

Date: December 10, 2008

To: Remediation Division

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Subject: **Risk-Based Guidance for the Soil-Human Health Pathway Update:**
→ Removal of Child Acute table on Tier II Soil Reference Value (SRV) spreadsheet
→ Changes in Tier I/II Residential and Recreational Arsenic, Barium, Copper, Cyanide, Fluoride, Pentachlorophenol (PCP), and Phenol SRVs
→ Use of SRVs Based on Acute Effects

The Risk-Based Guidance for the Soil-Human Health Pathway discusses the use of acute SRVs for the purpose of short-term hazard evaluations. Acute SRVs were calculated for a very limited number of contaminants to determine action levels – levels potentially associated with significant health effects in toddlers ingesting a single large quantity of soil. These action levels were established to indicate if an interim action to protect public health should be taken to interrupt the exposure pathway until remediation of the soil could occur.

Addressing acute exposures for all contaminants in a standard manner is difficult because of the lack of necessary data and consistent methodology. Due to these limitations and the lack of resources, the Child Acute table on the Tier II SRV spreadsheet will be removed. Five contaminants on the Tier I/II Residential and Recreational SRV spreadsheets which have Acute Effect Levels in place of a chronic SRV will remain. These five contaminants are known to be acutely toxic.

Barium, Copper, Cyanide, Fluoride, and Phenol will have values in the Tier I/II Residential and Recreational SRV spreadsheets that are based on Acute Effect Levels. Acute Effect Levels are values that when an 11 kg (24.2 lb) child ingests 10 grams (~ ½ tsp) of soil, an adverse health effect could be expected to occur. This information, along with the toxicological basis for acute values (see table below) should be considered when developing clean up goals for a site. For example, soil data for these contaminants should not be averaged over the site and extra caution may need to be taken to adequately characterize sites with these contaminants.

An effort to revise the entire list of SRVs is underway. Further changes to the values in this memo may or may not occur during this process. A future project may take a closer look at other acute exposure scenarios that would be useful in assessing risk at sites.

Tier I/II Residential and Recreational SRV Changes

	Current Residential (Recreational) SRV (mg/kg)	Updated Residential (Recreational) SRV (mg/kg)	Basis of Updated SRV
Arsenic	5 (5)	9 (11)	Based on current methodology for calculating <i>chronic</i> SRVs; this value is based on noncancer health effects (RfD 0.0003 mg/kg-day). The value based on carcinogenicity is 10 mg/kg (CSF 1.5 mg/kg-day ⁻¹). Source: EPA IRIS. The current value is based on an acute scenario. An Acute Effect Level for arsenic as updated would be greater than the chronic value and therefore not calculated at this time.
Barium	1200 (1200)	1100 (1100)	Acute Effect Level* based on the threshold of a toxic dose in adults (0.2-0.5 g). Symptoms begin in the GI tract Source: 2007 Handbook on the Toxicology of Metals. Applied UF** of 3 to lowest dose to account for severity of effects.
Copper	11 (11)	100 (100)	Acute Effect Level based on Tolerable Upper Intake Level for 1-3 year olds (0.09 mg/kg). Liver damage as an endpoint. Source: Institute of Medicine 2000. Also considered use of ATSDR 2004 Acute MRL drinking water study LOAEL (0.07 mg/kg). Endpoints – nausea, vomiting, abdominal pain.
Cyanide	62 (62)	60 (60)	Acute Effect Level based on the lowest reported fatal dose of 0.56 mg/kg. Source: ATSDR Tox Profile 2006. Applied UF of 10 to account for lethal endpoint.
Fluoride	550 (550)	180 (180)	Acute Effect Level based on the lowest lethal dose of 5 mg/kg estimated from child poisoning cases. Source: ATSDR Tox Profile 2003. Applied an UF of 30 to account for lethal endpoint and common exposure to other sources.
PCP	6 (6)	80 (80)	Based on the current methodology for calculating <i>chronic</i> SRVs; this value is based on carcinogenicity (CSF 0.12 mg/kg-day ⁻¹). Source: EPA IRIS. The current value is based on an acute scenario. An Acute Effect Level for PCP as updated would be greater than the chronic value and therefore not calculated at this time.
Phenol	1100 (1100)	1500 (1500)	Acute Effect Level based on the lower limit of lethal dose for adults (14 mg/kg). Source: ATSDR Tox Profile 2006 Draft. Applied UF of 10 to account for lethal endpoint.

*Acute Effect Level equation

$$AD_{\text{ingestion}} \text{ (mg/kg-day)} = (Cs \times IR \times CF) / (BW)$$

$$HQ = AD_{\text{ingestion}} / \text{Acute Toxicity Value}$$

Cs = Concentration in soil (mg/kg) – back-calculated

IR = Ingestion Rate - 10,000 mg

CF = Conversion Factor - 0.000001 kg/mg

BW = Body Weight - 11 kg

HQ = Hazard Quotient - 1

AD_{ingestion} – Average Ingested Dose (mg/kg-day)

Acute Tox Value = human data based on effect level, using UFs if appropriate

** UF - Uncertainty Factors have been applied based on professional judgment to lessen the potential for severe health endpoints