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MEMORANDUM

FROM: Gloria Post, Ph.D., DABT, Office of Science
THROUGH: Alan Stern, Dr.P.H., DABT, Office of Science
TO: Mary Anne Kuserk, Site Remediation Program
SUBJECT: Recommendation of revised interim specific ground water criterion for 1,4-dioxane
DATE: October 29, 2010

The purpose of this memorandum is to recommend a **revised interim specific ground water criterion of 0.35 ug/L for 1,4-dioxane**, based on the recently updated IRIS assessment for this chemical.

The current interim specific ground water criterion for 1,4-dioxane is 3 ug/L, effective February 2008. It is based on the previous IRIS assessment, posted in 1988, that classified this chemical as Group B2 (Probable Human Carcinogen) with a slope factor of $0.011 \text{ (mg/kg/day)}^{-1}$.

The IRIS assessment for 1,4-dioxane was updated on August 11, 2010 (USEPA, 2010a), and is supported by a Toxicological Review document (USEPA, 2010b). The updated IRIS assessment classifies 1,4-dioxane as likely to be carcinogenic to humans and provides an updated slope factor of $0.10 \text{ (mg/kg/day)}^{-1}$.

I have reviewed the updated IRIS assessment and Toxicological Review for 1,4-dioxane and recommend that the new slope factor be used as the basis for the interim ground water quality criterion.

1,4-Dioxane administered in drinking water caused liver tumors (hepatocellular adenomas and carcinomas) in several species and strains of rats, mice, and guinea pigs. It also caused nasal (squamous cell carcinomas), peritoneal mesotheliomas, and mammary tumors in rats. The mode of action for carcinogenicity by 1,4-dioxane is not known. Therefore, the IRIS risk assessment for carcinogenic effects was appropriately based on the default approach, linear low dose extrapolation, and a cancer slope factor was derived.

The previous IRIS slope factor, $0.011 \text{ (mg/kg/day)}^{-1}$, was based on increased incidence of squamous cell carcinomas of the nasal turbinates in male rats in a 1978 chronic drinking water study (NCI, 1978). The current slope factor, $0.10 \text{ (mg/kg/day)}^{-1}$, is based on liver tumors in female mice in a more recent study (Kano et al., 2009) which provides a more sensitive endpoint for carcinogenicity.

I have reviewed the IRIS Toxicological Review for 1,4-Dioxane (USEPA, 2010b) which presents the basis for the current IRIS assessment. I concur with USEPA's conclusion which form the basis for the risk assessment for 1,4-dioxane, as well as the recommended slope factor. Based upon this review, I recommend that the interim ground water criterion for 1,4-dioxane be revised to 0.35 ug/L.

Please feel free to contact me if you have any questions or need further assistance.

C: Gary Buchanan, Office of Science
Kevin Schick, SRP
Debra Hammond, WMS

Citations

Kano H; Umeda Y; Kasai T; Sasaki T; Matsumoto M; Yamazaki K; Nagano K; Arito H; Fukushima S (2009). Carcinogenicity studies of 1,4-dioxane administered in drinking-water to rats and mice for 2 years. Food Chem Toxicol, 47: 2776-2784.

NCI (1978). Bioassay of 1,4-dioxane for possible carcinogenicity. National Cancer Institute. Bethesda, MD. 78-1330 NCICGTR-80. http://ntp.niehs.nih.gov/ntp/htdocs/LT_rpts/tr080.pdf

USEPA (2010a). Integrated Risk Information System. 1,4-Dioxane (CASRN 123-91-1). Last updated on 8/11/2010. <http://www.epa.gov/IRIS/subst/0326.htm>

USEPA (2010b). Toxicological Review of 1,4-Dioxane (CAS No. 123-91-1). EPA/635/R-09/005-F. August 2010. <http://www.epa.gov/IRIS/toxreviews/0326tr.pdf>