

## Enhanced treatment of polluted surface water from Yellow river (China) with biooxidation as pretreatment: Pilot scale studies

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Received 15 September 2008; Accepted 5 November 2008

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### ABSTRACT

The Yellow River in China is being polluted with artificial pollution, which brings great challenges to drinking water treatment plants (DWTP) along the Yellow River. The conventional treatment processes could not ensure satisfactory quality of drinking water, and innovative processes are crucial for the achievement of the newly issued drinking water standard (GB5749-2006). The DWTP in Zhengzhou City takes the reservoir water as source water, which has been suffering from algal bloom of late due to the pollution of the Yellow River. This study shows the feasibility of using biooxidation processes (moving-bed biofilm reactor (MBBR) and Vceramsite biofilter (BF)) as pretreatment for enhancing surface water treatment. These two processes show effect in enhancing natural organic matter (NOM), and more significant effect was observed for NOM with lower molecular weight and higher biodegradability. BF shows higher capabilities of removing UV254 and controlling trihalomethane formation. MBBR and BF show effect in removing algae cells, and BF contributes to higher chlorophyll a removal (with average removal of 47.4%) than MBBR does. These two biofilm reactors show great potential of removing algae toxins (MCLR), which achieve removal rates of 56% and 63% respectively. The two processes are also observed to be effective in enhancing ammonia removal, which achieve removal rates of 61.6% and 68.0% respectively. MBBR and BF are effective in enhancing pollutants removal and are potentially feasible in drinking water treatment as pretreatment of conventional processes.

**Keywords:** Yellow River; Moving-bed biofilm reactor; Vceramsite biofilter; Algae; Algal toxins; Ammonia

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