PMC comments on the JRC report 'Monitoring-based Exercise: Second Review of the Priority Substances list under the Water Framework Directive'

1. The JRC report mentions on page 17 *'For metals, however, a strict separation between "whole water" and "**dissolved phase**" was performed because in the case of metals the EQS refers to the dissolved concentration, i.e. the dissolved phase of a water sample obtained by filtration through a 0,45 µm filter or any equivalent pre-treatment (Directive 2008/105/EC). STE for metals was run only in the dissolved phase.*' This statement is supported by PMC, but is not applied to silver: only "whole water" concentrations are considered for the silver STE scoring.

2. The REACH freshwater **PNEC** for silver is 0.04 µg/l, while JRC used an EQS for silver of 0.017 µg/l, which is more than 2 times lower and results in an unrealistically high STE score for silver. The REACH freshwater PNEC has been derived in accordance with Chapter R.10 of the European Chemicals Agency's guidance on information requirements and chemical safety assessment under REACH (ECHA, 2008) and using the species sensitivity distribution (SSD) methodology. Relevant studies for the PNEC derivation were assessed for reliability and relevance using the criteria developed by Klimisch et al. (1997) and only studies assessed to be either "reliable without restriction", or "reliable with restrictions" were used. Furthermore, the REACH freshwater PNEC for silver is identical to that proposed by the UK Environment Agency for the Water Framework Directive[1] (silver was prioritised by the UK as a Specific Pollutant in 2008 and hence an EQS was derived, but it was never implemented due to the fact that silver concentrations in effluents and freshwaters are neither high enough, nor widespread enough to be of concern).

3. It is also important to note that the REACH PNEC for silver was derived using **measured dissolved silver concentrations**. Comparing total silver concentrations (reported as the 'whole water' monitoring data in this exercise) with a PNEC/EQS derived for dissolved silver concentrations will result in an unrealistically high STE score for silver.

4. In 2010, PMC in collaboration with the UK Environment Agency has undertaken a 6-month monitoring programme in rivers and effluents from 84 sites across England and Wales, reflecting a range of potential exposures, including sites downstream from silver users in England and Wales[2]. This study concluded that the concentrations of dissolved silver are relatively low: about 80% of all samples from the 84 sites had silver concentrations below 6 ng/l and none of the sites had mean concentrations that exceed the REACH PNEC of 40 ng/l dissolved silver, either on a face-value or confidence of failure basis. The mean of the maximum dissolved silver concentrations reported at each site (reflected as the **regional background concentration** and calculated according to REACH guidance) was calculated as 6 ng/l. This is about 40 times lower than the mean values for silver listed in Table 13 of the JRC report (221-268 ng/l), which makes us question the monitoring dataset used and its statistical interpretation. In this respect, we would also like to refer to Reimann and Birke (2010)[3], who reported a median and 75th percentile silver

[1] Paul Whitehouse personal communication.
[2] Peters, A., Simpson, P., Merrington, G., Rothenbacher, K., Sturdy, L., 2011. Occurrence and Concentration of Dissolved Silver in Rivers in England and Wales. Bulletin of Environmental Contamination and Toxicology 86, 637-641.
[3] Reimann, C., Birke, M. (eds), 2010. Geochemistry of European Bottled Water. Borntraeger Science Publishers, Stuttgart, 268 pp, 1 CD, ISBN 978-3-443-01067-6.

concentration in bottled water below the LOD of 2 ng/l, and to Salminen et al. (2005)[4], who report a 95th percentile silver concentration in European surface waters of about 10 ng/l.

5. Finally, we would also like to point out that PMC has generated data to assess the influence of water physico-chemistry upon **silver bioavailability** in freshwaters. There is scientific evidence that metastable sulphide complexes and dissolved organic carbon mitigate silver ecotoxicity and reduce dissolved silver concentrations, even in oxic freshwaters. This means that the "whole water" concentrations are an overestimation of the silver fraction potentially causing effects.

[4] Salminen, R. (Chief Editor), Batista, M.J., Bidovec, M., Demetriades, A., De Vivo, B., De Vos, W., Duris, M., Gilucis, A., Gregorauskiene, V., Halamic, J., Heitzmann, P., Lima, A., Jordan, G., Klaver, G., Klein, P., Lis, J., Locutura, J., Marsina, K., Mazreku, A., O'Connor, P.J., Olsson, S.Å., Ottesen, R.T., Petersell, V., Plant, J.A., Reeder, S., Salpeteur, I., Sandström, H., Siewers, U., Steenfelt, A., Tarvainen T., 2005. FOREGS Geochemical Atlas of Europe, Part 1: Background Information, Methodology and Maps. Geological Survey of Finland, Espoo, 526 pp. Available online at: http://www.gtk.fi/publ/foregsatlas/