

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY

INTEROFFICE COMMUNICATION

TO: File for Coke oven emissions (CAS # 8007-45-2)¹
FROM: Keisha Williams, Air Quality Division (AQD) Toxics Unit
SUBJECT: Screening level update for coke oven emissions
DATE: October 27, 2015

The initial risk screening level (IRSL) and secondary risk screening level (SRSL) are 0.001 and 0.01 µg/m³ (annual averaging time), respectively, based on the U.S. Environmental Protection Agency (USEPA) inhalation unit risk (IUR) of 0.00062 per µg/m³ (USEPA, 1989). On January 1, 1991, the AQD's IRSL was established at 0.0016 µg/m³ (annual averaging time). The IUR for coke oven emissions that the AQD applies is changing at this time to account for an age-dependent adjustment factor (ADAF).

The USEPA used two epidemiological studies of occupational exposures, the Mazumdar et al. (1975) study and the Land et al. (1976) study, to identify and quantitate a dose-response relationship between coke oven emissions and increased respiratory cancer (USEPA, 1989).

Furthermore, it has been determined that coke oven emissions have a mutagenic mode of action (MOA) for carcinogenesis (USEPA, 2014). For chemicals that have been determined to have a mutagenic MOA for carcinogenesis, chemical-specific information should be used to develop cancer slope factors that address any potential for differential potency in early life stages, if appropriate data are available. If appropriate chemical-specific data are not available, then the default ADAFs should be applied to the IUR (USEPA, 2005). To calculate lifetime risk for a population with average life expectancy of 70 years, the IUR that is protective of childhood exposure is calculated from the sum the risk associated with each of these three time periods:

- Risk for birth through < 2 yr = (IUR) x 10 (ADAF_{< 2yr}) x (2yr/70yr)
- Risk for ages 2 through < 16 = (IUR) x 3 (ADAF_{2 - < 16yr}) x (13yr/70yr)
- Risk for ages 16 until 70 = (IUR) x 1 (ADAF_{16 - 70yr}) x (55yr/70yr)

Since appropriate chemical-specific data are not available for this chemical, the default ADAF (USEPA, 2005) for life-time exposure was applied to the adult-based IUR using the procedure below.

¹ NOTE: Amongst USEPA's revisions to the integrated risk information system documentation associated with coke oven emissions, the CAS # 8007-45-2 was removed and coke oven emissions are no longer associated with a CAS #.

Summing the above age specific ADAFs, the overall life-time ADAF is a factor of 1.6-fold. The ADAF adjustment for constant life-time exposure under standard exposures is applied to the IUR, as follows:

$$\text{IUR}_{\text{life-time}} = 0.00062 \text{ per } \mu\text{g}/\text{m}^3 \times 1.6$$

$$\text{IUR}_{\text{life-time}} = 0.000992 \text{ per } \mu\text{g}/\text{m}^3$$

Pursuant to Rule 231(1), the IRSL and SRSL are then calculated as follows:

$$\text{IRSL} = \frac{1\text{E-6 risk}}{0.000992 (\mu\text{g}/\text{m}^3)^{-1}} = 0.001 \mu\text{g}/\text{m}^3 \text{ (annual averaging time)}$$

$$\text{SRSL} = \frac{1\text{E-5 risk}}{0.000992 (\mu\text{g}/\text{m}^3)^{-1}} = 0.01 \mu\text{g}/\text{m}^3 \text{ (annual averaging time)}$$

References

USEPA. 1989. Summary for Coke Oven Emissions (CASRN NA). Integrated Risk Information System, US Environmental Protection Agency, Accessed on October 26, 2015.

http://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=395

(USEPA references the following:

Mazumdar, S., C. Redmond, W. Sollecito, N. Sussman. 1975. An epidemiological study of exposure to coal tar pitch volatiles among coke oven workers. Journal of the Air Pollution Control Association, 25(4): 382-289.

Land, C.E. 1976. Presentation at Occupational Safety and Health Administration hearings on coke oven standards.)

USEPA. 2005. Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens. Risk Assessment Forum, U.S. Environmental Protection Agency Washington, DC. EPA/630/R-03/003F: http://www3.epa.gov/ttn/atw/childrens_supplement_final.pdf

USEPA. 2014. Dose Response Assessment Tables, Table 1. Prioritized Chronic Dose-Response Values. U.S. Environmental Protection Agency.

<http://www2.epa.gov/sites/production/files/2014-05/documents/table1.pdf>

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