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**Sent:** Saturday, June 13, 2015 12:52 PM  
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**Subject:** Flint GAC 1 of 2  
**Attachments:** GAC-basis-of-design.pdf

Mike,

Attached is our revised basis of design. I am going to send preliminary drawings in a separate email due to file sizes.

Thanks,

**Jeffrey R. Hansen**  
Senior Project Manager



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**BASIS OF DESIGN**  
**FILTER MEDIA REPLACEMENT WITH GRANULAR ACTIVATED CARBON (GAC)**  
**CITY OF FLINT**

**1. GENERAL DESCRIPTION**

As one measure to assist with the reduction of total trihalomethanes (TTHM) in the water system the City of Flint (City) proposes to replace the existing anthracite media with GAC for each of the 12 filters within the water treatment plant (WTP). Two layers of media were installed in the filters in 2005: 12" of sand and 18" of anthracite. Recent investigations have shown that the sand installed does not meet the original design specifications and some intermixing of sand and anthracite has occurred. Consequently, replacement of the sand layer for all 12 filters is also proposed.

It is anticipated that the GAC media will be biologically active and chlorine feed prior to filtration can adversely affect the GAC. Therefore, the intermediate chlorine feed point is proposed to be moved to the weir chamber immediately downstream of the filters. The existing chlorine piping and diffuser upstream of the filters will remain in place for future use either for disinfection of the filters if necessary or for general disinfection if/when the KWA supply is available and GAC media is no longer needed in terms of TTHM control.

Relevant design information is provided in this narrative and detailed calculations follow.

**2. DESIGN CRITERIA**

The Flint WTP began full time operation using the Flint River on April 25<sup>th</sup>, 2014. The following information was taken from monthly operating reports (MOR's) for the full year from May 2014 through April 2015:

- A. Average daily demand (ADD) = 18.3 MGD
- B. Maximum daily demand (MDD) = 25.4 MGD
- C. Minimum monthly average chlorine feed at intermediate point = 1.8 mg/l
- D. Average monthly chlorine feed at intermediate point = 2.9 mg/l
- E. Average plant effluent pH = 7.8
- F. Maximum monthly average plant effluent pH = 8.1

Selected WTP design flow = 24 MGD

Maximum WTP flow expected = 30 MGD

Minimum WTP flow expected = 8 MGD

**3. MEDIA DESIGN**

- A. GAC Media
  - 18" depth
  - GAC media selected is Filtrasorb 400 manufactured by Calgon Carbon Corporation with an effective size of 0.65 mm, uniformity coefficient of 1.90 and specific gravity of 1.40.
  - The Filtrasorb 400 characteristics vary slightly from Ten State Standards (TSS) which state an effective size of 0.45-0.55 mm and a maximum uniformity coefficient of 1.65. However, it is somewhat unclear if TSS apply