



## Characteristics of reject waters and condensates generated during drying of sewage sludge from selected wastewater treatment plants

Beata Karwowska\*, Elżbieta Sparczyńska, Ewa Wiśniowska

*Faculty of Environmental Engineering and Biotechnology, Department of Chemistry, Water and Wastewater Technology, Częstochowa University of Technology, Dąbrowskiego 69, 42 200 Częstochowa, Poland, Tel. +48 343250491; Fax: +48 343250496; email: bkarwowska@is.pcz.czyst.pl (B. Karwowska)*

Received 9 September 2014; Accepted 6 November 2014

---

### ABSTRACT

The aim of the investigation was to evaluate the levels of BOD, chemical oxygen demand, biogen compounds (e.g. ammonium nitrogen, phosphates) and the heavy metals (Zn, Cu, Ni, Cd, and Pb) content in supernatants, and condensates generated during sewage sludge drying and reject waters, compared to the concentrations in raw wastewater from selected WWTP in southern Poland. It was stated that when compared to raw wastewater, other liquids were highly polluted with ammonium nitrogen. Reject waters and condensates were not highly polluted with phosphates in contrast to supernatants. The most abundant heavy metal in all samples was zinc, followed by nickel. Copper and lead concentrations were similar but lower than that of zinc. Cadmium concentration was at a very low level. Considering the potential loads of heavy metals, which may be discharged with condensates and supernatants to the head of WWTP, they can be at the level of maximum 2% of the total load. It indicates that one-time effect of these liquids on heavy metals loads discharged into an activated sludge chamber is negligible, however, when accumulated in wastewater treatment, they pose a risk for biological processes.

*Keywords:* Heavy metals; Supernatants; Condensates; Wastewater

---

\*Corresponding author.

*Presented at the 12th Scientific Conference on Microcontaminants in Human Environment 25–27 September 2014, Czestochowa, Poland*