Summary Report of Short-term Screening Level Calculation and Analysis of Available Animal Studies for Dipropylene Glycol Phenyl Ether (DiPPH) and Propylene Glycol Phenyl Ether (PPH)

Background:

On January 9, 2014 the release of methylcyclohexane methanol (MCHM) material from a storage tank into the Elk River resulted in contamination of the water system in the Charleston, West Virginia area. Based on information provided by the manufacturer on January 22, 2014 the composition of the released material was reported to be 88.5 % MCHM, 7.3 % PPH Stripped basic and 4.2 % water. The material PPH Stripped is reported to be primarily composed of dipropylene glycol phenyl ether (DiPPH) and propylene glycol phenyl ether (PPH). At this time, West Virgina is sampling the water system for MCHM and PPH Stripped. CDC/ATSDR has reviewed summaries of toxicological studies conducted on PPH and DiPPH provided by the manufacturer. CDC/ATSDR will review any additional toxicological data when it becomes available.

Summary of Available Toxicological Information on Dipropylene Glycol Phenyl Ether (DiPPH):

Based on the most recent Material Safety Data Sheet (MSDS) provided by the manufacturer, the highest percentage compound in PPH Stripped is dipropylene glycol phenyl ether (DiPPH), reported to represent up to 85% of the total PPH Stripped. There is no No Observed Adverse Effect Level (NOAEL) available for this compound. The only toxicological information available at this time indicates that that the acute toxicity by ingestion in rats for the PPH Stripped is an LD50 of >2000 mg/kg. The chemical structure of DiPPH, the LD 50 information and the application of an additional uncertainty factor suggest that the screening values calculated below for PPH would be protective for both components of the mixture.

Summary of Available Toxicological Information on Propylene Glycol Phenyl Ether (PPH):

- In a 90-day drinking water study in rats concentrations of 500, 2000 and 6000 ppm have been used. At 500 ppm no substance related effects have been observed, and at 2000 ppm the only effects observed were decreased body weight (<10%) and discoloration of urine. Therefore, the 2000 ppm (146 mg/kg bw/d) dose level is considered to be the NOAEL. In another study, varying amounts PPH was administered to rats via drinking water for a 26 week period. NOAEL was 1000 ppm (113 mg/kg-day). The Lowest Observed Adverse Effect Level (LOAEL) was 5000 ppm (478 mg/kg-day).

- In a developmental toxicity study, varying amounts of PPH were administered to pregnant rabbits over a 4-week period by the oral route of exposure. The NOAEL for fetal toxicity based on skeletal variations was 180 mg/kg-day. The LOAEL for fetal toxicity was 540 mg/kg-day.

- In a teratology study in rats a NOAEL for maternal toxicity was 40 mg/kg-day. **(CDC used this study to establish a short term screening level for PPH in the Elk River because it is the most protective NOAEL dose provided).**

- The NOAEL for development toxicity observed in rats was 160 mg/kg-day.

Screening Level Calculation for Propylene Glycol Phenyl Ether (PPH):

CDC/ATSDR used the following methodology[1] to establish a short term screening level of 1.2 ppm PPH in the water system:

The most sensitive toxicological result is the NOAEL for maternal toxicity at 40 mg/kg-day. We assumed 75 kg body weight for a pregnant woman during the first trimester and consumption of 2.5 L water/day

$$DW\ Advisory \leq \frac{NOAEL \times BW}{UF \times Intake}$$

Where:

- DW Advisory = Drinking Water Advisory
- NOAEL = No Observed Adverse Effect Level in the experimental species
- BW = Body weight of a pregnant mother (EPA Exposure Factor Handbook, 2011 Edition)
- UF = Uncertainty factors that address differences between animals and humans (10X), address differences accounting for sensitive humans (10x), and account for weaknesses in the toxicological database (10X).
- Intake = The estimated intake from drinking water of a pregnant mother in liters

Calculating using 75 kg BW and 2.5 L daily consumption rate:

NOAEL (mg/kg/d)	BW (kg)	UF (unitless)	Intake (L/day)	DW Advisory (mg/L or ppm)
40	75	1000	2.5	1.2 ppm

Note: Very limited specific toxicological information is available for DiPPH at this time. However the LD50 of > 2000 mg/kg and chemical structure suggest similar or lower toxicity, and the screening value calculated for PPH would also be protective for DiPPH.

Other Components

The MSDS lists additional minor constituents of 2-Hydroxy-alpha-methyl-benzeneethanol, 2-Hydroxy-beta-methyl-benzeneethanol and polypropylene glycol phenyl ether. Currently no toxicological information is available for these constituents.

Additional Information

The information used to determine the short-term screening value for DiPPH and PPH is based on unpublished proprietary information provided to CDC/ATSDR in summary form. CDC/ATSDR continues to work closely with federal and state partners to acquire and review additional toxicological data as it becomes available and will update this guidance if additional relevant information is received.

The available toxicological information has been reviewed by our federal partners including the National Institute of Environmental Health Sciences and National Toxicology Program, the National Library of Medicine, the Environmental Protection Agency, and they have concurred with the approach and methodology used in developing this screening level.

References:

Dow Chemical Company MSDS for PPH Basic, Nov 15, 2011.

Dow Chemical Company, Chemical Safety Report Substance Name 1-phenoxypropan-2-ol, July 9, 2010.

EPA Exposure Factor Handbook, 2011 Edition: http://www.epa.gov/ncea/efh/report.html

Freedom Industries MSDS for PPH, stripped, October 15, 2013.

OECD SIDS Initial Assessment Report, Propylene Glycol Phenyl Ether, SIAM 18, April 20-23, 2004 www.inchem.org/documents/sids/sids/770354.pdf

[1] Donohue, J.M. and Libscomb, J.C. Health advisory values for drinking water contaminants and the methodology for determining acute exposure values. *Sci Tot Env.* 288 (2002) 43-49.