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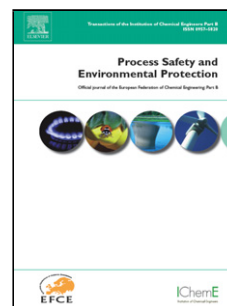
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Decentralized wastewater treatment systems: efficiency and its estimated impact against onsite natural water pollution status. A Romanian case study

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Highlights

- Three wastewaters management systems are assessed for a petroleum chemical company.
- Decentralized system was most efficient in fulfillment of treated effluent quality.
- Datasets were processed for estimation of treatment activities risks and impact.
- No to medium risk of residuals in treated effluent and natural receptor was found.
- Environmental impact towards watercourse was expressed by global pollution index.

Abstract

The paper proposes discussions of some concrete datasets resulted for three solutions of wastewaters management systems applied in case of a Romanian petroleum chemical company. These management options, differing especially in type (centralized or decentralized system) and wastewaters treatment system, were emphasized, mainly by real datasets on treatment performance, polluting species removals, risk of some residuals in treated effluents and natural watercourse nearby, but also environmental impact assessment, using the alternative methodology of global pollution index (I^*_{GP}). Interpreting datasets based on in-time analyzed physical-chemical quality indicators and river characteristics, it was estimated the standard quality classification of receiving watercourse as 'medium' (water quality indice, $WQI= 55.58 - 67.47$), affected more or less by treated effluents discharged in it. The environmental risks of some selected residuals in treated effluents and natural aquatic receptor were assessed by the risk quotient (RQ) which appreciated the risk of residuals towards aquatic life as *no* to *low-medium* level, with few exceptions. The impact assessment results conclude an admissible pollution status of natural water receptor due to company wastewaters mechanical-chemical-biological treatment plant activities, in decentralized ($I^*_{GP}= 1.73$) and centralized ($I^*_{GP}= 1.83$) system, but generating discomfort effects to aquatic life due to only mechanical-chemical treatment plant operating in decentralized system ($I^*_{GP} = 2.205$). Direct discharge of un-treated industrial wastewaters had been interdicted. These real results underline that decentralized systems are reliable, qualitatively efficient and costly effective, offering long-term solution, and that all wastewaters management strategies of petroleum chemical company had been adapted to specific on-site functioning situations.

Keywords: Onsite decentralized treatment system; Estimated impact and risk; Global pollution index; Petroleum chemical company; Risk quotient; Standard water quality indices.

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