MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY

INTEROFFICE COMMUNICATION

TO: File for 2,4-Dinitrophenol (CAS # 51-28-5)

FROM: Robert Sills, AQD Toxics Unit Supervisor

SUBJECT: 2,4-Dinitrophenol ITSL change in the averaging time from 24 hrs to annual

DATE: December 29, 2015

The current ITSL for 2,4-Dinitrophenol (7 ug/m^3) was derived on October 3, 2006 (see attached justification memo). The averaging time (AT) assigned to the ITSL at that time was 24 hours, as per the default methodology at that time (Rule 232(2)(b)). The current file review concludes that the AT may appropriately be set at annual, based on the nature and duration of the key study and the ITSL value derivation, as allowed under Rule 229(2)(b). Therefore, the AT is being changed from 24 hours to annual at this time.

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TO: 2,4-Dintrophenol file (CAS # 51-28-5)

FROM: Gary Butterfield

SUBJECT: Screening level development for 2,4-Dintrophenol

DATE: October 3, 2006

2,4-Dintrophenol is also known as 1-hydroxy-2,4-dinitrobenzene. 2,4-Dintrophenol is a solid at ambient temperatures. The melting point is 112C. The vapor pressure is $1.5x10^{-5}$ mmHg at 18C. The molecular weight is 184.1 g/mol. There are six isomers of dinitrophenol. 2,4-Dintrophenol was used as a weight reduction drug in the 1930s. The majority of toxicity data that is available comes from the human effects observed during that period of drug use. There is little or no toxicity information on the other five isomers. 2,4-Dintirophenol is used for synthesis of dyes, wood preservatives, pesticides, photographic developers, and picric acid.

The following references or databases were searched to identify data to determine the screening level: U.S. Environmental Protection Agency (EPA) Integrated Risk Information System (IRIS), National Institute for Occupational Safety and Health (NIOSH) Registry for Toxic Effects of Chemical Substances (RTECS), American Conference of Governmental and Industrial Hygienists (ACGIH) Threshold Limit Values (TLVs), Michigan Department of Environmental Quality (DEQ) library, International Agency for Research on Cancer (IARC) Monographs, Chemical Abstract Service (CAS) Online (1968 - September 2006), National Library of Medicine (NLM) - Toxline, and National Toxicology Program (NTP) Status Report.

The CAS and NLM searches were conducted on September 19, 2006. There is a general lack of any inhalation toxicity data for 2,4-dinitrophenol. The EPA has set a RfD of 2 ug/kg for 2,4-dinitrophenol based on cataract formation in patients from the 1930s. When that RfD was calculated, EPA decided that it was inappropriate to use the oral data for calculation of an RfC due to a lack of inhalation toxicokinetic information – including metabolism and excretion – as well as, portal of entry effects on the respiratory system, and there is no comparative systemic toxicity from inhalation and oral exposure. These reasons lead the RfC workgroup to conclude that using the oral RfD as a basis for setting an RfC was not reasonable.

Under Rule 232, if an inhalation RfC is not available then an oral RfD is used to determine the initial threshold screening level (ITSL), unless data is available to indicate such an extrapolation is inappropriate. While the above reasoning by EPA indicates that there was no data to support using oral studies to set the inhalation RfC, it can also be reasoned that the lack of data is an indication that there is no information indicating is it not appropriate to use oral data to set the inhalation screening level. Therefore, because of the need for AQD to have a screening level and the lack of inhalation toxicity data, the oral RfD is the best basis for determining the screening level consistent with Rule 232. Following R232(1)(b) the ITSL is calculated as follows.

RfD x ($70kg/20m^3$) = 2 ug/kg x ($70kg/20m^3$) = 7 ug/m^3 with 24-hour average

References:

ATSDR. 1995. Toxicological Profile

EPA. 2006. IRIS on-line

GB:LH