



CITY OF FLINT

Department of Public Works

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TO: City of Flint Residents

RE: Water Questions

DATE: January 13, 2015

Prelude

The decision to switch to the Karegnondi Water Authority as the City's permanent water source was made following extensive research and in-depth engineering studies. After entering into a contract with KWA and the subsequent termination of the existing water service contract by the Detroit Water and Sewerage Department, the same diligence was given in determining what source water to use while waiting for the community supported KWA water to arrive. The City concluded from this work that the Flint River presented a safe and financially responsible alternative water source. The decision to use the Flint River as an intermediate water source was approved by state regulatory officials in 2014 whereby the City was permitted by the Michigan Department of Environmental Quality to proceed with treatment of water from the Flint River.

The following questions were presented by concerned citizens, and the City's responses follow. This document will be put on the City's website for public viewing within the next several days.

1. What was the process by which the decision was made to switch from Detroit water to Flint River water? Who was responsible for what decisions?

On March 25th, 2013, after evaluating cost comparisons for a permanent water source, the Flint City Council, with support from the Mayor, voted 7 – 1 approving a resolution to purchase water from the Karegnondi Water Authority (KWA). On March 29th, resolution 2013EM041 was signed, authorizing the City of Flint to enter into a contract with the KWA.

On April 16th, 2013, then Emergency Manager Ed Kurtz, signed the contract effectively purchasing 18 MGD of capacity from the KWA.

On April 17th, 2013 Detroit Water and Sewerage Department (DWSD) sent a letter terminating the existing water service contract between the City of Flint and Detroit. With the termination set to take effect 12 months later on April 17th, 2014, a gap was created between the end of the DWSD contract and the start of the KWA.

On June 29th, 2013, following many preliminary discussions on how the City would fill the interim gap, a formal, all day meeting was held at the Flint Water Plant with all interested parties including City of Flint Officials (COF), representatives from the Genesee County Drain Commissioners Office (GCDC), the Michigan Department of Environmental Quality (DEQ), and the design engineers from the previous plant upgrade Lockwood, Andrews, and Newnam (LAN).

The purpose and agenda of the meeting was to determine the feasibility of the following items:

1. Using the Flint River as a Water Source
2. The ability to perform the necessary upgrades to the Treatment Plant
3. The ability to perform quality control
4. The ability for Flint to provide water to Genesee County
5. The ability to meet an April/May 2014 timeline
6. Development of a cost analysis

The conversation was guided with focus on the engineering, regulatory, and quality aspects of each item listed. The resulting determinations were made.

1. Yes, the Flint River would be more difficult to treat but is viable as a source.
2. Yes, it was possible to engineer and construct the upgrades needed for the treatment process.
3. Yes, with support from LAN engineering which works with several water systems around the state, quality control could be addressed.
4. No, the Flint treatment plant would not have the capacity needed to treat and distribute sufficient water to meet the documented needs of Flint and Genesee County.
5. Possible, it was determined that many obstacles needed to be overcome but completion by the April/May 2014 target was reachable.
6. Next steps from the meeting were for LAN to present the City with a proposal that would include engineering, procurement, and construction needs for the project along with cost estimates.

As a result of extensive evaluation, discussions with the professional engineers, and consulting the state regulators, the Department of Public Works along with the Finance Department recommended utilizing the Flint River as a temporary water source while waiting for the KWA to come online. The plan to accomplish this was accompanied with a construction timeline, a needs analysis for resources, and an FY 14 spending plan to complete the project.

2. Was it known prior to the switch that there would be problems managing total coliform and fecal coliform bacteria levels in the water?

It was understood that the Flint River would be subject to temperature variations, rain events, and have higher organic carbon than Lake Huron water and would be more difficult to treat. These facts were balanced against a licensed staff, LAN engineering's extensive experience in this field, advanced equipment that Flint has for treatment, and support from the DEQ.

3. What were the projected costs and benefits of the switch, and what have been the actual costs and benefits?

The engineered costs for upgrading the Flint Plant to treat KWA water from Lake Huron were projected to be ~\$9,000,000. These upgrades need to be in place prior to KWA water reaching Flint and are coupled with an additional ~\$3,500,000 in annual operational expenses for workforce additions, electricity costs, and process equipment for a total of ~\$12,500,000

The final year that the City of Flint purchased water from DWSD, the cost was \$12,400,000 and that cost was projected to rise to ~\$14,400,000 in 2014 and increase to ~\$16,000,000 in 2015.

The financial benefit for switching to the river was the opportunity to divert that revenue towards capitalizing the upgrade expenditures needed to run the plant and the development of a capital improvement program for the aged infrastructure without a significant increase to the water bill. This aspect was figured into the cost analysis at the time of the recommendation.

Based on the current DWSD rate structure, it appears that the actual costs to purchase water this year would have been higher than projected, The fixed cost would have been ~\$5,100,000 and the additional commodity or water costs would have resulted in another ~\$11,000,000 given the City's current water usage. This would result in an estimated ~\$16,000,000 in this year alone.

The upgrade expenditures stayed close to the engineered projections. The improvements at the water plant cost ~\$7,000,000, the remediation and development of Bray Rd for lime disposal cost ~\$1,700,000 and the increased operational costs so far this year are below the estimates and on target to finish the year at ~\$3,000,000. These changes come to a total of ~\$11,700,000 of necessary expenditures in the first year.

In addition to the ability to capitalize the upgrades, switching to the Flint River has allowed us to develop a Capital Improvement Plan for the Utility Department that will begin replacing pipe underground this spring and will account for overdue maintenance concerns such as valve replacements, and pipe lining extending the useful life of the system and allowing us to deliver better quality water.

It would have required close to a 30% raise in the water and sewer bill to accomplish this without using the Flint River as a source.

4. What were the causes of increased levels of trihalomethanes? Have those causes been sufficiently addressed? If not, what needs to be done to prevent this from occurring again in the future?

Just as low levels of chlorine can produce coliforms, high levels of chlorine can result in Disinfectant Byproducts (DBP) generating increased levels of trihalomethanes (TTHM). The DEQ requires this testing to occur once every three months at each of the testing sites and looks at an average over four quarters (one year) to determine the level to compare against the maximum contaminant level (MCL).

Research by the Science Advisory Board, the National Academy of Sciences, and the USEPA's Carcinogen Assessment Group predicts risk estimates associated with high levels of TTHM at an incremental risk of 3 to 4 people out of 10,000 that consume 2 liters of water over the MCL daily for 70 years.

The required remedy for this violation is to present the DEQ with an **Operational Evaluation Report** that assesses what caused the violation and what the proposed remedy is. The City generated a report to the DEQ in November 2014, which assesses each area of the Flint water system including water source, treatment process, and distribution system. The evaluation was complete with short and long term recommendations to optimize each area and the belief that the items listed would correct the violation and give Flint an increased ability to manage the system. Continued repairs on valves and colder temperatures have created a more consistent chemical footprint, and we have been producing a more consistent water quality.

5. What were the causes of increased levels of total coliform and fecal coliform bacteria levels? Have those causes been sufficiently addressed? If not, what needs to be done to prevent this from occurring in the future?

What we discovered is that as water travels through the 600 miles of the City's distribution mains it will, at times, reside in the system for up to 3 or 4 weeks. Water purchased from DWSD is drawn from Lake Huron, chlorinated, and then travels over 80 miles to reach the City. By the time the water reaches Flint it is stable and capable of withstanding this type of residency time within the system. Water drawn from the Flint River, specifically in summer months when the temperature is fluctuating, is more susceptible to being impacted by variables such as high residency times and increased chemical reaction.

The DEQ requires that a minimum of 100 tests be performed monthly for chlorine residuals at various locations throughout the system. When residual levels are too low, it creates an environment in which bacteria such as fecal coliform can grow. After switching sources, we encountered testing sites in June, 2014 that were consistently returning low residual levels. Several of these sites became areas that total coliform was eventually detected and ultimately boil water notices issued.

Low residual levels can sometimes trigger a positive test result for total coliform which is an indicator of a poor water environment but does not generally require a boil water notice. The normal course of action in these situations is to flush hydrants and introduce fresh water into the defined area. In certain areas this was successful and in other areas it was not. In a second course of action, the EPA also allows for water systems to increase the residual disinfectant, including chlorine, to a level and for a time necessary to protect public health. This information can be found in the EPA manual (40 CFR 141.65 & 141.130(d)). In contending with the low residual levels which represent a more immediate health concern along with the potential for tier 1 violations and boil water notices, we increased the chlorination treatment at times in order to combat the low residuals. This was also was an unsuccessful remedy and only after we located and replaced valves that were broken in the closed position on major transmission lines in these areas did the residual levels return to normal and have remained that way since.

There is still one test site, in the 2500 block of Flushing Rd. where we continue to experience low residual levels and we are actively pursuing efforts to locate more expected valve failures. The development of a hydraulic model of the system and the ability to use unidirectional flushing are tools that will assist us in mitigating areas where low residuals surface. Both of these are in progress of being developed by the engineering firm LAN and Potter Consulting who was also the author of our Water Reliability Study.

6. What are the public reporting requirements for these sorts of problems, and has the City met those requirements? What can be done to communicate in a more timely manner useful information about a public health threat such as the presence of cancer-causing chemicals in our drinking water?

The EPA 2010 "Revised Public Notification Handbook" has a specific breakdown of the elements required in public notifications and includes usable templates. The EPA has three different tiers associated with community water systems (CWS), each with specific timeframes and requirements that trigger upon issuance of the violation.

- Tier 1. CWS must provide public notification within 24 hours of a violation and continue this as directed by the primary agency.
- Tier 2. CWS must provide public notification within 30 days of a violation and continue this every three months until the violation is resolved
- Tier 3. CWS must provide public notification within one year and the EPA recommends repeat occurrences be provided in an annual notice

The current EPA violation is classified as a tier 2 violation and was issued December 16th, 2014.

Moving forward, the City of Flint is striving to increase communication with the public in a variety of ways.

- The city's new website will have current news and information updated on a regular basis.
- Increased data collection will be transitioned into real time ability to communicate with the residents through the Public Works area of the City's new website.
- Timely reporting of current test results on the new City website.

The establishment of these tools is in progress and expected to be implemented in the near future along with evaluating other avenues of communication.

7. Is there any reason to think that these or similar problems will continue even after the shift is made to water from Lake Huron?

The water coming from Lake Huron via KWA will be more consistent in temperature, have lower organic carbon, and will be less susceptible to variations but will have its own chemical footprint. The construction upgrades to the Flint Treatment Plant give us the ability to draw water from either source and should provide Flint the opportunity for testing and thereby streamlining the treatment process to match the Lake Huron chemical footprint before fully introducing it into the distribution system.

In addition to new source water, following the recommendations contained in the Operational Evaluation Report and the City's Water Reliability Study is the roadmap to being able to provide quality water.

Continuing to identify integrity issues and making preemptive repairs within our antiquated infrastructure are needed to maintain and provide a healthy system. Leak detection which is scheduled for the spring, hydraulic system modeling which includes unidirectional flushing is in progress now and will give us the information and tools to accomplish these goals.

8. Who is responsible for making sure we don't have these sorts of problems, and did that person or those people fail to meet their responsibilities?

The Utility Department is a Division underneath the Department of Public Works. The Public Works Director along with the Utilities Administrator will continue to work hand in hand with professional engineers, consultants, and the state regulatory agency DEQ in order to manage increased public communication and address any issues that arise going forward.

The DEQ requires that public water systems with population over 20,000 must have an F-1 state licensed operator in charge that oversees the operation of the treatment process. This license is the highest classification in the state that specializes in "complete treatment" The City of Flint has such a person on staff at the water plant and that person's responsibility is to determine the correct levels of chemical treatment, monitor the system, submit official test results to the state regulatory agency, and make necessary adjustments when contaminant levels are breached. All of these steps were followed and acknowledged by the DEQ.

The following is the list of supporting documents that will be available on the City's website for public viewing.

Cost Comparisons (the ROWE Study)

Upgrade Construction Timeline

EPA Chlorinating Information

Risk Assessment Information

Operational Evaluation Report

EPA 2010 revised Public Notification Handbook

The Current DEQ Violation Letter

Flint Water Reliability Study

Respectfully submitted,



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Mayor, City of Flint



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