Geophysical Research Abstracts
Vol. 13, EGU2011-10745-3, 2011
EGU General Assembly 2011

The discharge plume determination by conductivity measurements in Northern Moravia rivers towards industrial pollution detection.

Aleš Kot'átko (1), Pavel Danihelka (1), and Tomáš Mičánik (2)

(1) VŠB - Technical University of Ostrava, Faculty of Safety Engineering, Ostrava, Czech Republic (ales.kotatko@vsb.cz), (2) T.G.Masaryk Water Research Institute, p.r.i., Ostrava Branch Department, Macharova 5, 702 00 Ostrava, Czech Republic

Northern Moravia region is located in north-eastern part of the Czech Republic in the Odra river a Morava river basins. This region is specific by high industrialization (metallurgy, mining, machinery, chemical industry etc.).. The surface water bodies can be exposed to both continual and accidental releases of dangerous chemicals. It is known, that effluent plume at the beginning of the mixing process of polluted water and receiving water is formed and concentration of pollutant is highly non-homogenous in the cross-section of river. The part of the river, where the polluted water and receiving water are in the process of mixing is called "mixing zone". Mixing zone prediction is useful for the water management and accident mitigation, e.g. for sampling strategy, concentration and toxic effect prediction. Problems of mixing zones are taken into account in the Environmental Quality Standards achievement under Directive 2008/105/EC and the determination of mixing zones is consequently necessary.

.

For this purposes, campaigns of measurement were designed, where goal was to evaluate the mixing process in various parts of river. The convenient method of mixing process understanding is the measurement of conductivity distribution in the cross-section of river near to the stream mouth or discharge of polluted water (high conductivity) to the less polluted (low conductivity) water stream. The measurements of the discharge plumes by conductivity measurement were realized on several types of the rivers with regard to their width and depth, current speed, flow pattern and flow rate of the discharge. All series of measurement were realized during years 2009-2010 on the Odra, Becva and Opava rivers.

Distances from the discharge and ends of mixing zones were found a few kilometers in case of wide rivers and significant discharge. The simple model for plume dimension and extent and concentration predicting has been developed.

On the basis of obtained results, the control of major accident hazards can be facilitated, especially when further data visualization and modeling in GIS is used. Benefits of results are in the better knowledge of pollutant distribution in river with respect to mixing zone. As another result, appropriate places for continual monitoring of pollution and accidental releases into surface water can be chosen.

Acknowledgement:

This presentation was supported by the Czech Ministry of the Environment in the frame of R&D project "Comprehensive Interactions between Natural Processes and Industry with Regard to Major Accident Prevention and Emergency Planning" (Registration Number: SPII 1a10 45/07) and project "Research and Protection of the Hydrosphere" (Registration Number: MZP0002071101).