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Drinking Water Engineering and Science Discussions

Interactive comment on "NOM removal technologies – Norwegian experiences" *by* H. Ødegaard et al.

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General Comments This paper represents an overview of Norwegian experiences for the removal of NOM for drinking water purposes. This overview is interesting because of the huge experience of the authors with different NOM removal techniques. In Norway NOM, humic acids specifically, are of major concern because of the high color of the water, the possibility to form disinfection by-products and the effects on other treatment processes.

However it is assumed that humic acids is the main NOM fraction that causes problems (which is probably true), it is not confirmed by NOM characterization techniques. More knowledge of the NOM character could also be used to explain more specifically the obtained results and could offer a better pre-selection of removal techniques. It is

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known that for instance other NOM fractions or even inorganic species than humics can be responsible for UF membrane fouling. NOM characterization could improve the scientific level of this paper. A cost evaluation, in Norwegian perspective, would help to evaluate the treatment techniques on a different level. When costs of treatments are related to the drinking water price, it becomes possible to select treatments because this is one of the main selection criteria (at least in the Netherlands). Additionally an overview or comparison with internationally used treatment techniques and costs would fulfill this paper and put this on a more international level.

Specific comments Page 9, chapter 3.2: chemical cleaning is performed with 75% phosphoric acid, 15% sodium hypochloride and chlorinated water. What are the precise concentrations used for these cleaning steps? Page 10, line 18: A MF flux in the range of 130-160 lmh is rather high, under what circumstances (backwash, chemical cleaning protocol)? Page 10, line 23-25: a reference of the stated oxidation pathways is needed. Page 12, line 5-10: addition, normally a few months are necessary to obtain biological filtration in GAC filters. In this paragraph GAC is easily mixed with oxidation and should be more clarified. E.g. add ozone dosages and oxidation methods instead of dosages and method only. Page 12, line 17: are figures available of the “good” hygienic barrier? Page 12 line 25: improvement of taste and odor instead of removal. Page 13, line 4: c) inorganic trace pollutants will not be removed by MF/UF! Page 13, line 23: Only when NF or GAC filtration is used, a second barrier is created for micro pollutants. Otherwise the oxidation step is the only barrier. Page 14, line 5: a reference is needed for the pore blocking theory. Page 14, line 20: in the formula h (hours) and min (minutes) are used, what is the reason for this? This can cause mistakes.

Technical corrections Page 5, line 13: explain CA membranes Page 6, line 14: PAX = PACl? Page 8, line 20: have should be has Page 10, line 22: is normally be = normally is Page 11, line 8-9: very short lived = have a very short lifetime Page 12, line 5: as should be removed Line 7: gives = give Line 12: ozone dosages Line 13: oxidation method Line 15: methods is = methods are Line 23: explane AOP Line 24: to being

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the = be a Line 25: removal should be improvement? Page 13, line 14: hrs = h; at flux = at a flux Page 14, line 6: after = for Line 7: after etc.) have. . . do not understand this sentence Page 15, line 3, 4: filter = filtration Line 10: around = about Line 11: at is after Line 12: in = at Line 22: LMH = L/m2.h Page 16, line 3: are = is Line 7-8: take the growth potential out = to lower or to remove

Principal criteria Scientific significance: good, because of substantial amount of data/knowledge Scientific quality: fair, more international references would help, also cost evaluation and a better understanding of NOM characteristics Presentation quality: good to fair, the presentation and conclusions are clear, however the English sometimes is rather poor.

Interactive comment on Drink. Water Eng. Sci. Discuss., 2, 161, 2009.