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Interactive comment on "Comprehensive analysis of the start-up period of a full-scale drinking water biofilter provides guidance for optimization" *by* Loren Ramsay et al.

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Dear Anonymous Referee #1

We appreciate the effort by the Anonymous Referee #1 and thank you for your constructive comments to the manuscript. We have provided an individual response to each comment and described in text the changes to the revised final paper.

Answer to comment 1: Small fines in the filter media were washed out with the initial backwashes in the beginning of the start-up period as described in section 3.1. Otherwise, no media is washed out with the backwash water since this leaves the filter in the

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same pipe as the inlet water, high above the bed expansion. This will not be added to Figure 1 to avoid confusion with filter inlet, however, to accommodate the comment by the reviewer, the sentence “The inlet pipe is also used for backwash discharge and is located high above the bed expansion” will be added in section 2.3 of the revised final paper.

Answer to comment 2: Filter 2 contains quartz sand (100 % silica) and manganese oxide (which according to the manufacturer can contain up to 3.5 % iron) media. Therefore, iron fines present in the virgin manganese oxide media could be removed with the backwash water. The authors agree that some iron in the backwash water can result from chemical contact oxidation (or rather adsorption and subsequent abiotic oxidation). However, the amount of iron in the media greatly exceeds the iron in the inlet water of Filter 2. Therefore, the initial argumentation in section 3.1 in the discussion paper is retained in the revised final paper.

Answer to comment 3: In section 3.5, there is a reference to a previous study by the same authors that explain why manganese is reduced and dissolved and thereby mobilized out of the filter during the oxygen stop. However, for clarification, the following sentence will be included in the final revised paper: “Manganese oxide reduction and dissolution with concomitant oxidation of Fe(II) has previously been observed in drinking water treatment in conditions of low dissolved oxygen (Bray, R. & Olanczuk-Neyman, K. 2001. The influence of changes in groundwater composition on the efficiency of manganese and ammonia nitrogen removal on mature quartz sand filtering beds. Water Supp. 1 (2), 91–98.)”. This means that Fe(II) is the reducing substance and that methane is not needed to explain manganese mobilization. Why manganese was high at Day 58 is not known. Therefore, the following sentence will be added to the revised final paper “The explanation for an additional increase in manganese in effluent water after oxygenation was again working properly is not known”.

Answer to comment 4: We agree with the reviewer that Leptothrix is not the only potential MnOB, the genus was targeted with the purpose of iron oxidation. However, as the

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genus is known also to have a role in manganese oxidation, presence of this genus in the strata of manganese oxidation is naturally discussed by the authors. Other MnOBs were not targeted due to lack of specific primers for qPCR in the literature.

Answer to comment 5: We agree that the quality of the figures should be improved in the final revised paper, however, these were not requested for the discussion paper. All figures have already been prepared according to the “manuscript preparation” guidelines by Drinking Water Engineering and Science for the final paper.

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