

## **Charge to Peer Reviewers**

### **Sulfolane Reference Dose Review for Alaska Department of Environmental Conservation**

#### ***Introduction***

The Alaska Department of Environmental Conservation (ADEC) has tasked Toxicology Excellence for Risk Assessment (TERA) with conducting an independent, expert peer review of the available reference doses (RfDs) for sulfolane. A sulfolane RfD will be used by ADEC to develop cleanup levels for groundwater in North Pole, Alaska.

Background from ADEC webpage: "The discovery in late 2009 of sulfolane in drinking water wells near the North Pole Refinery, about 15 miles east of Fairbanks, has led to an extensive investigation of contaminated groundwater. The plume is nearly 2.5 miles wide and 3 miles long, one of the largest in the state. Flint Hills Resources of Alaska, the current refinery owner, responded quickly to offer affected residents an alternate drinking water source. Sulfolane, an emerging contaminant, was at first not officially listed as a hazardous chemical, and its long-term health effects from exposure have not yet been studied. This event has been unprecedented for the Contaminated Sites Program due to the number of properties affected with private drinking water wells and the size of the plume. For an overview in more detail, [see Frequently Asked Questions.](#)" (<http://dec.alaska.gov/spar/csp/sites/north-pole-refinery/index.htm>).

#### ***Reference Doses***

- Canadian Council of Ministers of the Environment (CCME). 2006. "Canadian Environmental Quality Guidelines for Sulfolane: Water and Soil (Scientific Supporting Document)." PN 1368.
- Agency for Toxic Substances and Disease Registry (ATSDR). 2010. "Health Consultation: Sulfolane." February 3.
- ATSDR. 2011. "Health Consultation: Sulfolane." May 2.
- Haney, J. [Texas Commission on Environmental Quality (TCEQ)]. 2011. Sulfolane (CASRN 126-33-0) [re: Update of March 9, 2011 toxicity factor documentation with a slightly revised benchmark dose (BMD)]. September 6.
- United States Environmental Protection Agency (US EPA). 2012. "Provisional Peer Reviewed Toxicity Values for Sulfolane (CAS No. 126-33-0)." National Center for Environmental Assessment (NCEA), Superfund Health Risk Technical Support Center, January 30.
- Magee, B. [ARCADIS U.S., Inc.]. 2012. Memorandum to Flint Hills Resources Alaska re: Assessment of dose response information for sulfolane. May 21.
- Thompson, CM; Gaylor, DW; Tachovsky, JA; Perry, C; Carakostas, MC; Haws, LC. 2013. "Development of a chronic noncancer oral reference dose and drinking water

screening level for sulfolane using benchmark dose modeling." *J. Appl. Toxicol.* 33(12):1395-1406.

- Health Canada. 2014. "Drinking Water Guidance Value for Sulfolane." March 17.

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The peer reviewers are asked to use independent professional scientific judgment to evaluate the reference doses. The panel should draw upon US EPA risk methods and guidance for BMD modeling, as these are the commonly accepted methods used in the US to derive RfDs that are used to develop protective cleanup levels for contaminated sites.

The following questions and topics should be used to frame your discussion of the scientific information and issues regarding derivation of a RfD for sulfolane and to identify the most adequate RfD.

1. The subject RfDs selected HLS (2001) or Zhu et al. (1987) as the principal study. Discuss the strengths and weaknesses of the key studies and the available toxicity data on sulfolane. Are there additional relevant references that should be considered for the RfD and if so, explain the reasoning for considering them.
2. Discuss the endpoints and effects seen in the toxicity studies and potential mode(s) of action.
  - a. Based on assessment of toxicological relevance, which endpoints should be considered for derivation of a RfD?
  - b. What dosimetric adjustments should be made for the relevant endpoints?
  - c. Discuss the no and lowest observed adverse effect levels (NOAELs and LOAELs). Evaluate the endpoints for suitability for benchmark dose (BMD) modeling and discuss model fit.
  - d. Which is the most scientifically defensible point of departure (POD) for a sulfolane RfD?
3. Discuss the basis for selection of uncertainty factors. What are the most appropriate values for the standard factors commonly used?
4. Please identify any additional scientific issues or questions that the panel should discuss.

5. Please discuss which of the RfDs reflects the best use of the currently available data, and why.
6. Discuss the overall confidence in the selected RfD(s) and what additional studies or analyses, if any, would help reduce uncertainty or increase confidence.

## **REFERENCES**

Huntingdon Life Sciences Ltd. (HLS). 2001. "Sulfolane Toxicity Study by Oral Administration via the Drinking Water to CD Rats for 13 Weeks. Volumes One and Two." Report to Shell Canada, Calgary, Alberta. October 16.

Zhu, ZH; Sun, ML; Li, ZS; Yang, ZC; Zhang, TB; Heng, ZC; Xiao, BL; Li, QQ; Peng, QY; Dong, YH; Jiang, S; Jiang, J. 1987. "An investigation of maximum allowable concentration of sulfolane in surface water." *J. West China Univ. Med. Sci.* 18(4):376-380.