Overview of Groundwater Standard for Total Chromium

Connie Brower
Division of Water Resources
Groundwater Standards

- Environmental Management Commission (EMC) establishes the best usages of groundwaters as a source of drinking water. The EMC, directed by GS 143-214.1, establishes classifications and standards for the waters of the state.

- Rules are located in 15A NCAC 02L
NC DEQ Total Chromium Groundwater Standard

- Adopted by EMC – effective January 1, 2010
- Based upon EPA Integrated Risk Information System non-cancer oral Reference Dose (RfD) of $3 \times 10^{-3}$ mg/kg/day for Hexavalent Chromium (1998 – One year, drinking water rat study)
  - This RfD is still listed on the IRIS site.
- This standard, as calculated, assumed all analytically reported Total Chromium may consist entirely of the more toxic Hexavalent Chromium.
Development of the Standard

- Previous standard was 50 ug/L
- Proposals to revise began in 2002
- After evaluation - 10 ug/L as total chromium was approved
- At point of development, info relating to carcinogenic effects had not been fully vetted.
GW Standards & IMACS

Per 02L .0202 (d) = the lower of:

1. Non-cancer concentration
2. 1/million cancer risk concentration
3. Taste threshold
4. Odor threshold
5. Maximum Contaminant Level (fed MCLs)
6. Secondary Drinking Water Standard
References Used

In order of preference:

- Integrated Risk Information System (US EPA)
- Health Advisories (US EPA Office of Drinking Water)
- Other health risk assessment data published by the US EPA
- Other relevant, published health risk assessment data, and scientifically peer-reviewed published toxicological data.
## Chromium – Surface Water Standards (freshwater)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Derivation</th>
<th>Surface Water Quality Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chromium III, acute</td>
<td>$WQS = [0.316 \times e^{0.8190[\ln Hardness]+3.7256}]$</td>
<td>180 @ 25mg/L hardness</td>
</tr>
<tr>
<td>Chromium III, chronic</td>
<td>$WQS = [0.860 \times e^{0.8190[\ln Hardness]+6848}]$</td>
<td>24 @ 25mg/L hardness</td>
</tr>
<tr>
<td>Chromium VI, acute</td>
<td>As dissolved fraction</td>
<td>16</td>
</tr>
<tr>
<td>Chromium VI, chronic</td>
<td>As dissolved fraction</td>
<td>11</td>
</tr>
</tbody>
</table>

All values and equations per EPA’s 1995 Water Quality Criteria Documents for the Protections of Aquatic Life in Ambient Water (EPA-820-B-96-001)
Questions?

Connie Brower
Connie.Brower@ncdenr.gov