

Evaluation of multi-source and -metric NOAA exposure data; Challenges and how to handle them.

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Since there is no consensus about the most appropriate metric (number, mass, size and surface area) to assess exposure to Nano-Objects, their Agglomerates and Aggregates (NOAA), it is commonly agreed that exposure is best characterized by a multi-metric exposure assessment approach in which different information sources are combined, e.g. results from offline analyses, direct-reading devices, and observed contextual information (Brouwer et al. 2012). The next step is the evaluation of the multi-source and –metric data to assess 1) whether exposure to NOAA occurs (i.e. likelihood of exposure), and 2) the level of exposure to NOAA (i.e. quantification of exposure). Decision logics to determine the likelihood of (occupational) exposure are proposed (Brouwer et al. 2009, 2013). However, an appropriate and widely supported method to evaluate the results with respect to the likelihood and level of exposure to NOAA is subject to discussion.

The goal of this presentation is to discuss the main challenges that are encountered with the evaluation of multi-source and -metric NOAA exposure data. Ensuing from that a method to evaluate this type of exposure data is proposed. Exposure data collected in a broad-scale exposure survey (2012-2013) covering over 40 occupational exposure scenarios across the life cycle of NOAA will be used as an example. In this exposure survey particle number concentration and size distribution was measured over a broad range (10 nm – 20 µm) using various online measurement devices. In addition, characterization of samples with SEM/EDX was performed and contextual information was gathered.

References:

Brouwer, D., B. Van Duuren-Stuurman, M. Berges, E. Jankowska, D. Bard, and D. Mark. 2009. "From Workplace Air Measurement Results Toward Estimates of Exposure? Development of a Strategy to Assess Exposure to Manufactured Nano-Objects." *Journal of Nanoparticle Research* 11 (8): 1867-1881.

Brouwer, D., M. Berges, M. A. Virji, W. Fransman, D. Bello, L. Hodson, S. Gabriel, and E. Tielemans. 2012. "Harmonization of Measurement Strategies for Exposure to Manufactured Nano-Objects; Report of a Workshop." *Annals of Occupational Hygiene* 56 (1): 1-9.

Brouwer, D. H., B. Van Duuren-Stuurman, M. Berges, D. Bard, E. Jankowska, C. Moehlmann, J. Pelzer, and D. Mark. 2013. "Workplace Air Measurements and Likelihood of Exposure to Manufactured Nano-Objects, Agglomerates, and Aggregates." *Journal of Nanoparticle Research* 15 (11).

Additional information:

- Session 2: Exposure assessment
- Project: NanoNextNL project – Human Health Risks (www.nanonextnl.nl)