

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.

Anonymous Referee #1

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In this paper, the authors successfully start up a practical drinking water treatment line including two biofilters to remove iron, manganese and ammonia from groundwater. A lot of investigations during the start-up period were carried out to better understand the removal process, especially that the related studies about archaea, coliforms and planktonic bacteria seemed to be constructed for the first time. This paper provides guidance for optimization of the biofilter in some degree, however, there are still some questions should be addressed as follows:

1. In the 2.3 section, “the filter backwash was based on a three-step procedure as follows:——”, the backwash strength for this system is stronger than other reports.

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Therefore, the authors should clear that if the filtering sand would be washed out of the layer during the start-up period of the system. In addition, it can not see from Fig. 1 that how to drain the backwash wastewater.

2. In the first paragraph of the 3.1 section, “For filter 2, —— the first 4 days of commissioning”. The quartz sand or manganese oxide media are suspect of containing any iron element? It is more likely that the removed iron is the result of chemical contact oxidation of the influent iron.

3. In the 3.5 section, the absence of oxygen that occurred on day 49-51 resulted in the increasing effluent manganese of filter 1 as described. Any filter can intercept solid oxides especially with the relatively smaller quartz sand size of 0.5-0.8 mm in this paper, even if the oxygen deprivation can move the manganese oxide off the sand surface. Therefore, it should be explained that why the manganese could subsequently flow out of the filtering layer. Actually, in absence of dissolved oxygen, the removed manganese (i.e. manganese oxide) may react with some reducing substances (e.g. methane), producing the divalent manganese that can not be trapped by layer. But this reaction will immediately stopped when oxygen is provided, it could not explain why the manganese increased until about 58 days, as the oxygen deprivation only occurred on day 49-51.

4. Generally, there are amounts of manganese oxidizing microbes with a variety of living habits in a biofilter rather than *Leptothrix* itself. So what is the purpose of this paper use *Leptothrix* as the sole indicator.

5. The quality of all the figures should be improved.

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