Pre-treatment of co-digestion effluents before reverse osmosis (RO) application

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Received 23 September 2012; Accepted 27 March 2013

ABSTRACT

Effective treatment method of highly polluted post-digestion effluents, allowing the treated waters to be directly released into a natural reservoir, was developed. The co-digestion effluents containing varied ammonia-nitrogen content (1,400–5,445 mg NH₄⁺/dm³) underwent chemical precipitation (struvite) as a pre-treatment step and subsequent membrane filtration (RO or NF+RO). The application of dual treatment by means of struvite precipitation and subsequent RO turned out to be effective in case of all analysed post-digestion effluents (1,400–5,445 mg NH₄⁺/dm³), and allowed to decrease contaminants concentrations below discharge levels. However, it was necessary to apply an increased molar ratio of reagents during precipitation (Mg²⁺:NH₄⁺:PO₄³⁻ = 1.5:1:1.5). Introducing nanofiltration (NF) between struvite precipitation and RO allowed to decrease the dosage of reagents used for struvite precipitation (pre-treatment). Thus, waters containing initially up to 2980 mg NH₄⁺/dm³ fulfilled discharge standards after struvite precipitation was conducted at molar ratio of reagents (Mg²⁺:NH₄⁺:PO₄³⁻ = 1:1:1) and subsequent two-step membrane filtration (NF + RO).

Keywords: Reverse osmosis; Nanofiltration; Struvite; Ammonia-nitrogen removal; Co-digestion effluents