# Blueleaf Incorporated

**WATER SYSTEM TESTING AND OPERATIONS**
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Re : **Performance of Pressure Filtration Systems at Sites with High-Manganese, Low-Iron Raw Water**

Several pilot studies on high-manganese, low-iron sites have found issues that present challenges for full-scale implementation of manganese greensand treatment systems. In general, the issues fall into one of three categories:

i. The backwash water contained a low percentage of the manganese mass that was removed during filtration, suggesting that most of the manganese mass was not removed during backwash, and remained on the media;
ii. The backwash water settled poorly, and was not amenable to settling and recycling;
iii. The development of headloss across the filter media was not consistent, with some filter trials resulting in very low headloss, despite good removal of contaminants.

All three issues potentially reduce the applicability of the manganese greensand treatment process, and may force municipalities into looking at alternative treatment processes. The typical pilot studies that identify these issues as problematic are operated over too short a duration to determine whether they persist long term.

It is likely that there are there are numerous full-scale treatment systems using the manganese greensand process to treat high-manganese, low-iron waters with long-term success. The research questions to be answered during this research are:

a) After long-term operation, is the manganese mass that was adsorbed during filter service effectively removed from the filter media during normal backwash or does the unrecovered manganese mass accumulate on the media, possibly causing media growth?
b) After long-term operation, are the settling characteristics of the backwash water amenable to recycling?

c) After long-term operation, what is the nature of the headloss development across the filter media?

Participating Treatment Systems:

We plan to address these research questions by reviewing the records and water quality of representative facilities. In particular, we will complete the following tasks:

1. Collect water samples from raw source, pre-filter (post chemical pretreatment), post-filtered, and representative backwash water. Analyze in accordance with following table:

| Analysis | Raw | Pre-Filtered | Post-Filtered | Backwash Water | Settled Backwash Supernatant |
|---|---|---|---|---|---|
| Total Iron | 2 Samples | 2 Samples | 2 Samples | 1 Sample | 1 Sample |
| Dissolved Iron | 2 Samples | 2 Samples | 0 Samples | | |
| Total Manganese | 3 Samples | 3 Samples | 3 Samples | 1 Sample | 1 Sample |
| Dissolved Manganese | 3 Samples | 3 Samples | 3 Samples | | |
| Settleability | | | | 1 Sample | |

2. Collect information from historical operation for filter performance, including media type, depth, age, average filter loading rate, triggers for filter run termination, and headloss data as a function of runtime.

There is no cost to participating full-scale facilities. The identity and results of each full-scale facility will be confidential. Data and conclusions will be made available to all participating facilities.

If interested in participating in this study, please contact:

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