Acute Toxicity SCTL Issues

- Need for and prevalence of separate guidelines?
- Present list: Ba, Cu, CN\textsuperscript{-}, F\textsuperscript{-}, Ni, Phenol, V (cadmium evaluated, default SCTL protective of acute tox)
- Proposed revision has only Ba, Cu, F\textsuperscript{-}, Phenol
- Soil Ingestion Rate (IR): 10 grams/event (50x default)
- Review of tox values to be used
- Bioavailability: Assumes 100%
Need / Prevalence

- Extreme outlier (pica) behavior recognized, but acute harm implausible, undemonstrated
- Several based primarily on transient GI effects (Cu, Ni, V)
- Regulation of GW, SW does not single out extreme outliers
- FL sites can be driven by acute tox values (e.g., Ba)
- Other states/federal/international guidance; 3 of 26 states responding to UF use the acute basis
  - CA (groundwater only; soil levels do not)
  - MN (Ba, Cu, CN-, F-, Phenol)
  - NY (As, Ba, Cd, Cu, CN-, Ni, Naph, Penta, Phenol) cites FL
  - USEPA (RSLs do not address acute exposure)
  - Canada (CN- only)
# List of Chemicals 1

<table>
<thead>
<tr>
<th>Chemical</th>
<th>Acute 2015 (mg/kg)</th>
<th>Acute 2005 (mg/kg)</th>
<th>2005 Chronic (mg/kg)</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barium</td>
<td>340</td>
<td>120</td>
<td>5,800</td>
<td>RfD (IRIS) increase from 0.07 to 0.2</td>
</tr>
<tr>
<td>Copper</td>
<td>150</td>
<td>150</td>
<td>3,300</td>
<td></td>
</tr>
<tr>
<td>Cyanide</td>
<td>8.9 * (~50)</td>
<td>34</td>
<td>1,700</td>
<td>RfD (IRIS) decrease from 0.02 to 0.0006 (NOTE: cannot duplicate 8.9 mg/kg)</td>
</tr>
<tr>
<td>Fluoride</td>
<td>840</td>
<td>840</td>
<td>5,200</td>
<td></td>
</tr>
<tr>
<td>Nickel</td>
<td>1.7 * (1,600)</td>
<td>340</td>
<td>1,600</td>
<td>2015 based on carc (oral CSF from CalEPA); 2002 IRIS RfD</td>
</tr>
<tr>
<td>Phenol</td>
<td>500</td>
<td>500</td>
<td>18,500</td>
<td></td>
</tr>
<tr>
<td>Vanadium</td>
<td>5 * (~400)</td>
<td>67</td>
<td>550</td>
<td>RfD decrease from 0.007 (HEAST) to 0.00007 (PPRTV); but RfD for V in RSLs is 0.005 based on IRIS for V$_2$O$_5$</td>
</tr>
</tbody>
</table>

* 2015 proposed SCTLs not based on acute calculation
List of Chemicals 2

- CN⁻ and phenol have reasonable acute basis in tox
- Tox of Ba, Cu, F⁻, Ni, V lacks good foundation
- Endpoints for some are ambiguous, transient, reversible; there should be real hazard potential
- Same substances present in dietary, commercial products at similar or higher levels
  - Barium in brazil nuts (3,000-4,000 ppm) and cultivated plants (lima beans, cabbage, soy beans; up to 1,500 ppm)
  - Copper in beef liver (mean of 123 ppm), clams (up to 171 ppm), and oysters (up to 600 ppm)
  - Cyanide in cassava root up to 1,500 ppm
Ingestion Rate

- 10 gram, single soil ingestion event is present assumption
  - Historical support as infrequent acute exposure
  - More indicative of extreme pica or geophagy
- Frequency of events is often cited but weakly supported (e.g., 33% may ingest 10 g 1-2 times/year)
- Calabrese et al. (1997) cites 200 mg/day protects 95% of children; 2011 EFH concurs
- Others use 1 to 5 gram range for pica recommendation (2011 EFH, 2008 Child EFH, CalEPA 2012, literature)
- Recommend 3 g/event (midpoint 1 to 5 g/event range)
- Ingestion rate recommended at 1 g/event, based on EFH
Toxicological Guidance

- $\text{RfD}_{\text{acute}}$ values developed by UF from human studies; mostly drinking water exposure
- $\text{RfD}_{\text{acute}}$ for some substances set very close to acceptable dietary recommendations
- Large soil bolus alone may cause adverse GI effects
- Existing dose/response from nonsoil exposures
- Effects for several substances based on transient GI
Bioavailability

- Chemical-specific info available, but default is 100%
- Limited or no literature for most chemicals
- Other default recommendations exist (e.g., 50% MADEP)
- Single acute exposures beg a question: Are there no reports of acute effect because toxins are unavailable?
Options/Recommendations

- Discontinue development of default SCTLs based on acute toxicity considerations
- Reduce the acute chemicals to Phenol and CN⁻ only
- Consider site-specific approach for acute considerations
- Reduce acute ingestion rate to 1 g/event (per 2011 EFH)