



Risk-Based Decision Making (RBDM) 2007 Updates

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RBDM 2007 Updates

- **Review of Use and Application of RBDM chemical-specific spreadsheet**
- **Use of US EPA-Region 6 Values vs. Region 9**
- **Implementation of Early-Life Exposure methodology**



Use and Application of Spreadsheet

- **Risk-based concentration (RBCs) are applicable at all cleanup program sites and UST program sites**
- **September 2006 update included expanded list of (94)chemicals to include:**
 - **Chemicals previously listed in redacted OAR 340-122-045 (SOCLEAN) cleanup table.**
 - **Chemicals requested between 2003 & 2006**



Use and Application of Spreadsheet

- **DEQ preference is to use these RBCs. When not available:**
 - Calculate scenario-specific RBCs using chemical-specific toxicity and physical properties (Demo).
 - Use US EPA Region 6 screening levels



Use and Application of Spreadsheet

- **Cautions:**
 - Non-cancer-based RBCs are sometimes lower.
 - These include:
 - Cadmium in soil/gw (no oral slope factor)
 - Chromium VI (gw only) soil carc. lower
 - Carbon Tetrachloride: (Excavation Worker) Volatile, low Inh. RfD.



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New Source for Toxicity Information

- **Region 6 Toxicity Values Now Used.**
 - Last EPA Region 9 Update is October 2004.
 - Follows hierarchy specified in OAR 340-122-084
 - EPA Region 10 is using Region 6 RBCs.
 - For most chemicals- No difference



New Source for Toxicity Information

- There are differences in choices made by Regions 9 and 6 that affect RBC calculations:
- 1,2-Dichlorobenzene:
 - Region 9 inh. RfD-cites HEAST 1997 (0.057)
 - Region 6 inh RfD-cites NCEA, (0.0069)
 - Results in RBCs roughly x10 lower



Chemicals where RBCs changed (2003 Short List)

<i>PATHWAY</i>	<i>RECEPTOR</i>
<i>Soil Direct Contact</i>	<i>Residential & Urban Residential</i> Toluene, EDB and MTBE (increased); n-propylbenzene, c-PAHs, trans-1,2-DCE, 1,1,1-TCA (decrease)
<i>Soil Vapor Intrusion</i>	Toluene, MTBE (increased); EDB, trans-1,2 DCE (decreased)
<i>Direct Contact with Groundwater</i>	Toluene, EDB, MTBE, 1,1-DCE (increase); c-PAHs, n-propylbenzene, trans-1,2 DCE (decrease)

a - Toluene decreases in the construction worker scenario only Inhalation RfD up x10, Oral Rfd down by x5.



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Carcinogen Risk Assessment (Early Life Exposure)

The National Research Council

"EPA should assess risks to infants and children whenever it appears that their risks might be greater than those of adults."

*Science and Judgment in Risk Assessment
National Research Council, 1994*



Early-Life Exposure

- **US EPA revises it's cancer risk assessment guidance for chemicals with a mutagenic mode of action –April 2005**
 - Peer Reviewed by EPA SAB (2004-2005)
 - Implements US EPA *supplemental* Carcinogen Risk Assessment Guidance (EPA 630/R-03/003F)-Final March 2005
 - <http://cfpub.epa.gov/ncea/raf/recordisplay.cfm?deid=16000>



USEPA Implementation

- March 2005-EPA administrator directs agency to begin using approach for all new risk assessments-but not done at this time.
 - List of mutagenic chemicals?
 - What exposure factors to use?
- March 2005- Adjustment Factors (ADAFs) provided in *supplemental* guidance.
- June 2006-Science Policy Council provides list of chemicals acting by a mutagenic mode or action. (exp. Factors taken from Region 6, 12/06)



DEQ Implementation Schedule

- New Risk Evaluations: -Use revised RBCs and Approach
- Ongoing: Implement approach on a case by case basis
- Completed: may be used if a new risk-based decision is required. Otherwise, previous decisions stand.



Early-Life Exposure

- Standard Approach:

$$IRS_{adj} = \frac{ED_{0-6} \cdot IRS_{0-6}}{BW_{0-6}} + \frac{ED_a \cdot IRS_a}{BW_a}$$



Early-Life Exposure

- **Early-Life Approach:**

$$\begin{aligned}
 IRS_{adj} = & \frac{ED_{0-2} \cdot IRS_{0-2} * ADAF_1}{BW_{0-2}} + \frac{ED_{3-6} \cdot IRS_{3-6} * ADAF_2}{BW_{3-6}} + \\
 & + \frac{ED_{7-16} \cdot IRS_{7-16} * ADAF_2}{BW_{7-16}} + \frac{ED_{17-30} \cdot IRS_{17-30} * ADAF_3}{BW_{17-30}}
 \end{aligned}$$



Early-Life Exposure

- **ADAFs from USEPA supplemental Guidance**
 - 0-2 ADAF = 10
 - 3-16 ADAF = 3
 - 17-30 ADAF = 1
- **Exposure factors also age-specific**



Early-Life Exposure

- **Which Chemicals are affected ?**
 - Benzo(a)Pyrene-B(a)P
 - All carcinogenic PAHs, based on B(a)P toxicity
 - Vinyl Chloride
 - Others: but not typical at Cleanup or UST sites- Full list available at:
 - http://www.epa.gov/OSA/spc/cancer_guidelines.htm



Early-Life Exposure Implementation

- **How much difference does it make ?**
 - Benzo(a)Pyrene- and other cPAHs
 - Soil-Factor of 4 (res) to 6 (urban res) lower
 - Occupational/Excavation-no change
 - GW-Factor of 3 (res) to 4 (urban res) lower
 - Vinyl Chloride- special case that had been implemented previously



What's next?

- **Adding Single Table showing lowest of all RBCs**
- **Annual Update/Revision schedule**
- **Revision to guidance document to indicate broad cleanup program applicability**
- **Questions?**