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On the trail of hazardous substances

Best Available Techniques (BAT) for reducing the entry of micropollutants from wastewater of Chemical-Physical Treatment Plants (CP Treatment Plants) for hazardous waste into water bodies.

Before hazardous liquid waste is disposed of, for example, discharged into sewers or water bodies, it undergoes treatment in so-called chemical-physical treatment plants (CP plants). After processing, the treated waste still contains significant amounts of chemical compounds that are relevant to human health and the environment. In order to investigate the composition and the potential impact that these treated wastes may have, a research project was conducted in collaboration with two companies operating CP plants, Lobbe Umweltberatung GmbH and Indaver GmbH, as well as the Institute for Urban Water Management at RWTH Aachen University.

Each CP plant is specifically designed for the treatment of the waste it receives and accordingly has different treatment steps, which can vary significantly. For this reason, there is no universally applicable scheme for a CP plant. However, the CP plant can be generally described as follows, as shown in Figure 1.

During the project, an investigation was conducted to determine whether and to what extent trace substances are present in CP treatment plants and if they can be eliminated. Initially, relevant trace substances were selected through a three-stage decision-making process. The criteria used to assess the relevance of these substances were based on their physicochemical properties and their impact on the environment. Subsequently, a detailed study was carried out on the different types of waste entering a CP plant, as well as the various treatment methods. To achieve this, a national survey was conducted, involving interviews with 184 CP plants. Following this, laboratory examinations of waste input and output were performed.

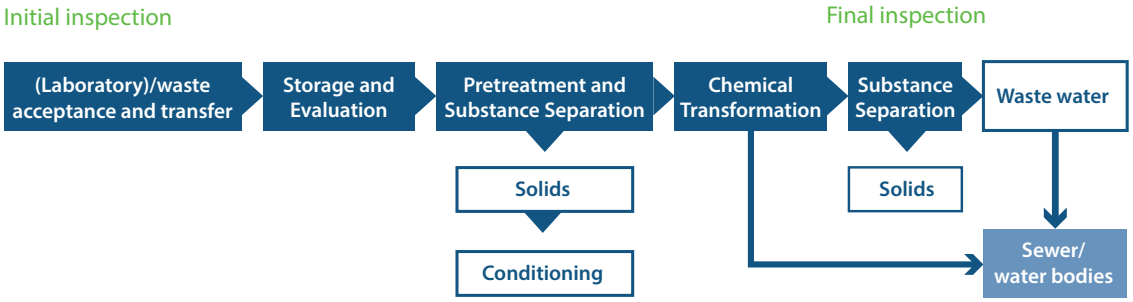

Fig. 1: General layout of a CP plant.

	Complexing agent	PAC	Organo-phosphorus compounds	N-Hetero-cycles
CFP	●	●	●	●
Evaporator	●	●	●	●
CFP + Activated carbon	●	●	●	●

	Phtalates	Triazole	Phenols	PFAS
CFP	●	●	●	●
Evaporator	●	●	●	–
CFP + Activated carbon	●	●	●	●

● Very good ● Good ● Medium ● Bad ● Very bad

Fig. 2: Overview of the elimination performance of individual substance groups from CP plants.

The relevant trace substances were detected, to some extent, in both the waste input of the examined plants and the treated wastewater. However, the uniqueness of this project lay in the analytical examination before and after each step of the treatment process. The focus was on the chamber filter press (CFP), vacuum evaporator, and activated carbon filter. Special methods for determining the individual relevant trace substances were developed in the ISA laboratory. This allowed the elimination performance of each treatment step in both CP plants to be quantified. The results are presented in the following table.

Based on these results, recommendations for minimizing the entry of relevant trace substances into water bodies were developed. Additionally, a proposal for reducing the entry of trace substances was presented for consideration in the next revision of the waste treatment guidelines.

Project overview

PROJECT TITLE

Best Available Techniques (BAT) for reducing the entry of micropollutants from wastewater of Chemical-Physical Treatment Plants (CP Treatment Plants) for hazardous waste into water bodies.

PROJECT PERIOD

12/2017 – 04/2022

PROJECT PARTNER

Lobbe Umwelt-Beratung GmbH; Institut für Siedlungswasserwirtschaft der RWTH Aachen

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