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Drink. Water Eng. Sci., 3, 53-61, 2010
www.drink-water-eng-sci.net/3/53/2010/
doi: 10.5194/dwes-3-53-2010

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NOM characterization and removal at six Southern African water treatment plants

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Abstract. Organic pollution is a major concern during drinking water treatment. Major challenges attributed to organic pollution include the proliferation of pathogenic micro-organisms, prevalence of toxic and physiologically disruptive organic micro-pollutants, and quality deterioration in water distribution systems. A major component of organic pollution is natural organic matter (NOM). The operational mechanisms of most unit processes are well understood. However, their interaction with NOM is still the subject of scientific research. This paper takes the form of a meta-study to capture some of the experiences with NOM monitoring and analysis at a number of Southern African Water Treatment Plants. It is written from the perspective of practical process selection, to try and coax some pointers from the available data for the design of more detailed pilot work. NOM was tracked at six water treatment plants using dissolved organic carbon (DOC) measurements. Fractionation of the DOC based on biodegradability and molecular weight distribution was done at a water treatment plant in Namibia. A third fractionation technique using ion exchange resins was used to assess the impact of ozonation on DOC. DOC measurements alone did not give much insight into NOM evolution through the treatment train. The more detailed characterization techniques showed that different unit processes preferentially remove different NOM fractions. Therefore these techniques provide better information for process design and optimisation than the DOC measurement which is routinely done during full scale operation at these water treatment plants.

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Citation: Haarhoff, J., Kubare, M., Mamba, B., Krause, R., Nkambule, T., Matsebula, B., and Menge, J.: NOM characterization and removal at six Southern African water treatment plants, Drink. Water Eng. Sci., 3, 53-61, doi: 10.5194/dwes-3-53-2010, 2010. [Bibtex](#) [EndNote](#) [Reference Manager](#) [XML](#)

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