**Unique characteristics of emerging contaminants, the result of NATO Project**

Mirjana Vojinović Miloradov1, Ivana Mihajlović1, Jelena Radonić1, Maja Turk Sekulić 1, Ivan Španik2

1 Department of Environmental Engineering, Faculty of Technical Sciences, University of Novi Sad, Trg Dositeja Obradovica 6, 21000 Novi Sad, Serbia, [miloradov@uns.ac.rs](mailto:miloradov@uns.ac.rs)

2 Faculty of Chemical and Food Technology, Slovak University of Technology in Bratislava, Radlinského 9, 812 37 Bratislava

Emerging contaminants (EmC) are ubiquitous, persistent/pseudo-persistent and biologically very active molecules that occur in the environment as a result of natural, industrial and human activities. EmC in low doses with their pseudo-persistency effects are recognized as powerful chemical eco stressors on total biosphere with unknown eco toxicology implication, fate, behavior, distribution and partitioning as well as the transport through all environmental media. Particularly specific and unique physico-chemical characteristic of EmS is so called ”chemical cocktail effect” which complicate the explanation of toxicological effects of EmS because of synergistic, antagonistic and catalytic interactions of EmS in real biological fluids.

Four screening campaigns in the river Danube in the vicinity of Novi Sad have been performed within the NATO Project ESP.EAP.SFP 984087 in order to determine occurrence of EmC, priority and hazardous substances of interest for Danube basin and to proceed with target analysis of Danube surface water and wastewater discharged directly into Danube, which is the fundamental basis for the broader knowledge of the newly recognized properties of EmC (Vojinovic Miloradov et al, 2014, Milic et al, 2014). The selected sampling points include waste water directly from the collectors of four sewage discharges GC1, GC2, Ratno ostrvo (RO) and Rokov potok (RP), while samples of surface water from Danube River were taken 100 meters downstream of the each discharge.

Collected water samples were analysed by GC-MS for the presence of PAHs, PCBs, organochlorine pesticides, phtalates, phenols and PBDEs. Simazine, Atrazine, Isoproturon, Diuron and hormones were analyzed using SPE-HPLC-DAD according to modified ISO 11369 procedure. The group of metals was determined using AAS according to STN EN ISO 15586, while Hg and its compounds were determined by CV-AFS and using STN EN ISO 17852. The inorganic ions were determined using coulometric analyzer.

In screening analyses more than 150 different organic and inorganic chemicals were registered. Within the target analyses, the most of the detected organic compounds from the groups of PAH, phenols, phthalates and pesticides; therefore special attention should be focused to those compounds.

The main aim of those screening and target analyses was to obtain data basis for prioritization process needed for evaluation of ecological status. The prioritization approach is based on the evaluation of the Exceedance of environmental thresholds, referred to as predicted no effect concentrations (PNEC), for all organic compounds monitored in the water bodies. Processes of prioritization enable focus on derivation of environmental quality standard values (EQS) for substances already well investigated with sufficient amount of data on their occurrence and toxicity; improvement of analytical methods for substances monitored whose limits of quantification (LOQs) are higher than PNEC values; additional screening when more occurrence data are needed; and, to discontinue with monitoring of substances that are already well investigated and proved not to represent a threat to the environment. Results obtained within NATO Project were used for calculation of predicted environmental concentration (PEC)/PNEC values and could be used for the prioritization processes on the global level.

Acknowledgement: The research is supported by NATO Project DriWaQ-NS (ESP.EAP.SFP 984087) and project of the Ministry of Education, Science and Technological Development (III46009).

1. Vojinović Miloradov. M., Mihajlović, I., Vyviurska, O., Cacho, F., Radonić, J., Milić, N., Spanik, I. (2014). Fresenius Environmental Bulletin, Volume 23, No. 9: 2137-2145.
2. Milić, N., Spanik, I., Radonić, J., Turk Sekulić, M., Grujić, N., Vyviurska, O., Milanović, M., Sremački, M., Vojinović Miloradov, M. (2014). Fresenius Environmental Bulletin, Volume 23, No. 2: 372-377.