Pollution monitoring at extreme low concentration levels: is it still feasible?

Monteyne Els[1], Patrick Roose[1] and Colin R. Janssen[2]

[1] Management Unit of the North Sea Mathematical Model, Royal Belgian Institute of Natural Sciences, 2e en 3e Linieregimentsplein, 8400 Ostend, Belgium
E-mail: els.monteyne@mumm.ac.be

[2] Laboratory of Environmental Toxicology and Aquatic Ecology, Ghent University, J. Plateaustraat 22, 9000 Ghent, Belgium

Marine environmental concentrations of known organic pollutants show a decreasing trend over the past decade. On the other hand, regulatory environmental quality standards against which pollution levels are compared, are becoming increasingly stringent. To measure these pollutants at the challenging low levels, cutting edge and very expensive analytical equipment is needed to meet both the analytical requirements as the quality standards.

To overcome these problems, a novel monitoring technique is proposed, called passive sampling. The measuring device integrates organic pollutants in marine water over a certain period of time, after which the pollutants can be extracted from the device and quantified analytically.

A four-year monitoring was performed to study the freely dissolved water concentrations of PAHs and PCBs in three Belgian coastal harbours and at an offshore station in the North Sea. The results are part of a more extensive study to provide information on occurrence, distribution and effects of pollutants in the Belgian coastal zone.

Estimated freely dissolved concentrations for sum 15 PAHs varied between 3.9 and 170 ngl^{-1} and for sum 14 PCBs between 0.030 and 3.1 ngl^{-1}. The stations located within marinas showed the highest level of contamination, while the offshore station (5 mile from coastline) exhibited the lowest level.

References

Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy

Directive 2008/105/EC of the European Parliament and of the Council of 16 December 2008 on environmental quality standards in the field of water policy http://ec.europa.eu/environment/water/water-dangersub/pri_substances.htm

Janssen C., P. Roose, H. De Brabander, M. Vincx, J. Mees. Integrated risk assessment and monitoring of micropollutants in the belgian coastal zone – INRAM - Final Report Phase 1. Brussels : Belgian Science Policy 2010 – 53p.

Mills G.A., G.R. Fones, K. Booij, R. Greenwood. 2011. Passive sampling technologies. p. 397-432. In: Quevauviller P., P. Roose., G. Verreet (Eds). Chemical Marine Monitoring: Policy Framework and Analytical Trends. John Wiley & Sons, Ltd., West Sussex.

Monteyne E., P. Roose, C.R. Janssen. (in press). Application of a silicone rubber passive sampling technique for monitoring PAHs and PCBs at three Belgian coastal harbours. Chemosphere.

OSPAR Commission. 2009. Status and trend of marine chemical pollution. OSPAR Commission, London. Publication 395/2009.