



**Missouri Department of Health and Senior Services**

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Director

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September 13, 2004

Linda Vogt  
Missouri Department of Natural Resources  
P.O. Box 176  
Jefferson City, MO 65101

RE: Chemicals with multiple toxicity values to be utilized in the Missouri Risk-Based Corrective Action (MRBCA) process

This is a follow-up letter that clarifies and supercedes the previous letter dated August 23, 2004. In an August 12, 2004 letter, the Missouri Department of Health and Senior Services (DHSS) provided recommendations to the Missouri Department of Natural Resources (DNR) regarding the chemicals with multiple or toxicity values. It was noted that four chemicals have multiple toxicity values in the United States Environmental Protection Agency (EPA) Integrated Risk Information System (IRIS): Benzene, Cadmium, 1,3-Dichloropropene, and Vinyl Chloride. Toxicity values for the aforementioned chemicals and for Trichloroethylene (TCE) were discussed.

As was discussed during an August 16, 2004 telephone conversation between you and Daniel Creek of DHSS, DNR will not be able to use multiple values as DHSS suggested for Cadmium, Vinyl Chloride, and TCE. The recommendation for 1,3-Dichloropropene remains the same and Benzene is addressed by the Tanks MRBCA guidance document. DHSS recommends that DNR continue to utilize the approved hierarchy of toxicity values set forth in the EPA Office of Solid Waste and Emergency Response (OSWER) Directive 9285.7-53. If multiple values are presented in IRIS, DHSS recommends that the most conservative value be utilized in the default target levels and Tiers 1 and 2 of the Missouri Risk-Based Corrective Action (MRBCA) process. Please find the following detailed recommendations:

- **Cadmium**

Multiple RfD<sub>o</sub> values in IRIS are based on oral intake. The oral reference dose (RfD<sub>o</sub>) of  $5 \times 10^{-4}$  mg/kg-day is based on Cadmium-contaminated water intake, whereas the RfD<sub>o</sub> of  $1 \times 10^{-3}$  mg/kg-day is based on Cadmium-contaminated food intake. DHSS recommends that  $5 \times 10^{-4}$  mg/kg-day be used in the lower tiers of the MRBCA process. DHSS believes that the RfD<sub>o</sub> of  $1 \times 10^{-3}$  mg/kg-day may be used for food intake scenarios and a RfD<sub>o</sub> of  $5 \times 10^{-4}$  mg/kg-day may be used in drinking water uptake scenarios during a Tier 3 analysis in the MRBCA process.

- **Vinyl Chloride**

Multiple values in IRIS include oral slope factor ( $SF_o$ ) values of  $7.2 \times 10^{-1}$  per mg/kg-day and  $7.5 \times 10^{-1}$  per mg/kg-day for continuous lifetime exposure during adulthood and 1.4 per mg/kg-day and 1.5 per mg/kg-day for continuous exposure from birth. These multiple values in each exposure scenario stem from the use of different models: dose metric (lifetime average delivered dose in rats) calculated from physiologically-based pharmacokinetic (PBPK) modeling of administered animal dose and lifetime daily human oral dose required to produce an equivalent liver concentration. The oral slope factor of  $7.2 \times 10^{-1}$  per mg/kg-day, based on use of the linearized multistage model, is recommended by IRIS to account for continuous lifetime exposure during adulthood. A twofold increase to 1.4 per mg/kg-day is recommended to account for continuous lifetime exposure from birth. Therefore, DHSS recommends that a  $SF_o$  of 1.4 per mg/kg-day and a Inhalation Unit Risk Estimate ( $URE_i$ ) of  $8.8 \times 10^{-3}$  per  $mg/m^3$  be used in the default target levels and Tiers 1 and 2 of the MRBCA process. DHSS believes that the  $SF_o$  of  $7.2 \times 10^{-1}$  per mg/kg-day and a  $URE_i$  of  $4.4 \times 10^{-3}$  per  $mg/m^3$  may be used in occupational scenarios and that a  $SF_o$  of 1.4 per mg/kg-day and  $URE_i$  of  $8.8 \times 10^{-3}$  per  $mg/m^3$  may be used in residential scenarios during a Tier 3 analysis in the MRBCA process.

- **1,3-Dichloropropene**

Multiple values in IRIS include  $SF_o$  values of  $1 \times 10^{-1}$  per mg/kg-day and  $5 \times 10^{-2}$  per mg/kg-day. These multiple values were based on varying animal studies. IRIS recommends the use of the more conservative value (a  $SF_o$  of  $1 \times 10^{-1}$  per mg/kg-day). DHSS agrees with the IRIS recommendation.

- **TCE**

No toxicity values are currently in IRIS for TCE. Multiple values used according to EPA Region 7 guidance include the  $SF_o$  of  $1.10 \times 10^{-2}$  per mg/kg-day (the provisional value that was pulled from IRIS in July 1989) and the more conservative (most conservative of public health) value of  $4 \times 10^{-1}$  per mg/kg-day from the August 2001 Draft TCE Health Risk Assessment. EPA Region 7 has verbally requested that DHSS use both of these toxicity values when developing risk assessments and Preliminary Remediation Goals (PRGs) until a final pronouncement is made. Undoubtedly, such a toxicity range would be cumbersome when generating the risk-based target levels (RBTLs) of the lower MRBCA process tiers. Therefore, DHSS will continue to recommend, according to EPA guidance, that TCE toxicity values for Superfund sites utilize the more conservative value (an  $SF_o$  of  $4 \times 10^{-1}$  per mg/kg-day and a  $RfD_o$  of  $3 \times 10^{-4}$  mg/kg-day) from the 2001 Draft until EPA makes a final pronouncement regarding TCE toxicity.

Another alternative would be to utilize the California Environmental Protection Agency (Cal EPA) toxicity values for TCE. Cal EPA would be considered a Tier III source in the hierarchy set forth by OSWER Directive 9285.7-53 and would be acceptable for use in the MRBCA process. Cal EPA sets forth an  $URE_i$  of  $2 \times 10^{-3}$  per  $mg/m^3$ , an inhalation slope factor ( $SF_i$ ) of  $7 \times 10^{-3}$  per mg/kg-day, and a  $SF_o$  of  $1.3 \times 10^{-2}$  per mg/kg-day. For noncarcinogenic toxicity, Cal EPA sets forth a chronic reference exposure level of  $0.6 mg/m^3$  that may be used in place of a reference concentration ( $RfC$ ).

DHSS believes that using multiple toxicity values or ranges for individual chemicals may be justified in a site-specific MRBCA Tier 3 risk assessment and would need to be discussed as an uncertainty in the assessment. Keep in mind that the origin of all toxicity values used in the MRBCA process should be thoroughly documented and all values should be adequately justified.

Likely, more chemicals will be discovered that exhibit such toxicity ranges or multiple values. DHSS recommends that logic, similar to that used above, be used to choose the most appropriate toxicity value. Furthermore, DHSS wishes to reiterate that when using Tier 3 sources from hierarchy set forth by OSWER Directive 9285.7-53, priority should be given to sources that provide toxicity information based on similar methods and procedures as those used for Tiers 1 and 2 of the hierarchy, contain values which are peer reviewed, are available to the public, and are transparent about the methods and processes used to develop the values. DHSS extends the offer to review such values on a case-by-case basis if the need arises. If you have any questions or concerns regarding this letter, please contact Daniel Creek at (573) 751-6160.

Sincerely,



Scott A. Clardy, Administrator  
Section for Environmental Public Health