



# CITY OF FLINT

**Dr. Karen Weaver**  
Mayor

April 19, 2017

Mr. Chris Korleski, Director  
Water Division, Region 5  
United States Environmental Protection Agency  
Ralph Metcalfe Federal Building  
77 West Jackson Boulevard (W-15J)  
Chicago, Illinois 60604-3590

**Sent via Email**

Dear Mr. Korleski:

In my November 30, 2016 correspondence, I identified the Flint Water Treatment Plant as the primary long-term water source for the City of Flint. Due to the multi-year construction schedule for the Flint Water Treatment Plant improvements and pipeline limitations, I also stated that it would be necessary to obtain an interim supply from the Genesee County Drain Commissioner (GCDC) after their new treatment plant was completed. Additionally, a secondary/back-up source of water was to be derived from on-site raw water reservoirs and an emergency interconnection with the GCDC.

Over the past four months, the City has undertaken extensive studies and negotiations to improve its long-term water source selection. We recognize that multiple changes in water source may result in water quality concerns. Therefore, maintaining our current water source from Great Lakes Water Authority (GLWA) will minimize these concerns and provide the highest level of public health protection.

Recent cooperation from regional stakeholders (GCDC, Karegnondi Water Authority (KWA), GLWA and the State of Michigan) has resulted in the City being able to maintain a continuous, long-term water supply from GLWA. GCDC will be installing a 42-inch transmission main parallel to the existing 72-inch transmission main that currently supplies treated water from GLWA to GCDC customers as well as the City. This will allow the GCDC to supply treated water from its new treatment plant to its customers (beginning in October, 2017) while the City continues to receive treated water from GLWA. This new GCDC transmission main will allow Flint to contract for an uninterrupted flow from GLWA and permit ownership of the 72-inch transmission main to return to the City. Additionally, a partnership between Flint, KWA, GCDC and GLWA will transfer control of Flint's portion of its KWA raw water supply to GLWA. This agreement made maintaining GLWA as the City's long-term water source economically feasible.

A summary of the water source alternatives and analysis is attached. This summary assesses each options based on its public health protection, cost, implementation risk/reliability and primary source implementation time. The long-term water supply from GLWA option (option no. 4 in the attachment) has the top ranking in all four categories.

In the November 17, 2016 First Amendment to the Emergency Administrative Order (“Order”), *Paragraph 60* was revised to require the City to “notify EPA in writing within five days if there are any changes in its initial, or any subsequent, new water source designation”. Therefore, this correspondence is official notification that Flint is designating GLWA as its long-term, primary water source with its back-up source being as interconnection with GCDC. This recommendation is subject to the public input received during the Public Participation Plan, which has been previously submitted to EPA.

Attached please also find a revised Corrosion Control Plan. This Plan outlines a two-phase investigation which is consistent with the revised water source recommendation. Phase 1 involves optimizing corrosion protection for the current GLWA source through coupon and loop studies and determining how to best transition orthophosphate doses and pH. Phase 2 addresses corrosion optimization for the long-term GCDC/GLWA blend. Continuous flow through the GCDC interconnection will be required to maintain proper water quality within the pipeline. The revised Corrosion Control Plan reflects a controlled blend for the proposed loop studies.

As co-responders to the Order, Mr. Bryce Feighner (Director – Drinking Water and Municipal Assistance Division, Michigan Department of Environmental Quality (MDEQ)) has reviewed this submittal on behalf of the State and concurs with the content of the document.

If you have clarifying questions and/or need additional information, please contact me at (810) 237-2035 or via email at [kweaver@cityofflint.com](mailto:kweaver@cityofflint.com).

Respectfully submitted,



Dr. Karen W. Weaver  
Mayor

cc: Mr. Robert Kaplan, US EPA  
Mr. Rich Baird, Governor’s Office  
Mr. Keith Creagh, MDNR  
Mr. Bryce Feighner, MDEQ  
Mr. Sylvester Jones, City of Flint  
Mr. John Young

Attachments:  
City of Flint Water Supply Option Analysis  
Corrosion Control Plan

City of Flint  
Water Supply Option Analysis

Option	Interim Source	Primary Source	Back-Up Source	Cost NPV – 20yr.	Public * Health	Cost	Risk/ ** Reliability	Time (Primary Source)
1	GCDC	Flint WTP w/ WWTP residual discharge	Raw Water Reservoir; Distribution Storage	\$323M	3	4	3	3
2	GCDC	GCDC	GCDC	\$311M	2	3	2	2
3A;3B	GCDC	A.Flnt WTP w/ on-site residual processing B. Flint WTP w/ WWTP residual discharge of residuals	GCDC	\$313M \$303M	3	2	2	3
4	GLWA	GLWA	GLWA (GCDC)	\$269M	1	1	1	1
5	GLWA	GLWA (until July, 2018) then GCDC	GCDC	\$335M	2	6	1	2
6A;6B	GLWA	A.Flnt WTP with on-site residual processing B.Flnt WTP with WWTP discharge of residuals	GLWA	\$364M \$354M	2	7	1	3
7A;7B	GLWA	A.Flnt WTP with on-site residual processing B.Flnt WTP with WWTP discharge of residuals	GCDC	\$337M \$327M	2	5	1	3
8	GLWA	GCDC	Flint WTP	\$456M	3	8	1	2
9	GLWA	GLWA	Flint WTP	\$482M	1	9	1	1

\*reflects number of required water source changes; not indicative of the quality of any individual water source

\*\* Indication of continuous reliable capacity available for Flint; 1=most reliable

# FLINT CCT STUDY TEST PLAN

April 13, 2017

EE&T, INC.

## BACKGROUND SUPPLY ASSUMPTION

The supply plan is for Flint to stay on GLWA water permanently as the primary supply. The back-up or secondary water supply for Flint will be from the new Genesee County WTP. In order to provide County treated water to Flint, a new pipeline will be installed. So that the new County line can remain flushed, a minimum flow of approximately 0.5 mgd will be maintained in the pipeline to Flint. This County treated and supplied water will be continually blended in with the GLWA water. Therefore, in the long term plan, the Flint distribution system will be a blend of GLWA and County treated water. Flow measurement or pressure monitoring will be used to maintain the County water at no more than 5 percent of the GLWA supply.

## OBJECTIVE

It is necessary to fully evaluate the corrosion control treatment (CCT) required for a blend of County and GLWA water prior to the County water being introduced to the Flint system. The County treatment system may use a different coagulant than the GLWA delivered water. Further, Flint currently has an orthophosphate residual leaving the plant of about 3.5 mg/L (maintaining above 3.1 mg/L in the distribution system) and a pH goal of about 7.4 leaving the plant. At this point it is not known what CCT conditions the County will set, but they could be different than current Flint water. *One key objective therefore is to determine proper CCT when the two waters are blended.*

When Flint switched back from the Flint River supply to the GLWA supply, it was necessary to quickly set CCT conditions. Using theoretical solubility relationships and experience, EPA selected a minimum orthophosphate residual in the distribution system of 3.1 mg/L. Time constraints did not allow for a robust test to determine the ideal orthophosphate dose or pH. *Therefore, a second objective of this CCT study is to determine the optimal CCT for GLWA water.* These optimal GLWA conditions will also be used to better set the blend conditions, especially since the blend will be no more than 5 percent County water and is therefore GLWA water dominant.

## CCT STUDY PLAN OVERVIEW

*Phase 1.* At the Flint WTP there are 16 pipe segments available in 4 loop rigs. These test rigs were assembled by EPA and EPA has stabilized the pipe segments on existing Flint distributed water. Therefore, these pipes can be used immediately to evaluate pH and the appropriate

orthophosphate dose since they are already stabilized. By using these pipes for testing, an optimal pH and orthophosphate dose going forward for GLWA water can be selected.

*Phase 2.* Having determined in the existing loops the best pH and orthophosphate dose for GLWA water, those conditions can serve as a starting point for testing the 5 percent blend of County treated water. Likely the proper course of action for the final treatment will be to blend the County and GLWA water at the Flint WTP site, where the blended water could then be adjusted to the CCT conditions found to be optimal for the blend.

## SCHEDULE CONSIDERATIONS

*Phase 1.* The existing loop system at the WTP will be used for orthophosphate dose and pH evaluations as soon as possible after contract finalization and loop set up; approximately June 2017. The pH and orthophosphate evaluations on GLWA water will continue for 6 months.

*Phase 2.* After the 6-month testing on GLWA water, testing will be conducted at a 5 percent County treated water blend on the already stabilized pipes. Testing of the blend conditions will take place for 3 months.

## TEST PLAN OVERVIEW

*Phase 1.* The first phase study will be used to evaluate pH and orthophosphate dose on the existing rigs using pipes that have been already been equilibrated with Flint water (pH in the 7.3 range and orthophosphate of about 3.5 mg/L as PO<sub>4</sub> which is the approximate residual at the plant site).

*Note that there will be coupon studies conducted before the loops start that may inform or alter the loop study plan.*

Two pH values will be tested at four (4) orthophosphate doses. Duplicates will be conducted for each test condition, which will use all 16 of the available pipes. The two pH values selected are 7.5 and 7.2. The higher pH (7.5) was selected as being an almost ideal pH based on theoretical and experimental solubility curves, while the lower pH value (7.2) was selected to represent a lower bound for orthophosphate performance. Therefore, if similar performance is achieved by both pH values then the distribution system can be allowed to drift down to pH of 7.2. However if pH 7.5 provides better control of lead solubility, that will set a target at a higher pH. In the latter case, additional pHs may be evaluated along with the Phase 2 work to better define pH conditions.

The four orthophosphate doses will be:

1. The current Flint orthophosphate residual goal of 3.1 mg/L. This dose will represent current practice as well as the high end dose. The residual used might actually be the

- 3.5 mg/L that is available at the plant site or GLWA water might be adjusted up to 3.1 mg/L.
2. The lowest orthophosphate dose tested will be GLWA water as received which has a residual of about 1 mg/L. This dose will represent the lowest dose tested.
  3. Two doses in-between the range of 1 to 3.5 will then be also evaluated; planned as 1.75 and 2.5 mg/L.

This first phase of the study will recommend how to transition the current Flint-treated GLWA conditions to the optimal pH and orthophosphate conditions.

*Phase 2.* During the second phase, the pipes tested in the first phase will be used. The pipes will receive 5 percent County treated water and 95 percent GLWA water. The blended water will be evaluated at the 4 orthophosphate doses tested above using the corresponding pipe. For example, the pipes stabilized in Phase 1 at an orthophosphate residual of 2.5 mg/L will receive blended water treated to 2.5 mg/L orthophosphate residual. This will follow for all four orthophosphate residuals used in Phase 1. However, if the first phase finds some doses were not acceptable, the dose may be eliminated or modified. One pH condition will be tested in Phase 2 as determined from the first phase. Tests will be in duplicate for a total of 8 pipe loops. The remaining pipes could be used to better refine pH or orthophosphate dose.

These results will allow for a final selection for CCT conditions to be set for the normal situation of County and GLWA blended water.