PROJECT PROFILE

Title	Modifying BIOFOR Flocculation Filters to Trace Substance Elimination **(AdOx Köln)**
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Funding agency	The Ministry for Environment, Agriculture, Conservation and Consumer Protection of the State of North Rhine-Westphalia
Duration	since 09/2012

The Urban Drainage Facility Köln, (StEB Köln) operates five wastewater treatment plants (WWTP) in Cologne and the surrounding area. The WWTP located in Köln-Stammheim (GKW) with a capacity of 1.570.000 $PE_{BSB5.60}$, is the largest WWTP discharging into the Rhine in North Rhine-Westphalia. In the 1990's, improvements in the biological treatment process of Colognes WWTP's were made, which made it possible to meet nutrient discharge requirements without the further treatment by the existing BIFOR-filtration. However, the filters may be used in the future to meet anthropogenic trace element discharge requirements once these will be defined by law.

Since the Ministry for Environment, Agriculture, Conservation and Consumer Protection of the State of North Rhine-Westphalia (MULNV NRW) has initiated efforts to avoid and largely retain trace substances, the StEB feel obliged to contribute to the future handling of trace substances within the scope of their possibilities. In particular, the investigations will focus on an economically and technically feasible conversion of a BIOFOR (BIOlogical-Fixed-Oxygen-Reactor) filter system for the elimination of trace substances, and thus on the development of transferable findings for such systems.

For this purpose, the "AdOx Köln" project funded by the Ministry for Environment, Agriculture, Conservation and Consumer Protection of the State of North Rhine-Westphalia was launched. "AdOx Köln" owes its name to the pursuit of two promising treatment methods recommended in a previous feasibility study by the Institute for Environmental Engineering of the RWTH Aachen University (ISA):

- Adsorption (Ad) onto granular activated carbon (GAC) in up-flow filters

- Oxidation (Ox) by ozonation with subsequent biological treatment

For financial reasons, however, the practical testing of suitable processes is not to be carried out directly at the waste water treatment plant Stammheim, but with a pilot plant at the smaller sewage treatment plant Rodenkirchen in Cologne. The aim of these pilot-scale experiments is to determine whether ozonation or GAC adsorption is best suited for trace substance elimination with regard to effectiveness, cost efficiency and suitability for operation. In addition to the two experimental reactors (ozone and GAC), an additional filter cell will be operated as a BIOFOR filter in parallel as a reference filter cell. The findings with regards to technical and operational issues of the pilot-scale operation will be transferred to the WWTP Stammheim although the main objective is determining investment and operational costs. The project is divided into two phases. Phase 1 comprises various preliminary investigations (screening, ozone depletion tests, rapid small-scale column tests / pilot-scale tests with GAC adsorption) and planning. Based on the results of phase 1, in phase 2 the filter systems at the WWTP Rodenkirchen will be converted and the processes will be examined at large-scale.