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Presence of organic pollutants in sludge from anaerobic wastewater stabilization ponds

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ABSTRACT

One of the most common disposal options of sewage sludge is its application to agricultural lands. During wastewater treatments, pollutants tend to be concentrated into sludge so it is important to evaluate the concentration of those pollutants to avoid negative effects to the environment. To control the quality of the sludge that is going to be applied to soil, the European Union (EU) published in 2000 the third draft of a future sludge Directive entitled "Working Document on Sludge" where concentration limit values for some organic compounds (AOX, DEHP, LAS, NPE, PAH, PCB and PCDD/F) are fixed. The implementation of the future Directive could imply the application of post-treatment processes to sludge to reduce the concentration levels of the organic pollutants to levels that enable safe application of sewage sludge as soil fertilizer. Several authors have reported concentration levels of the above cited pollutants in anaerobic and aerobic treatment plants. However, there is no much information about concentration levels in lagoon sludge from anaerobic wastewater stabilization ponds which are the most common wastewater treatments applied in small communities with equivalent inhabitants in the range up to 10,000. In the present work, concentration levels of several of the organic compounds included in the EU directive draft have been measured in sewage sludge samples from three wastewater stabilization ponds operating in small communities located in the south of Spain. Organic compounds measured were di-(2-ethylhexyl) phthalate (DEHP), sum of nonylphenol and nonylphenol ethoxylates with 1 and 2 ethoxy groups (NPEs), linear alkylbenzene sulphonates (LAS), sum of nine polycyclic aromatic hydrocarbons (PAHs) and sum of seven polychlorinated byphenyls (PCBs). Sludge applicability to soil, in relation with the limit values fixed in the EU sludge directive draft, has been evaluated. The highest concentration levels were found for LAS (mean value 5373 mg/kg dry matter), NPE (mean value 177.1 mg/kg dry matter) and DEHP (mean value 72.3 mg/kg dry matter), in this order. PAHs were detected at lower concentration levels (concentrations lower than 0.80 mg/kg dry matter) whereas no PCB was detected in the analyzed samples.

Keywords: Organic pollutant; Sewage sludge; Working document on sludge; Wastewater stabilization ponds

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