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Fate and impact of phthalates in activated sludge treated municipal wastewater on the water bodies in the Eastern Cape, South Africa

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11 Abstract

The concentration and fates of six priority phthalate esters (PAEs); dimethyl phthalate (DMP), 12 diethyl phthalate (DEP), di-n-butyl phthalate (DBP), benzyl butyl phthalate (BBP), di(2-ethyl 13 hexyl) phthalate (DEHP), and di-n-octyl phthalate (DOP) in wastewaters from the wastewater 14 treatment plants (WWTPs) which adopted the activated sludge technology in the Amathole 15 Municipality, Eastern Cape, South Africa were investigated. The six PAEs were detected in 16 all the influents and in almost all the WWTP effluent of which DBP was the most abundant in 17 the influent followed by DEHP. Influent concentration of DBP in the three WWTPs ranged 18 between $2.7 - 2488 \,\mu g L^{-1}$ and the average effluent concentration was $4.90 - 8.88 \,\mu g L^{-1}$. On 19 average, the concentration of PAEs in WWTP effluents were higher than PAEs in the upstream 20 and downstream of the discharging point suggesting PAE impact on the receiving water. The 21 22 concentrations detected in the sludge of which DEHP and DBP were more pervasive ranged between 130-1094 µg/g dry weight. The average removal capacity; 27.3-99.5% suggested more 23 adsorption on settling particles and sludge than biodegradation as high significant correlation 24 was found between PAEs removal, total suspended solid and turbidity. Removal of high 25

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