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Sent: Wednesday, May 20, 2015 11:20 AM
To: Prysby, Mike (DEQ)
Cc: Matta, Samir; Green, Warren; Brent Wright
(bwright@cityofflint.com); mglasgow@cityofflint.com
Subject: Flint Filter Media Change to GAC
Attachments: GAC-basis-of-design.pdf

Hi Mike,

Attached is our preliminary basis of design. We are currently working through details with GAC suppliers to determine the best specific media for Flint, but the Filtrasorb 300 and 400 series from Calgon or equivalent appear to be the best suited. Please note that both meet AWWA B604, but are questionable by Ten States Standards (TSS) as TSS are non-specific for GAC capping. According to Calgon, their Filtrasorb product has been approved by DEQ at numerous plants including Ann Arbor, Grosse Pointe Farms, Manistique, and Alpena.

Also note we intend to add a chlorine feed point following filtration while maintaining the intermediate feed point, with valving, so chlorine can be added at either point. The intermediate feed point prior to filtration can then be used as a means of disinfecting the filters in the future, if necessary.

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CITY OF FLINT WTP
Filter Media Replacement
Basis of Design

Notes

Max. Expected Flow Rate =	30.0 mgd =	20,833 gpm =	2,785 cft/min
Max. Day May 2014 - April 2015 =	25.4 mgd =	17,639 gpm =	2,358 cft/min
Avg. Day May 2014 - April 2015 =	18.3 mgd =	12,708 gpm =	1,699 cft/min
Design Flow Rate =	24.0 mgd =	16,667 gpm =	2,228 cft/min
Min. Expected Flow Rate =	8.0 mgd =	5,556 gpm =	743 cft/min

Area / Filter = 700 sq ft
 Number of Filters = 12

	mgd	30.0	24.0	8.0
Loading (gpm/sq ft) =		2.48	1.98	0.66

Top of Underdrain elev =	723.58		
Washwater Trough Weir elev =	730.67		
Operating Water Level =	734.00		
Top of Filter Basin / Floor elev =	736.00		
Filter BW Dimensional D =	7.08		
Existing Sand D =	12.00 inches =	1.00 ft	
Existing Anthracite D =	18.00 inches =	1.50 ft	

Proposed Sand D =	12.00 inches =	1.00 ft	
Proposed GAC D =	18.00 inches =	1.50 ft	
Proposed Water Depth =		7.92 ft	
Max Cold BW Flow rate / filter =	9800 gpm =	14.0 gpm/sq ft	
Max Warm BW Flow rate / filter =	14000 gpm =	20.0 gpm/sq ft	
Max Sand Expanded D =	14.2 inches =	1.18 ft =	18%
Max GAC Expanded D =	34.20 inches =	2.85 ft =	90%
Total BW Expanded D =	48.40 inches =	4.03 ft	
Proposed BW Freeboard =		3.05 ft	
Proposed # of Filters to Replace	12		
GAC Volume =	12,600 cft		
GAC apparent density =	33.7 lbs/cft		
GAC Total Weight =	424,620 lbs =	212.3 tons	

	mgd	30.0	24.0	8.0
EBCT (min) =		4.5	5.7	17.0

Propose to relocate intermediate chlorine feed to inlet side of weir chamber following filtration
 Intermediate CL2 feed point to remain in place as means to disinfect filters in the future, if needed

	mgd	30.0	24.0	8.0
Contact time (min) =		55.0	68.8	206.3
CT =		99.0	123.8	371.4

Required CT at 1.8 mg/l chlorine, less than 0.5 degrees C, and pH of 8.0 = 56

See following pages for details

To match current BW flow rate
 Use when water temp > 65 degrees
 Occurs at cold temps

Calculations attached separately

