basis of exposure factors. The **CONSENSUS** was yes. New draft tables will be distributed by mid-June, before the July workshop for 62-777

- Chris Teaf discussed the acute toxicity of barium, supported with a handout. Steve Roberts requested time to review the study that Chris' proposal is based on. Review, comment, and consensus will be reached by email.

- The next MFG meeting will be in late summer, probably in August. The location is to be determined. Topics to be discussed include: Bioavailability; Anthropogenic Background;; 95% UCL (hot spots); and, uncertainty factors. Chris Seranko will take the minutes.

Methodology Focus Group Meeting Summary

August 24, 2000
Progress Center - Alachua, Florida
Prepared by Chris Saranko

The meeting was called to order at 10:15 am by the chairman Bob DeMott.
Bob DeMott listed the agenda Items for the meeting:

1. DERM acute toxicity SCTL proposal – Wilbur Mayorga
2. Revised 62-777 SCTLs presentation, question/answer – Steve Roberts
3. Upcoming action items for Methodology Focus Group
    a. UF arsenic bioavailability study
    b. Updates to VF
    c. Anthropogenic background

1. <u>DERM Acute Toxicity SCTL Proposal</u> - Wilbur Mayorga introduced the topic of the revisions to the acute toxicity SCTLs proposed by DERM.

- DERM requested that Steve Roberts and the UF group recommend a consistent approach for developing acute toxicity SCTLs for DERM's Chapter 24 regulations.
- Wants to bring the new approach to the MFG to for consideration as the approach used for Chapter 62-777.
- Steve Roberts introduced the revised approach by outlining the decision rules for the application of Safety Factors (SFs)to be used in the derivation of acute toxicity SCTLs.

  <u>Case 1</u> - If most sensitive endpoint is based on transient GI distress in humans:
  If dose is clearly a NOAEL, then no SF applied.
  If a dose is a LOAEL, a 10x SF is applied

  <u>Case 2</u> - If most sensitive endpoint is something more serious than transient GI distress:
  If dose is a NOAEL,. a 10x SF is applied (sensitive individuals)
  If a dose is a LOAEL, a 100x SF is applied (sensitive individuals +LOAEL to NOAEL)

  <u>Case 3</u> – If only endpoint is lethality:
  If dose is a NOAEL,. a 100x SF is applied
  If a dose is a LOAEL, a 1000x SF is applied

- For barium, copper, cyanide, nickel, and phenol, the acute dose as calculated above is below the USEPA's chronic RfD or recommended daily intake. These later values were used as the floor for calculating the acute SCTLs for these chemicals.
- Based on this scheme, there are essentially two special case endpoints: transient GI distress, which is considered less severe (10-fold lower SF applied), and lethality, which is considered more severe (10-fold higher SF applied)
- Bob DeMott noted that this differs from the consensus approach arrived at for Chapter 62-777 because it considers a LOAEL for GI distress as an endpoint of concern. Previously, transient GI distress was determined not to be an "adverse effect."
- Chris Teaf asked whether the nature of the toxicological dataset (i.e., reports of human poisoning incidents) already selects for sensitive individuals, since these individuals are more likely to become ill following exposure, thus making the 10x SF unnecessary.
- Steve Roberts indicated that this could be possible, however there is uncertainty about how low of a dose could have produced this effect..

- Changes in GI Absorption Factors
- Changes in Exposure Assumptions
    - Body weights
    - Surface Areas
    - Adherence Factors
    - Inhalation Rates
- Changes in Toxicity Values
    - Updates included in Workshop Draft
    - Proposed Changes to Workshop Draft
- Chemicals Added or Dropped from Consideration
- Chemicals Names Changed
- Addition of Synonyms for Chemicals
- Acute Reference Doses and Acute SCTLs
- Errata to Workshop Draft

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	
Acenaphthene	26%	1900	2400	11%	18000	20000	0.5	0.5	
Acenaphthylene	64%	1100	1800	82%	11000	20000	0.5	1	
Acephate	30%	64	83	85%	130	240	0.5	1	
Acetone	67%	780	1300	36%	5500	7500	0.8	1	
Acetonitrile	42%	120	170	25%	960	1200	0.8	1	Yes
Acetophenone	44%	2700	3900	33%	24000	32000	0.8	1	
Acrolein	25%	0.04	0.05	0%	0.3	0.3	0.8	1	
Acrylamide	0%	0.1	0.1	33%	0.3	0.4	0.5	1	
Acrylonitrile	0%	0.3	0.3	20%	0.5	0.6	0.8	1	
Alachlor	-8%	12	11	28%	36	46	0.8	1	
Aldicarb [or Temik]	18%	56	66	13%	760	860	1	1	
Aldrin	-14%	0.07	0.06	0%	0.3	0.3	1	1	
Allyl alcohol	126%	62	140	111%	460	970	0.5	1	
Aluminum	11%	72000	80000	0%	*	*	0.04	0.04	Yes
Aluminum phosphide	13%	31	35	21%	730	880	0.2	1	
Ametryn	14%	590	670	18%	9300	11000	0.68	0.68	
Ammonia	36%	550	750	8%	3700	4000	0.8	1	
Aniline	-7%	14	13	20%	100	120	0.5	1	
Anthracene	17%	18000	21000	15%	260000	300000	0.5	0.5	
Antimony	4%	26	27	54%	240	370	0.01	0.01	
Arsenic	-13%	0.8	0.7	11%	3.7	4.1	0.95	0.95	
Atrazine	5%	4	4.2	58%	12	19	0.5	1	
Azobenzene	-4%	8.2	7.9	29%	24	31	0.5	1	
Barium	9%	110	120	26%	87000	110000	0.05	0.07	
Bayleton	20%	2000	2400	59%	29000	46000	0.5	1	
Benomyl	11%	3600	4000	20%	64000	77000	0.67	0.67	
Bentazon	40%	1500	2100	78%	18000	32000	0.5	1	
Benzaldehyde	50%	2200	3300	33%	18000	24000	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	
Benzene	9%	1.1	1.2	6%	1.6	1.7	0.9	0.9	Yes
Benzenethiol	100%	0.1	0.2	30%	1	1.3	0.8	1	
Benzo(a)anthracene	-7%	1.4	1.3	32%	5	6.6	0.5	0.5	Yes
Benzo(a)pyrene	0%	0.1	0.1	40%	0.5	0.7	0.5	0.5	Yes
Benzo(b)fluoranthene	-7%	1.4	1.3	35%	4.8	6.5	0.5	0.5	Yes
Benzo(g,h,i)perylene	9%	2300	2500	27%	41000	52000	0.5	0.5	
Benzo(k)fluoranthene	-13%	15	13	27%	52	66	0.5	0.5	Yes
Benzoic acid	20%	150000	180000	0%	*	*	1	1	
Benzotrichloride	0%	0.04	0.04	29%	0.07	0.09	0.8	1	
Benzyl alcohol	13%	23000	26000	10%	610000	670000	0.5	1	
Benzyl chloride	25%	0.8	1	33%	1.2	1.6	0.8	1	
Beryllium	0%	120	120	59%	820	1300	0.006	0.006	
Bidrin [or Dicrotophos]	35%	5.5	7.4	79%	67	120	0.5	1	
Biphenyl, 1,1- [or Diphenyl]	30%	2300	3000	31%	26000	34000	0.8	1	
Bis(2-chloroethyl)ether	0%	0.3	0.3	25%	0.4	0.5	0.98	0.98	
Bis(2-chloroisopropyl)ether [or Bis(2-chloro-1-metylethyl)ether]	2%	4.4	4.5	11%	7.3	8.1	0.8	1	
Bis(2-ethylhexyl)phthalate [or DEHP]	-5%	76	72	39%	280	390	0.5	1	
Bisphenol A	21%	3300	4000	55%	51000	79000	0.5	1	
Boron	13%	7000	7900	25%	160000	200000	0.2	1	
Bromacil	32%	5700	7500	67%	72000	120000	0.5	1	
Bromochloromethane	67%	57	95	36%	390	530	0.8	1	
Bromodichloromethane	7%	1.4	1.5	10%	2	2.2	0.98	0.98	
Bromoform	0%	48	48	11%	84	93	0.75	0.75	
Bromomethane [or Methyl bromide]	41%	2.2	3.1	7%	15	16	0.8	1	
Butanol, n-	123%	1300	2900	110%	10000	21000	0.5	1	
Butyl benzyl phthalate	13%	15000	17000	19%	320000	380000	1	1	
Butylate	52%	2100	3200	82%	22000	40000	0.5	1	
Butylphthalyl butylglycolate	14%	74000	84000	0%	*	*	0.5	1	

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Cadmium	9%	75	82	31%	1300	1700	0.04	0.04	Yes
Calcium cyanide	13%	3100	3500	21%	73000	88000	0.2	1	
Captan	21%	190	230	83%	410	750	0.5	1	
Carbaryl [or Sevin]	13%	6800	7700	8%	120000	130000	0.98	0.98	
Carbazole	-8%	53	49	26%	190	240	0.8	1	
Carbofuran	124%	58	130	112%	430	910	0.5	1	
Carbon disulfide	35%	200	270	7%	1400	1500	0.8	1	
Carbon tetrachloride	25%	0.4	0.5	17%	0.6	0.7	0.85	0.85	Yes
Carbophenothion [or Trithion]	12%	9.8	11	39%	180	250	0.5	1	
Chlordane	-10%	3.1	2.8	17%	12	14	0.8	0.8	
Chlorine	6%	7800	8300	-30%	200000	140000	0.2	1	Yes
Chlorine cyanide [or Cyanogen chloride]	54%	910	1400	35%	7200	9700	0.8	1	
Chloro-1,3-butadiene [or Chloroprene]	35%	2.6	3.5	12%	17	19	0.8	1	
Chloroacetic acid	49%	87	130	85%	920	1700	0.5	1	
Chloroaniline, p-	42%	190	270	85%	2000	3700	0.5	1	
Chlorobenzene	300%	30	120	225%	200	650	0.31	0.31	Yes
Chlorobenzilate	-8%	3.9	3.6	29%	14	18	0.57	0.57	
Chloroform	-25%	0.4	0.3	20%	0.5	0.6	1	1	Yes
Chloro-m-cresol, p- [or 4-chloro-3-methylphenol]	46%	410	600	82%	4400	8000	0.5	1	
Chloromethane	88%	1.7	3.2	100%	2.3	4.6	0.8	1	Yes
Chloronaphthalene, beta-	28%	4000	5100	31%	49000	64000	0.8	1	
Chloronitrobenzene, p-	11%	28	31	33%	55	73	0.8	1	
Chlorophenol, 2-	59%	82	130	34%	640	860	0.8	1	
Chlorophenol, 3-	32%	280	370	74%	3400	5900	0.5	1	
Chlorophenol, 4-	50%	220	330	83%	2400	4400	0.5	1	
Chlorothalonil [or Bravo]	0%	88	88	50%	280	420	0.5	1	
Chlorotoluene, o-	67%	120	200	41%	850	1200	0.8	1	
Chlorotoluene, p-	70%	100	170	36%	730	990	0.8	1	

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	
Chlorpropham	23%	13000	16000	60%	200000	320000	0.5	1	
Chlorpyrifos	14%	220	250	19%	4200	5000	0.9	0.9	
Chromium (hexavalent)	-5%	210	200	10%	420	460	0.01	0.01	
Chrysene	-7%	140	130	42%	450	640	0.5	0.5	Yes
Cobalt	11%	4700	5200	18%	110000	130000	0.25	0.25	
Copper	36%	110	150	9%	76000	83000	0.56	0.56	
Coumaphos	17%	18	21	50%	300	450	0.5	1	
Crotonaldehyde	43%	0.07	0.1	100%	0.1	0.2	0.5	1	
Cumene [or Isopropyl benzene]	38%	160	220	9%	1100	1200	0.8	1	
Cyanide, free	13%	30	34	13%	39000	44000	0.5	1	
Cyanogen	65%	340	560	36%	2500	3400	0.8	1	
Cycloate	42%	240	340	81%	2600	4700	0.5	1	
Cyclohexanone	121%	68000	150000	-100%	510000	*	0.5	1	
Cypermethrin	13%	750	850	36%	14000	19000	0.5	1	
Diallate	-6%	17	16	46%	56	82	0.5	1	
Diazinon	27%	55	70	58%	760	1200	0.5	1	
Dibenz(a,h)anthracene	0%	0.1	0.1	40%	0.5	0.7	0.5	0.5	
Dibenzofuran	14%	280	320	26%	5000	6300	0.8	1	
Dibromo-3-chloropropane, 1,2- [or DBCP, 1,2-]	-13%	0.8	0.7	41%	2.7	3.8	0.5	1	
Dibromochloromethane	7%	1.4	1.5	10%	2.1	2.3	0.75	0.75	
Dibromoethane, 1,2- [or EDB]	0%	0.01	0.01	25%	0.04	0.05	0.98	0.98	
Dicamba	28%	1800	2300	67%	24000	40000	0.5	1	
Dichloroacetic acid	40%	200	280	78%	2300	4100	0.5	1	
Dichloroacetonitrile	100%	170	340	107%	1400	2900	0.5	1	
Dichlorobenzene, 1,2-	35%	650	880	9%	4600	5000	0.8	1	
Dichlorobenzene, 1,3-	-48%	27	14	-53%	180	85	0.8	1	Yes
Dichlorobenzene, 1,4-	7%	6	6.4	10%	9	9.9	1	1	
Dichlorobenzidine, 3,3'-	0%	2.1	2.1	56%	6.3	9.8	0.5	1	

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	
Dichlorodifluoromethane	38%	56	77	11%	370	410	0.8	1	
Dichlorodiphenyldichloroethane, p,p' [or DDD, 4,4'-]	-9%	4.6	4.2	22%	18	22	0.8	0.8	
Dichlorodiphenyldichloroethylene, p,p'- [or DDE, 4, 4']	-12%	3.3	2.9	15%	13	15	0.8	0.8	
Dichlorodiphenyltrichloroethane, p,p'- [or DDT, 4, 4'-]	-12%	3.3	2.9	15%	13	15	0.8	0.8	
Dichloroethane, 1,1-	34%	290	390	5%	2000	2100	0.8	1	Yes
Dichloroethane, 1,2- [or EDC]	0%	0.5	0.5	0%	0.7	0.7	1	1	
Dichloroethene, 1,1-	11%	0.09	0.1	0%	0.1	0.1	1	1	
Dichloroethene, cis-1,2-	74%	19	33	38%	130	180	0.8	1	
Dichloroethene, trans-1,2-	71%	31	53	38%	210	290	0.8	1	
Dichlorophenol, 2,3-	28%	180	230	64%	2500	4100	0.5	1	
Dichlorophenol, 2,4-	46%	130	190	92%	1300	2500	0.5	1	
Dichlorophenol, 2,5-	20%	200	240	53%	3000	4600	0.5	1	
Dichlorophenol, 2,6-	29%	170	220	68%	2200	3700	0.5	1	
Dichlorophenol, 3,4-	20%	200	240	55%	3100	4800	0.5	1	
Dichlorophenoxy acetic acid, 2,4-	15%	670	770	18%	11000	13000	1	1	
Dichloropropane, 1,2-	0%	0.6	0.6	13%	0.8	0.9	1	1	
Dichloropropene, 1,3-	600%	0.2	1.4	1000%	0.2	2.2	0.98	0.98	Yes
Dichlorprop	37%	270	370	76%	3300	5800	0.5	1	
Dichlorvos	50%	0.2	0.3	33%	0.3	0.4	0.96	0.96	
Dicofol [or Kelthane]	-4%	2.3	2.2	45%	7.6	11	0.5	1	
Dieldrin	-14%	0.07	0.06	0%	0.3	0.3	1	1	
Diethylphthalate	13%	54000	61000	-100%	920000	*	1	1	
Dimethoate	55%	8.4	13	86%	86	160	0.5	1	
Dimethrin	26%	19000	24000	63%	270000	440000	0.5	1	
Dimethylformamide, N,N-	27%	1100	1400	10%	7800	8600	0.5	1	
Dimethylphenol, 2,4-	43%	910	1300	84%	9800	18000	0.5	1	
Dimethylphthalate	17%	590000	690000	0%	*	*	1	1	
Di-n-butylphthalate	12%	7300	8200	21%	140000	170000	1	1	

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	
Dinitrobenzene, 1,2- (o)	77%	13	23	85%	130	240	0.5	1	
Dinitrobenzene, 1,3- (m)	66%	3.5	5.8	94%	33	64	0.5	1	
Dinitrophenol, 2,4-	67%	66	110	94%	620	1200	0.5	1	
Dinitrotoluene, 2,4-	-8%	1.3	1.2	16%	3.7	4.3	1	1	
Dinitrotoluene, 2,6-	20%	1	1.2	86%	2.1	3.9	0.5	1	
Di-n-octylphthalate	13%	1500	1700	44%	27000	39000	0.5	1	
Dinoseb	18%	55	65	12%	740	830	1	1	
Dioxane, 1,4-	92%	12	23	111%	18	38	0.5	1	
Dioxin (equivalents) [or 2,3,7,8-TCDD]	0%	7E-06	7E-06	33%	0.00003	0.00004	0.9	0.9	
Diphenamid	28%	1800	2300	64%	25000	41000	0.5	1	
Diphenylhydrazine, 1,2-	-8%	1.2	1.1	30%	3.7	4.8	0.5	1	
Disulfoton	14%	2.9	3.3	18%	56	66	0.94	0.94	
Diuron	15%	130	150	15%	2000	2300	0.9	0.9	
Endosulfan	12%	410	460	16%	6700	7800	0.82	0.82	
Endothall	54%	780	1200	92%	7800	15000	0.5	1	
Endrin	19%	21	25	50%	340	510	0.5	1	
Epichlorohydrin	27%	11	14	8%	74	80	0.8	1	
Ethion	11%	38	42	18%	780	920	1	1	
Ethoprop	35%	5.5	7.4	74%	69	120	0.5	1	
Ethoxyethanol, 2-	23%	8100	10000	11%	65000	72000	0.5	1	
Ethyl acetate	65%	5500	9100	36%	39000	53000	0.8	1	
Ethyl acrylate	25%	1.6	2	36%	2.2	3	0.8	1	
Ethyl chloride [or Chloroethane]	34%	2.9	3.9	35%	4	5.4	0.8	1	
Ethyl dipropylthiocarbamate, S- [or EPTC]	27%	1100	1400	8%	13000	14000	0.96	0.96	
Ethyl ether	73%	150	260	40%	1000	1400	0.8	1	
Ethyl methacrylate	66%	380	630	35%	2600	3500	0.8	1	
Ethyl p-nitrophenyl phenylphosphorothioate [or EPN]	14%	0.7	0.8	20%	15	18	1	1	
Ethylbenzene	36%	1100	1500	8%	8400	9100	0.8	1	

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	
Ethylene diamine	80%	610	1100	100%	5500	11000	0.5	1	
Ethylene glycol	121%	24000	53000	106%	180000	370000	0.5	1	
Ethylene oxide	0%	0.3	0.3	0%	0.4	0.4	0.8	1	
Fenamiphos	27%	15	19	62%	210	340	0.5	1	
Fensulfothion	36%	14	19	72%	180	310	0.5	1	
Fluometuron	31%	750	980	65%	9700	16000	0.5	1	
Fluoranthene	10%	2900	3200	23%	48000	59000	0.5	0.5	
Fluorene	18%	2200	2600	18%	28000	33000	0.5	0.5	
Fluoride	68%	500	840	8%	120000	130000	0.97	0.97	
Fonofos	17%	120	140	17%	1800	2100	0.82	0.82	
Formaldehyde	10%	21	23	7%	29	31	0.5	1	
Furfural	19%	160	190	20%	2000	2400	0.5	1	
Guthion [or Methyl azinphos]	9%	110	120	20%	2000	2400	1	1	
Heptachlor	0%	0.2	0.2	11%	0.9	1	0.8	0.8	
Heptachlor epoxide	0%	0.1	0.1	25%	0.4	0.5	0.4	0.4	
Hexachloro-1,3-butadiene	-2%	6.3	6.2	8%	12	13	1	1	
Hexachlorobenzene	-20%	0.5	0.4	9%	1.1	1.2	0.8	0.8	
Hexachlorocyclohexane, alpha- [or BHC, alpha-]	-50%	0.2	0.1	20%	0.5	0.6	0.97	0.97	
Hexachlorocyclohexane, beta- [BHC, beta-]	-17%	0.6	0.5	14%	2.1	2.4	0.91	0.91	
Hexachlorocyclohexane, delta- [or BHC, delta-]	9%	22	24	17%	420	490	0.92	0.92	
Hexachlorocyclohexane, gamma- [or Lindane or BHC, gamma-]	0%	0.7	0.7	14%	2.2	2.5	0.99	0.99	
Hexachlorocyclopentadiene	42%	2.4	3.4	13%	16	18	0.9	0.9	
Hexachloroethane	12%	34	38	12%	78	87	0.8	1	
Hexahydro-1,3,5-trinitro-1,3,5-triazine [or RDX]	15%	6.7	7.7	75%	16	28	0.5	1	
Hexane, n-	36%	500	680	8%	3600	3900	0.8	1	
Hexanone, 2- [or Methyl butyl ketone]	371%	5.1	24	282%	34	130	0.98	0.98	Yes
Hexazinone	44%	1600	2300	78%	18000	32000	0.5	1	
Hydroquinone	44%	1800	2600	84%	19000	35000	0.5	1	

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	

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

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	Factor	62-777 (mg/kg)	Proposed (mg/kg)	Factor	62-777 (mg/kg)	Proposed (mg/kg)	62-777	Proposed	
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	

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

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	Factor	62-777 (mg/kg)	Proposed (mg/kg)	Factor	62-777 (mg/kg)	Proposed (mg/kg)	62-777	Proposed	
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	

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

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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	

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	
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	

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	
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

CHEMICAL NAMES PROPOSED TO BE CHANGED FOR 62-777, F.A.C.

CAS #	Name Used in Chapter 62-777 F.A.C.	Proposed New Name
101-55-3	Bromophenyl phenyl ether, 4-	Bromodiphenyl ether, p-
71-36-3	Butanol, 1-	Butanol, n-
78-93-3	Butanone, 2-	Methyl ethyl ketone
85-68-7	Butyl benzyl phthalate, n-	Butyl benzyl phthalate
7758-19-2	Chlorite, sodium	Sodium chlorite
106-47-8	Chloroaniline, 4-	Chloroaniline, p-
57-12-5	Cyanide (potassium salt)	Cyanide, free
68085-85-8	Cyhalothrin, lambda	Cyhalothrin
72-54-8	DDD, 4,4'-	Dichlorodiphenyldichloroethane, p,p'
72-55-9	DDE, 4,4'-	Dichlorodiphenyldichloroethylene, p,p'-
50-29-3	DDT, 4,4'-	Dichlorodiphenyltrichloroethane, p,p'-
84-74-2	Dibutyl phthalate	Di-n-butylphthalate
608-73-1	Hexachlorocyclohexane	Hexachlorocyclohexane, technical
93-65-2	Methyl-4chlorophenoxy propionic acid, 2-	Propionic acid, 2-(2-methyl-4-chlorophenoxy)
74223-64-6	Metsulfuron, methyl	Ally
114-26-1	Propoxur	Baygon
93-72-1	Trichlorophenoxy propionic acid	Trichlorophenoxy propionic acid, 2, (2, 4, 5-)
7440-61-1	Uranium, natural	Uranium, soluble salts

ACUTE REFERENCE DOSES AND CORRESPONDING ACUTE TOXICITY SCTLs

Chemical	62-777, F.A.C. Acute RfD (mg/kg-day)	62-777, F.A.C. SCTL (mg/kg)	Proposed Acute RfD (mg/kg-day)	Proposed SCTL (mg/kg)
Barium	0.07	110	0.07[a]	120
Cadmium	0.001	75	0.05	84
Copper	0.07	110	0.09[b]	150
Cyanide	0.02	30	0.02 [a]	34
Fluoride	0.33	500	0.5	840
Nickel	0.07	110	0.2	340
Phenol	0.6	900	0.6 [a]	1000
Vanadium	0.01	15	0.04	67

[a] Selected RfD based on USEPA chronic oral reference dose
[b] Selected RfD based on WHO recommended intake limit

ERRATA TO WORKSHOP DRAFT (JULY 27, 2000)

Chemical	Workshop Draft		Corrected		Reason
	Residential (mg/kg)	Industrial (mg/kg)	Residential (mg/kg)	Industrial (mg/kg)	
Acetophenone	0.4	2.2	3900	32000	RfDi was an IRIS withdrawn value. Due to lack of confidence in reference study, RfDi is now extrapolated from RfDo.
Antimony	34	810	27	317	G.I. absorption value input was 0.15 (RAGs E), should be 0.01 (ATSDR). Data entry error.
Beryllium	1500	2300	120	1300	G. I. absorption value input was 0.006 (RAGs E), should be 0.007 (ATSDR). Also, data entry error or toxicity values, omission of RfDo.
Butyl Alcohol, tert-	140	780	1400	7800	Used RfDo of 0.02 rather than 0.2. Data entry error.
Chromium, hexavalent	230	460	200	460	G.I. absorption value input was 0.03 (RAGs E), should be 0.013 (ATSDR)
Dichlorobenzene 1,3-	460	2800	14	85	Changes are reflective of updated NCEA RfDo of 9.00E-4.
Nickel	340	33000	340	35000	G.I. absorption value input was 0.04 (RAGs E), should be 0.05 (ATSDR).
Nitroglycerin[1]	27	54	5.3	12	Used Region IV dermal absorption default. Chemical specific value is 0.5.

[1] Systemic bioavailability of nitroglycerin through dermal absorption is 70 ± 20%. To accommodate the possibility of reduced dermal absorption from a soil matrix, we recommend using a dermal bioavailability value from the lower end of the observed range – 50% (0.5).

CHANGES SINCE WORKSHOP DRAFT of JULY 27,2000

Chemical	Value	Previous	Updated	Basis for Update
Bromochloromethane	RfDo	1.300E-02 HAL	1.0 E-02 HAL	Updated Health Advisory Level, USEPA Summer 2000
Dichloroacetonitrile	RfDo	8.00E-03 HAL	None	HAL value has been withdrawn
Trichloroacetic acid	RfDo	1.300E-02 HAL	1.00E-01 HAL	Updated Health Advisory Level, USEPA Summer 2000
Trichlorobenzene, 1,3,5-	RfDo	5.700E-03 HAL	6.00E-03 HAL	Updated Health Advisory Level, USEPA Summer 2000

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