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REMOVAL EFFICIENCY OF HEAVY METALS BY A BIOLOGICAL WASTEWATER TREATMENT PLANT

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Abstract

The purpose of this research was to study the fate and removal of heavy metals by a biological wastewater treatment plant. The levels of heavy metals were compared in wastewater and sludge before and after treatment. The content of heavy metals wastewater and sludge was determined by inductively coupled plasma spectrometry (ICP-OES). Some of the metals were found to be present in trace amounts, while others were dispersed over a wide range of concentrations and were sometimes below the limit of detection. They occurred in the following order: Fe > Zn > Cu > Mn > Ba > Pb > Cr > As > Co > Ni > Cd > Hg. The reduction in heavy metal concentrations was in direct proportionality to their starting levels in the influent wastewater. The heavy metal concentration was, in ascending order, proportional to the content of the influent: Ba < Co < Mn < Pb < Cu < Zn < As < Ni < Cr < Fe < Cd < Hg. These metals concentrated in the sludge and accumulated after treatment. Concentrations of heavy metals in treated sludge were found to meet standards for agricultural land application. Values for lifetime cancer risk due to exposure to heavy metals in sludge samples were also estimated and it ranged from 4.42E-07 to 5.89E-04 for adults and children. The number of people suspected of having cancer due to exposure to sludge is between 6 and 44 in 10 million.

Keywords: health risk assessment, heavy metals, removal, wastewater treatment plant

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