

Rennaker, Joanne (DEQ)

From: Prysby, Mike (DEQ)
Sent: Wednesday, January 14, 2015 8:15 AM
To: Busch, Stephen (DEQ); Cook, Pat (DEQ)
Subject: FW: Flint THM Operational Evaluation Report Draft
Attachments: Flint-TTHM-OER-DRAFT_toMDEQ.pdf

I reviewed Flint's draft OEL report; and jotted down some preliminary comments (nothing overly critical). I will call Jeff later today to go over what I have. I plan to compile my comments and send an official punch-list to Jeff within the next week. If you have any comments/questions....let me know and I will add them to the list. I will plan to meet with the city and LAN soon afterwards to discuss completion of the OEL report and schedule of implementation of TTHM reduction measures.

Michael Prysby, P.E.
 District Engineer
 Office of Drinking Water and Municipal Assistance
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From: Hansen, Jeff [<mailto:jrhansen@lan-inc.com>]
Sent: Tuesday, January 13, 2015 3:22 PM
To: Prysby, Mike (DEQ)
Subject: FW: Flint THM Operational Evaluation Report Draft

Hi Mike,

I figured it was about time to follow up and see if you had put together any review comments on the draft report for Flint?

Jeffrey R. Hansen
 Senior Project Manager

From: Hansen, Jeff
Sent: Monday, December 01, 2014 4:18 PM
To: Mike Prysby; 'buschs@michigan.gov'; 'cookp@michigan.gov'
Cc: Brent Wright (bwright@cityofflint.com); Daugherty Johnson (djohnson@cityofflint.com); hcraft@cityofflint.com; jwgreen@lan-inc.com; Matta, Samir; mglasgow@cityofflint.com
Subject: Flint THM Operational Evaluation Report Draft

Mike,

In response to your letter dated 9/10/14 and our meeting on 11/07/14 please find attached a draft of the OER for your review and comment.

Jeffrey R. Hansen
 Senior Project Manager



**Lockwood, Andrews
& Newnam, Inc.**

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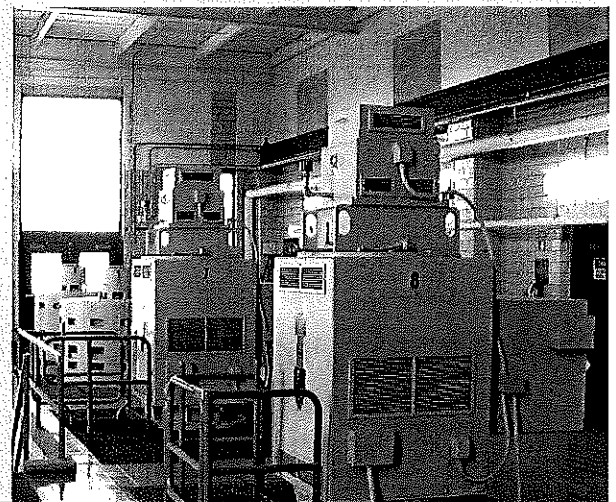
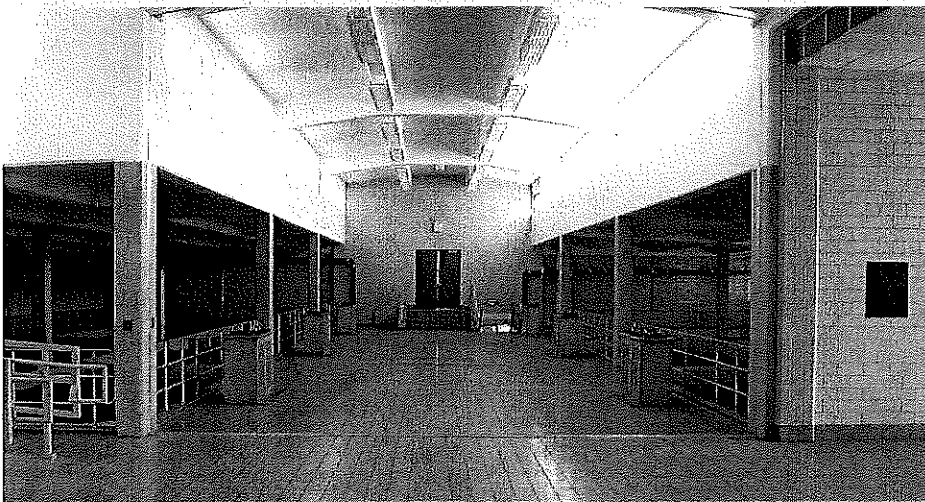
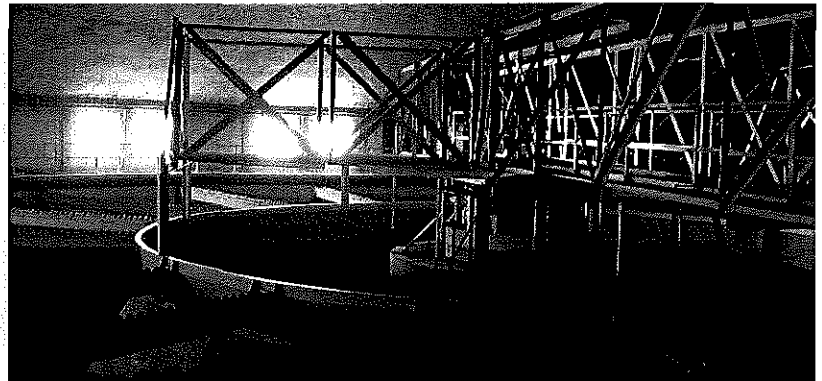
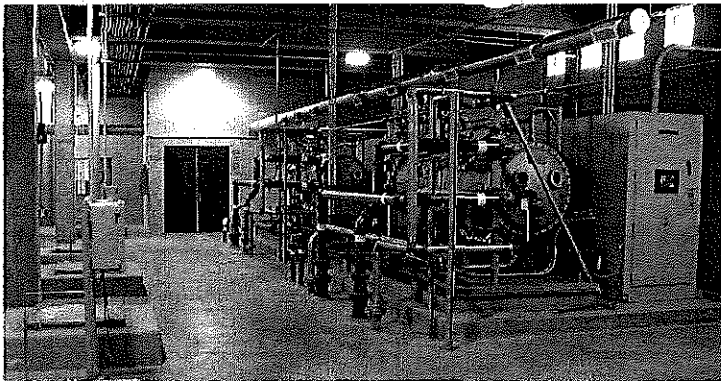
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Operational Evaluation Report City of Flint



Trihalomethane Formation Concern

November 2014



**Lockwood, Andrews
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EXECUTIVE SUMMARY

Environmental Protection Agency (EPA) and Michigan Department of Environmental Quality (MDEQ) regulations require that public water suppliers test drinking water quarterly throughout the distribution system for disinfectant by-products (DBP's). Two categories of DBP's, tri-halomethanes (THM) and halo-acetic acids (HAA5), are regulated and must be tested for. The City of Flint began operation of their water treatment plant (WTP) full time with the Flint River as the source on April 25, 2014. Since that time, two quarters of samples taken indicate that future violations are inevitable for total THM without some modifications to the water system. In response, the City hired Lockwood, Andrews & Newnam, Inc. (LAN) to complete this Operational Evaluation Report (OER) in conformance with EPA guidelines with the goal to determine the cause(s) of high levels of THM and evaluate possible solutions.

The EPA promulgated the Stage 2 Disinfectants and Disinfection By-Products Rule (DBPR) in January 2006 which set maximum contaminant levels (MCLs) for total trihalomethanes (TTHM) and HAA5 based on an annual running average, tested quarterly, for a given sampling location. The City of Flint reports levels from 8 sampling test locations. Of the two quarterly sampling cycles since Flint began operating the WTP full time, HAA5 levels have been acceptable but TTHM levels have been high at all 8 sampling sites.

According to the Stage 2 DBPR, the annual average value requires 3 quarters of sampling data with the most current period counting twice. Therefore, the City of Flint has not yet experienced a violation of the TTHM MCL because only 2 quarters of data have been obtained. However, levels recorded indicate the likelihood of an MCL exceedance later this year.

A number of issues have been identified as possibly contributing to the high THM levels measured.

1. Inefficient ozone system functionality which has resulted in increased chlorine feed.
2. Upstream influences in terms of increased chlorine demand.
3. Bypass stream around softening contributed to chlorine demand.
4. Unlined cast iron pipes in the distribution system contributing to chlorine demand.
5. Recirculating water in the distribution system due to less than ideal configuration of Cedar Street and West Side pump stations.
6. Broken valves resulting in stagnant water in some areas.
7. High chlorine demand in filters.
8. High THM formation potential (THMFP) in source water.
9. Less than optimal removal of THM precursors

ACTION PLAN

The City of Flint has signed an agreement with the Karegnondi Water Authority (KWA) to purchase raw water drawn from Lake Huron. The KWA system is currently under construction and expected to be operational by late 2016. The water supply from Lake Huron will have entirely different water quality characteristics from the Flint River and those characteristics are expected to yield drastically reduced DPB formation. With that, non-structural options to help reduce THM levels are much preferred over solutions requiring new construction. Therefore, two categories of actions have been devised: Stage 1 being actions that can be completed relatively quickly without major construction and Stage 2 consisting of either long term actions or solutions requiring major construction. The City has completed or intends to complete Stage 1 Actions by February 16, 2015, the week in which the next quarterly sampling is to be done. Stage 2 actions are to be implemented only if Stage 1

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actions are ineffective in adequately reducing TTHM levels and therefore Stage 2 is contingent upon the outcome of Stage 1.

Stage 1 – Immediate Actions

- Hire ozone system manufacturer to troubleshoot ozone system
- Bench scale jar testing
 - Match existing process and access possible areas of improvement
 - Simulate potential modifications to treatment process
 - Evaluate coagulation and flocculation polymer aid feeds to assist with TOC removal
- WTP operational changes
 - Discontinue softening bypass stream to reduce chlorine demand
 - Disinfection of filter beds to reduce chlorine demand
 - Possibly begin coagulation and flocculation polymer aid feeds to assist with TOC removal depending on bench scale test results
- Increase water main flushing efforts to minimize stagnant water
- Water system modeling to identify areas with high water age and potential solutions
 - Cedar Street Pump Station potential recirculation
 - West Side Pump Station potential recirculation
 - Storage tank volume use
 - Possible broken closed valve locations
 - Locations in need of flushing
 - Lower high water levels in storage tanks

Stage 2 – Contingent Actions

- Fix ozone system
- Start feeding coagulation and flocculation polymer aids to lower TOC, if not completed in Stage 1
- Convert to lime and soda ash softening
- Change disinfectant to chloramine or chlorine dioxide until KWA
- Install pre-oxidant feed at intake to optimize ozone disinfection
- Implement advanced treatment for THM precursor removal
- Increased main flushing based on water modeling results
- Continue valve replacements with water model assistance
- Emphasize cast iron pipes on water main replacement priority list

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I. BACKGROUND

The City of Detroit Water and Sewer Department (DWSD) has historically provided drinking water for the City of Flint and Genesee County. In the late 1990's growing concern regarding the reliability of the DWSD supply prompted the City of Flint to upgrade their existing water treatment plant (WTP). Those improvements, defined as Phase I, were completed in 2005 and were intended to allow the Flint WTP to operate, using the Flint River as the source, for an extended period of time in the event that supply from the DWSD was temporarily interrupted. Additionally, the Phase I improvements set the stage for Flint to break free from dependence on the DWSD supply and water charges over which they had no control.

A. WATER SUPPLY TRANSITION

1. Detroit Water and Sewer Department (DWSD)

Until recently the Genesee County and Flint region had been provided drinking water by the DWSD. However, due to excessive cost increases and reliability issues with the DWSD system other options had to be explored.

2. Karegnondi Water Authority (KWA)

In 2010 the Karegnondi Water Authority (KWA) was formed for the purpose of developing a new water supply from Lake Huron to serve the region in lieu of the DWSD supply and the City of Flint elected to join. The KWA expects the new system which is currently being constructed to become operational in the fall of 2016.

3. Flint River – Interim Period

With a renewing water supply agreement between Flint and the DWSD being terminated by the DWSD (effective April 30, 2014) and the KWA system not expected to be operational until late 2016, the City of Flint decided to initiate operation of the existing WTP full time utilizing the Flint River as the interim water source. A variety of WTP improvements were necessary for the Flint plant to become a full time plant. For purposes of this report, Phase II improvements to the Flint WTP are improvements which have been made to allow the plant to operate full time with either the Flint River as the source or the KWA supply as the source.

B. TTHM PENDING VIOLATIONS

The calculation for determining if the MCL has been violated for TTHM is:

$$(2 \times \text{current quarter value} + \text{previous 2 quarter values}) / 4$$

Flint has completed tests for 2 quarters and therefore has not violated an MCL limit to date. However, the third quarter of sample data is likely to provide MCL exceedances at all 8 sampling sites. Test results are tabulated below.

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TABLE 1 – 2014 DBP TEST RESULTS

Sample Location	TTHM			HAA5		
	1 st Qrt 5/21/14	2 nd Qrt 8/21/14	3 rd Qrt	1 st Qrt 5/21/14	2 nd Qrt 8/21/14	3 rd Qrt
1) 3719 Davison - McDonalds	162.4	145.3		64	43	
2) 822 S. Dort Hwy - BP Gas Sta.	111.6	112.0		52	40	
3) 3302 S. Dort Hwy – Liquor Pal.	96.5	127.2		48	31	
4) 3606 Corunna – Taco Bell	106.4	181.3		55	24	
5) 2501 Flushing – Univ. Market	75.1	196.2		38	17	
6) 3216 MLK – Salem Housing	82.2	112.4		41	25	
7) 5018 Clio – Rite Aid	88.2	144.4		49	30	
8) 6204 N. Saginaw – N. Flint Auto	79.2	118.3		50	37	

TTHM MCL = 80 ug/l

HAA5 MCL = 60 ug/l

C. WATER TREATMENT PLANT RECENT IMPROVEMENTS & STATUS

1. Phase I WTP Improvements

Since 1965, the Flint WTP has remained a secondary or backup supply system to the DWSD primary supply. Typically the secondary supply for a public water system is expected to be needed only during emergency situations and normally is designed for short term operation such as providing the average daily demand for a few days. Conversely, Phase I improvements were designed with the intent to upgrade the Flint WTP in order to allow for an extended short term period (6 weeks) because of the perceived high risk that the DWSD supply would fail and remain out of service for an extended duration. Regardless, the Flint WTP was still intended to serve as a standby plant and as such the Phase I improvements lacked redundancies that would be required for a primary supply WTP.

2. Past Pilot Study & Testing

During design of the Phase I improvements a treatability study was completed by Alvord, Burdick & Howson, LLC (AB&H) in 2002. The Treatability Study evaluated the current treatment processes that are in place at the Flint WTP today with the Flint River as the source. The report recommended the following:

TABLE 2 – 2002 WTP TREATMENT RECOMMENDATIONS

Treatment	Purpose	Point of Application	Dosage (mg/l)
Sodium permanganate	Zebra mussel control	Intake	0.3
Ozone	Taste & odor removal, disinfection	Diffusor basin	1.5
Ferric chloride	Coagulation	Rapid mix	40
Coag aid polymer	Turbidity & TOC removal	Rapid mix	2.0
Floc aid polymer	Turbidity & TOC removal	Floc basin	0.05
Lime	Softening	Softening basin	175
Soda ash	Softening	Softening basin	52
Carbon dioxide	pH adjustment	Recarb basin	37
Media filters	Filtration	Na	Na
Chlorine	Disinfection	Filter effluent	1.0



Of the recommended items, zebra mussel control, coagulant and flocculation polymer aids, and soda ash feed have not been incorporated into the treatment process.

3. Phase II WTP Improvements for Full Time Operation

Phase II WTP improvements are those needed to convert the Flint WTP from a back-up supply to a primary supply plant. A number of improvements have already been constructed as they were necessary to operate full time, treating water from the Flint River. The improvements under the title of Phase II that have been completed or are nearly complete include upgrades to the lime sludge lagoon, the lime sludge lagoon decant and disposal system, decant pump station and force main, installation of mid-point chlorination before filtration, and upgrade of the electric feed sub-station.

Additional improvements to the Flint WTP that are to be completed to become part of the normal treatment process using water supplied by the KWA are:

- New oxygen and nitrogen storage facilities for the ozone system (under construction)
- New coagulant feed system
- Electrical
 - Pump Station #4 upgrades (under construction)
 - SCADA and controls upgrades
 - Filter transfer pump station feeders
- Installation of the future raw water feed connection point for the KWA (under construction)
- Pump replacements and VFD installation in the low and high service pump station (under construction)
- Filter transfer pump station to Dort Reservoir
- Facility security improvements

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II. SOURCE WATER EVALUATION

A. DATA ANALYSIS

Based on past data collected and the 2002 Treatability Study by AB&H, the Flint River water quality varies seasonally with higher hardness and alkalinity experienced in the winter. Higher magnesium concentrations are also experienced in the winter, adding difficulty to the settling process due to neutrally buoyant floc. General water quality average characteristics recorded for the 2002 Treatability Study as compared with average characteristics recorded this year are shown in Table 3 below.

TABLE 3 – FLINT RIVER WATER QUALITY CHARACTERISTICS						
Period	Turbidity NTU	TOC Mg/l	Alkalinity Mg/l	Hardness Mg/l as CaCO₃	pH	Total Col. Count/day
2001 Apr–Oct	7.9	9.4	215	272	8.1	870-1230 (7300 max)
2014 May–Oct	8.3	10.3 5/22/14	207	252	8.2	1900-9000 (48,300 max)

Other than total Coliform, the Flint River characteristics do not appear to have changed significantly over the past 10+ years. Note that further investigation by City staff revealed a sewer leak upstream of the plant that may have contributed to the total Coliform count. The leak was subsequently repaired.

B. CONCLUSIONS

Considering the minor changes in Flint River water quality, much of the information contained in the 2002 Treatability Study by AB&H remains relevant today. Data from that report assumed to be consistent today include the following:

- Flint River is influenced by groundwater from a dolomitic aquifer
- Hardness varies seasonally with higher hardness and alkalinity in the winter
- Hardness, alkalinity, magnesium concentrations tend to be reduced by run-off
- Total THMFP is likely 380-440 micrograms per liter as measured between April 2001 and January 2002. The City intends to re-test the raw water to confirm the THMFP has not changed. Results are pending.

In development of the 2002 Treatability Study, processes were simulated which resulted in low THMFP. Therefore, information contained in that report will be used to assist with establishing a baseline jar testing procedure as discussed further in Section III.



III. TREATMENT PROCESS EVALUATION

A. EXISTING PROCESS DESCRIPTION

The existing WTP consists of an intake with screening from the Flint River, low lift pumping, ozonation, rapid mix, flocculation, settling, softening, recarbonation, filtration, storage and high service pumping. A process diagram is shown as Figure 1.

1. Intake

A 72" diameter pipe draws water from the Flint River through 2 traveling screens to the low lift pump structure. No chemicals are currently fed for Zebra mussel control or pre-oxidation as recommended by the 2002 Treatability Study. Manual removal of zebra mussels proved to be more economical than installation of chemical feed equipment considering the short term need.

2. Ozone

There are 2 ozone generators designed to provide adequate ozone for a WTP flow of up to 36 mgd. There are 3 ozone contact basins. The ozone generators were designed to produce 900 lbs/day at 10% concentration and up to 1300 lbs/day at 6% concentration each. Recent readings have indicated a production rate of approximately 700 lbs/day at 4% concentration. While serving the purposes of taste and odor control and disinfection, it is possible the current ozone feed might not be optimized to realize additional TOC removal benefits demonstrated by previous tests. Also, less than optimal ozonation has led to increased chlorine feed.

3. Rapid Mix

East and West rapid mix chambers allow chemical feed prior to the flocculation basins. Each rapid mix chamber is equipped with a 5 hp mixer.

4. Coagulation / Flocculation

The WTP contains two equally sized flocculation basins, east and west, and each basin provides tapered or gradually slowed mixing from inlet to outlet. There are fifteen 2 hp mixers for each basin with VFDs to control mixing speed. The 2002 Treatability Study recommended feeding both coagulation and flocculation polymer aids. Neither polymer aid is being used today because turbidity and TOC removals have been sufficient to meet regulatory requirements.

5. Settling

Primary clarification takes place within 3 basins containing plate settlers. The settlers are operating as designed.

6. Softening

Again, there are two basins for softening: east and west. Each basin is 120' in diameter and contains a solids contact softening unit. Each softening basin/unit has a design capacity of 18 mgd. Low lift pumping limitations, flow control to the basins, and fluctuating demands have made it difficult for WTP staff to stabilize the softening process. Softening is accomplished by feeding lime. The decision was made by the City not to feed soda ash in order to remove non-carbonate hardness because acceptable hardness levels could be achieved with lime feed only and softening is short term until Lake Huron water becomes available.



7. Recarbonation

Recarbonation for pH adjustment is accomplished in east and west recarbonation basins between and to the north of the softening basins. Carbon dioxide storage and feed equipment is located west of the recarbonation basins.

8. Filtration

Filtration is accomplished with 12 dual media filters, equally sized and designed to filter 3.0 mgd each. Media consists of 12" of sand and 18" of anthracite. The filters have been operated intermittently over the years due to the standby nature of the WTP and until recently, chlorine injection took place downstream of the filters. It is possible some microbial growth has developed in the filters.

9. Disinfection

Limited disinfection is provided by ozonation, but the primary form of disinfection is chlorine fed prior to filtration and prior to finish water storage / high service pumping. The intermediate chlorine injection location was recently constructed under the Phase II, Segment 1 contract.

10. Clear Well & Pumping

The pump building sits adjacent to a 3 MG clear well and contains both low and high service pumps.

B. JAR TESTS / EXPERIMENTS

1. Approach

There are several well practiced methods by which DBPs can be reduced. First, the disinfectant can be changed to an alternate that has a lower tendency to form DBPs. Second, additional treatment systems such as activated carbon or air stripping (depending on the nature of the precursors) can be added to remove DBP precursors. Lastly, the existing treatment processes can be optimized to remove as much DBP precursor as possible. Of these options, optimizing existing treatment processes is the only strategy that does not require the construction of new and expensive facilities. It is anticipated that Flint will be receiving Lake Huron water in approximately two years and this water will have a completely different chemistry from the Flint River. Major process changes instituted to address THM levels using Flint River water are likely to be unnecessary for Lake Huron water and may even be inappropriate. Therefore, those options which require addition of new treatment processes are undesirable at this time. In recognition of this upcoming change in water source, this study will concentrate on improving the existing processes, rather than adding new ones. New treatment processes will only be recommended if operational changes to the existing treatment train prove ineffective.

Recent sample test results suggest that most of the DBPs are formed in the distribution system rather than within the treatment plant. Therefore, the most logical approach is to reduce the DBP formation potential (DBPFP) rather than simply lowering the levels of DBPs leaving the plant. During bench scale testing, formation potential (FP) levels will be the primary indicator of success or failure of any proposed process modifications.

2. Protocol

Bench scale pilot testing is intended to reflect actual plant operating and hydraulic conditions so the bench scale treatment units will be sized based on various dimensionless factors to ensure the pilot treatment matches the actual system. Bench scale ozonation is not practical due to time and cost limitations. Therefore, water

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samples will be withdrawn following the plant ozone basin. These samples will be transported to the laboratory where they will be dispensed into square testing jars. The jars will act as rapid mix, three-stage flocculation, and settling. Rapid mix and flocculation conditions will be matched to the plant based on "Gt" values. The "G" value is a measure of the mixing intensity and is a function of mix time, viscosity of the liquid, and mixing power applied to the water. "Gt" then, is a size scaling factor where time has been accounted for. Settling time will be scaled to match the shorter settling depth of the testing jars. After settling, samples will be decanted from the test jars. The decanted samples will then be lime softened; softening conditions will be similarly matched on the basis of "Gt". Fluoride will be added and carbon dioxide sparged into the samples to reduce the pH. The water will then be vacuum filtered through filter paper, sized to simulate the plant's dual media filters. The samples will be dosed with excess chlorine and allowed to react for seven days before testing for DBPs to determine the formation potential.

Although these conditions may be refined based on new information, we anticipate the following:

TABLE 4 – BENCH SCALE TEST MIXING INTENSITIES

Process	G	Duration
Ozonation	Plant	-
Rapid Mix	350	25 sec
Flocculation, Stage 1	50	9 min
Flocculation, Stage 1	25	9 min
Flocculation, Stage 1	12	9 min
Settling	na	10 min
Softening	TBD	10 min
Recarbonation	na	na

It is expected that the primary variables during the testing will be chemical additions and chemical dosages. Specific chemicals and dosages used for initial testing conditions will be selected to reflect current plant usage and the recommendations of the 2002 Treatability Study:

TABLE 5 – BENCH SCALE TEST CHEMICAL FEED RATES

Chemical	Current Usage	2002 Study
Ozonation	4.66 mg/l	1.5 mg/l
Ferric Chloride	7.7 mg/l	40 mg/l
Coagulant Aid Polymer	Not used	2.0 mg/l
Flocculation Aid Polymer	Not used	0.05 mg/l
Lime	120 mg/l	175 mg/l
Soda Ash	Not used	52 mg/l
Cationic Softening Polymer	3.13 mg/l	Not used
Anionic Softening Polymer	0.88 mg/l	Not used
Fluoride	0.45 mg/l	1 mg/l
Carbon Dioxide	32 mg/l	37 mg/l
Chlorine	6.3 mg/l	1 mg/l



3. Considerations

The 2002 Treatability Study did not note significant formation of DBPs. This may be a function of different Flint River water chemistry at that time. However, recognizing the considerable differences in chemical usage and dosages between that study and current operations, those differences in chemical use and dosage are an obvious starting point for optimizing treatment to prevent DBP limit exceedance.

Although it is believed that optimization of current treatment can correct the DBP issue, should optimization of present treatment prove insufficient, alternate residual disinfectants (chloramines and chlorine dioxide) will be investigated as additional treatment measures.

4. Results

[To be completed following jar testing and experimentation]

5. Conclusions

[To be completed following jar testing and experimentation]

DRAFT



IV. DISTRIBUTION SYSTEM EVALUATION

EPA guidance for the distribution evaluation portion of an OER is focused on identification and isolation of a specific portion of the distribution system that led to the exceedance. The circumstances of Flint's apparent pending TTHM exceedances are unusual in that a new supply has been implemented which clearly corresponds to the high TTHM sample results. Despite obvious implications to the primary cause of increased TTHM levels, value remains in evaluating the distribution system as there may still be distribution improvements that can be made to help alleviate the problem.

Evaluation of the distribution system, including modeling, was recently added to LAN's scope of services. When finished, information will be provided to complete the following topics in this section.

A. INFRASTRUCTURE

1. Piping

According to the most recent MDEQ Sanitary Survey, the distribution system is estimated to contain 70% cast iron, 20% ductile iron, 2% concrete and 8% steel water mains. Unlined cast iron pipe can become pitted, allowing colonization sites for microorganisms leading to chlorine demand. Additionally, much of the piping in the system is aged and in poor condition. Increased chlorine demand could be resulting from biofilm in older pipes and from main breaks/repairs.

The City utilizes City Point software and GPS equipment to document main breaks and prioritize replacements. Areas that have been targeted for main replacements include Fenton Road, Atherton Road, Dort Highway, Averil Street, and Boulevard Drive. The extent of contribution is not known but any water main replacement project will contribute to decreasing chlorine demand somewhat if constructed properly.

2. Storage

[To be completed]

- *Appropriate capacity*
- *Mixing, baffling, other provided to prevent stagnant water*
- *Condition*

3. Pump Stations

[To be completed]

- *Condition*
- *Pump capacity evaluation*
- *Valve condition and pressure zones*

B. OPERATIONS AND MAINTENANCE

1. Pump Station & Storage Operations

[To be completed]

- *Control of pressure districts*
- *WTP Pump Station (No. 4)*
- *Cedar Street Pump Station*
- *Westside Pump Station*



- *Torrey Road Pump Station*
- *High and low levels in tanks*

2. Booster Disinfection Practices

Booster disinfection is provided at the Cedar Street and Westside pump stations. Sodium hypochlorite is applied while the reservoirs are being filled.

3. Changes in System Demands

[To be completed]

- *Long term decline in demands*
- *Short term fluctuations – max day in winter due to high volume of main breaks*

C. WATER SYSTEM HYDRAULIC MODELING

[To be completed]

1. Simulation of Existing System

Match existing conditions, particularly chlorine residual. We have chlorine feed data at plant and residuals at 10 locations in each MOR, May-October.

2. Identification of Deficiencies

Specific issues to look at:

*Worst case at minimum daily demands
 Water age in entire system
 Recirculating water through pump stations
 Use of storage tanks
 Indications of broken valves
 Effectiveness of booster disinfection*



V. RECOMMENDATIONS TO MINIMIZE FUTURE OEL EXCEEDANCES

A. SOURCE

The City of Flint has already committed to the change from the Flint River as the water source to Lake Huron under the KWA system, planned for late 2016. The risk of future TTHM limit violations will decline substantially with the use of water from Lake Huron due to much lower DBP precursors. It is important to recognize that the Flint River will become strictly an emergency supply when the KWA supply becomes available and any investments toward the Flint River should be contemplated accordingly. Recommendations discussed below in this section apply to the Flint River as the source.

Reverting to supply from the DWSD until the KWA supply is available as an option. However, the DWSD has stipulated that a \$4 million connection fee would apply and current water rates would include approximately \$900,000 / month flat fee plus usage charges. Therefore, utilizing the DWSD for interim supply is cost prohibitive under the terms defined by the DWSD.

1. Watershed Management

A volunteer group entitled the Watershed Coalition performs various tasks related to managing the Flint River watershed such as spring cleanups and annual benthic studies to evaluate the river 'health'. No additional action is recommended at this time.

2. Monitoring

The City documents typical raw water characteristics as part of standard preparation of Monthly Operating Reports (MOR). No changes are recommended at this time.

3. Intake Operations

The 2002 Treatability Study recommended pre-oxidation in the form of sodium permanganate as a feed at the intake. However, pre-oxidation with sodium permanganate is unlikely to provide significant oxidizing of organics beyond that provided by ozonation. It is possible the addition of hydrogen peroxide would enhance the ozone process.

4. Seasonal Strategies

Past data indicates the Flint River is influenced by groundwater and in particular, dolomitic spring water. The result is hard water with high concentrations of magnesium and sulfate. Also, hardness and alkalinity are higher during the winter. Upon initiation of supply from the Flint River, the City made the decision to soften with lime only to focus on removal of carbonate hardness. One potential modification that could assist with TOC removal and thus decrease THMFP would be lime and soda ash softening. If implemented soon, the procedural change would be timely as it would also address increased hardness expected going into this winter.

5. Upstream Contamination Issues

Upstream contamination issues are extremely difficult to prevent and even if detected are difficult to locate. Evaluation of raw water data collected for MORs is the easiest manner in which to detect upstream contamination issues because the data is already collected for treatment purposes. In fact, high total Coliform readings signaled a potential issue recently that the City identified and removed.

An upstream monitoring and warning system could be established to attempt to detect spill event type contamination early enough to cease intake prior to the



contamination reaching the WTP. However, given the imminent conversion to the KWA supply, the period of full time use would likely be far too short to achieve payback on the capital expenditures.

B. TREATMENT PROCESS

1. Operational Recommendations

- Coagulation and flocculation polymer aids: The 2002 Treatability Study suggested the use of coagulation and flocculation polymer aids. These polymer aids were shown in the 2002 Treatability Study to increase TOC removal and thereby reduce THMFP. Further evaluation will be completed during jar testing.
- Discontinue softening bypass: The City was previously bypassing a portion of flow around the softening basins because hardness levels did not warrant softening of the full stream. However, this practice was discontinued because it was believed the bypass stream was contributing to chlorine demand and preliminary data has supported that belief. Chlorine demand dropped 0.5 – 1.0 mg/l following elimination of the bypass stream in early November 2014.
- Softening with lime and soda ash: Research has shown that enhanced softening with both lime and soda ash may provide additional TOC removal. The efficacy of this option will be evaluated during jar testing.
- Disinfection of filter beds: In case there has been microbial growth it is recommended the filters be 'shock' treated with chlorine and rinsed. A chlorine injection point was added upstream of the filters during the first segment of Phase II so future growth in the filters should not be an issue.
- Optimization of all existing treatment processes: Depending on bench scale testing conditions and results, slight modifications to all treatment processes might in order to replicate lower DPBFP.

2. Infrastructure Change Recommendations

- Fix and/or replace faulty ozone equipment: Since the ozone equipment was installed it has not been used extensively so the hope is that major components remain in good condition and the system can be easily modified to restore proper functionality. The City has scheduled the equipment manufacturer to field inspect the system on December 15, 2014.
- Change disinfectant to chloramine or chlorine dioxide: If other options prove to be ineffective, conversion to another disinfectant should be fully evaluated. Various characteristics of chloramination indicate an advantage over chlorine dioxide, but a full analysis would provide clarity as to which would be preferred.
- Install pre-oxidant chemical feed: Hydrogen peroxide as a pre-oxidant can enhance the activity of the ozone. This option is listed as a consideration only if problems continue with ozonation.
- Repair upstream sewer leak: a sewer leak upstream of the WTP intake was discovered and has already been repaired by the City.



C. DISTRIBUTION SYSTEM

Recommendations will be incorporated into this report when available. It is anticipated details will be provided for the following topics. [To be completed]

- 1. Manage Water Age**
 - a) *Storage Tanks*
 - b) *Residence Time in Pipes*

- 2. Reduce Disinfectant Demand**
 - a) *Flushing*
 - b) *Cast Iron Pipes*

- 3. Water Modeling of Recommendations**

Determine best flushing locations to reduce water age

Changes to storage tank operating levels to reduce water age

Valves to close/add to improve pressure zones, reduce recirculation

Optimization of pump station use – smaller pumps? Shut down?

Evaluate booster disinfection

A number of actions have already been taken in terms of the distribution system. Water main flushing efforts were increased until late November when freezing weather became prevalent. Also, numerous valves that were broken in the closed position and believed to have been contributing to stagnant water were replaced.

D. BOOSTER DISINFECTION

Decreasing chlorine feed at the WTP and adding booster disinfection in the distribution system is an alternative intended to reduce the reaction time at higher concentrations of chlorine to reduce DPB formation. Extensive looping and branching within the existing system complicate how to best implement and utilize booster disinfection. Water system modeling is recommended to determine the most effective feed point locations and dosages. Further discussion and details will be provided when the distribution evaluation results are available.

E. CATEGORIZATION OF ACTIONS

Considering that the Flint River is being used as the water source only until the KWA supply is available (expected late 2016), options to address high THM formation that require new construction or extensive time to implement are not preferred. On the other hand, the City understands THM sample results to date dictate that some action is necessary. Two categories have been developed to assist the City in prioritizing actions to take. Stage 1 consists of actions that can be completed relatively quickly without major construction and Stage 2 actions are either long term actions or solutions requiring major construction. Stage 1 actions are to be completed first followed by evaluation of the results prior to consideration of Stage 2 actions. Grouping of actions are shown in the table below.

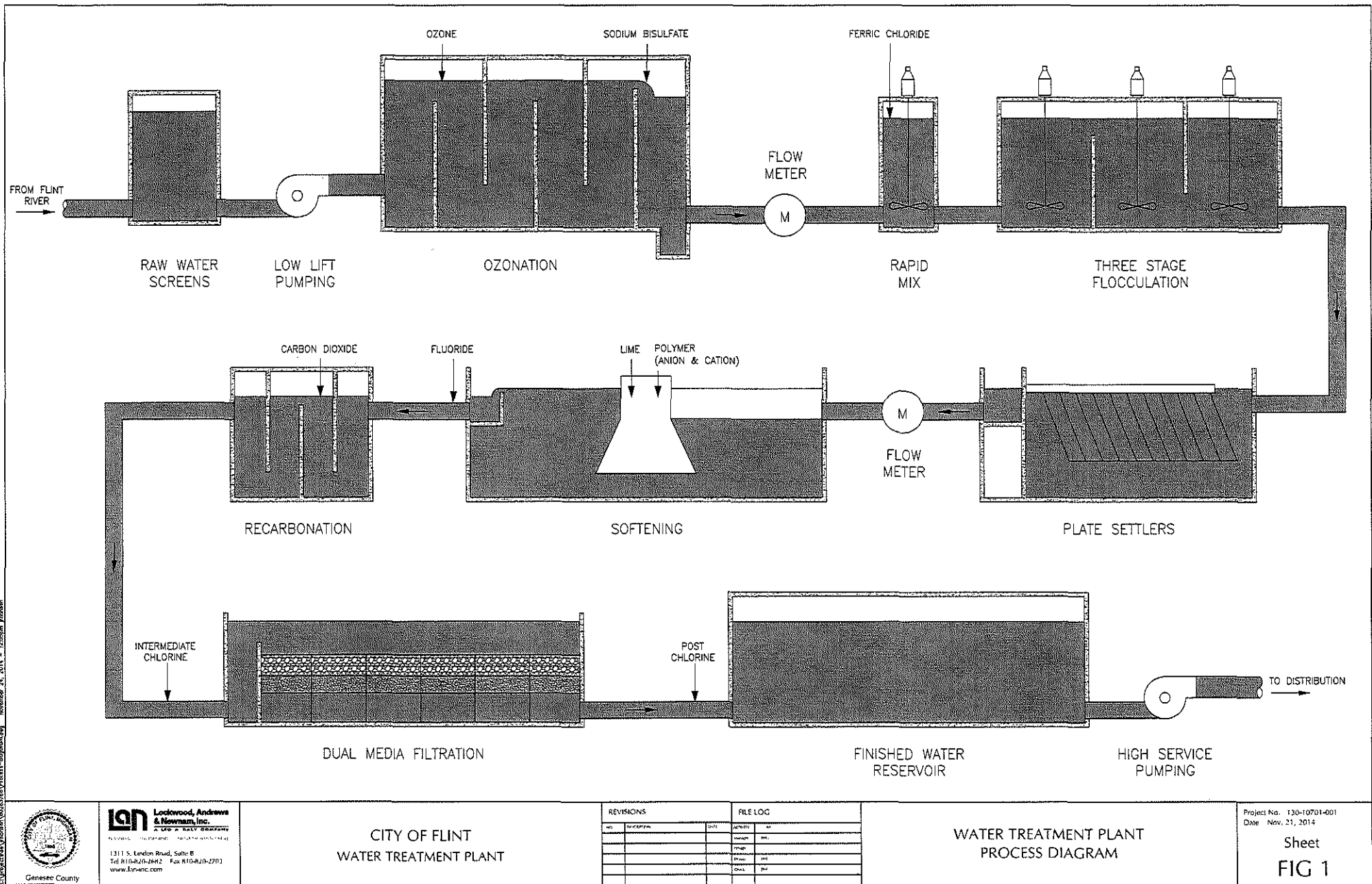
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TABLE 6 – ACTION PLAN

	Action	Purpose
Stage 1	Troubleshoot ozone feed system	Reduce chlorine feed and increase TOC removal
	Bench scale jar testing	Optimize treatment process and evaluate possible modifications
	Discontinue softening bypass	Reduce chlorine demand
	Disinfect filters	Reduce chlorine demand
	Increased water main flushing	Reduce water age / stagnant water
	Water system modeling evaluation	Determine areas with high water age and reasons
	Implement coag. & floc. polymer aids, if appropriate	Increase TOC removal
	Modify booster disinfection feeds, if appropriate	Decrease water age
Stage 2	Repair ozone system	Reduce chlorine feed and increase TOC removal
	Continue increased water main flushing	Reduce water age / stagnant water
	Convert to lime and soda ash softening	Increase TOC removal
	Continue valve replacements based on water model	Reduce water age / stagnant water
	Change disinfectant to chlorine dioxide	Reduce THMFP
	Install pre-oxidant feed at intake	Optimize ozone disinfection, reduce chlorine
	Place priority on replacing cast iron water mains	Reduce chlorine demand

Samples were taken the week of November 17th for the 3rd quarter of testing. Although the City has begun implementation of Stage 1 actions, THM results are not expected to be noticeably affected since there has not been enough time for a response. The next quarter of sampling is due to be completed the third week in February. It is the City's intent to implement Stage 1 actions prior to the 3rd quarter of THM sampling.



Rennaker, Joanne (DEQ)

From: Hansen, Jeff <jrhansen@lan-inc.com>
Sent: Wednesday, January 14, 2015 8:06 AM
To: Prysby, Mike (DEQ)
Subject: RE: Flint THM Operational Evaluation Report Draft

Thanks Mike. Please use my cell number if you call today – 810.333.3201

Jeffrey R. Hansen
 Senior Project Manager

From: Prysby, Mike (DEQ) [<mailto:PRYSBYM@michigan.gov>]
Sent: Wednesday, January 14, 2015 7:48 AM
To: Hansen, Jeff
Cc: Busch, Stephen (DEQ)
Subject: RE: Flint THM Operational Evaluation Report Draft

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Michael Prysby, P.E.
 District Engineer
 Office of Drinking Water and Municipal Assistance
 517 290-8817

From: Hansen, Jeff [<mailto:jrhansen@lan-inc.com>]
Sent: Tuesday, January 13, 2015 3:22 PM
To: Prysby, Mike (DEQ)
Subject: FW: Flint THM Operational Evaluation Report Draft

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Jeffrey R. Hansen
 Senior Project Manager

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Cc: Brent Wright (bwright@cityofflint.com); Daugherty Johnson (djohnson@cityofflint.com); hcroft@cityofflint.com;

jwgreen@lan-inc.com; Matta, Samir; mglasgow@cityofflint.com

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In response to your letter dated 9/10/14 and our meeting on 11/07/14 please find attached a draft of the OER for your review and comment.

Jeffrey R. Hansen

Senior Project Manager



**Lockwood, Andrews
& Newnam, Inc.**

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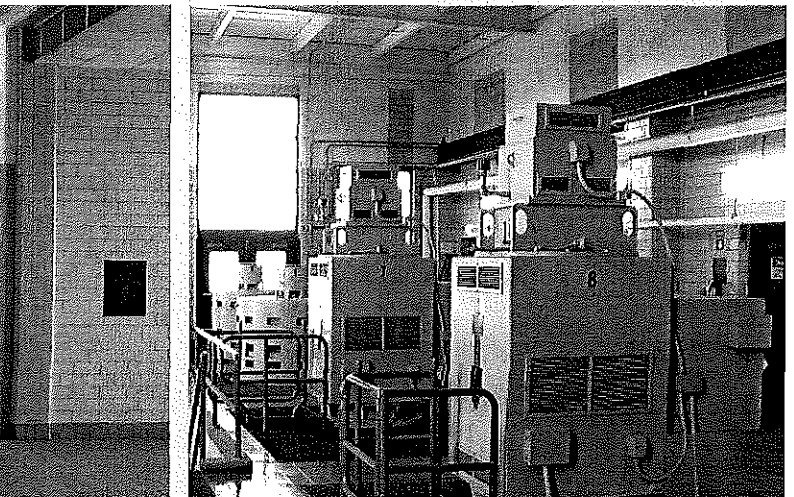
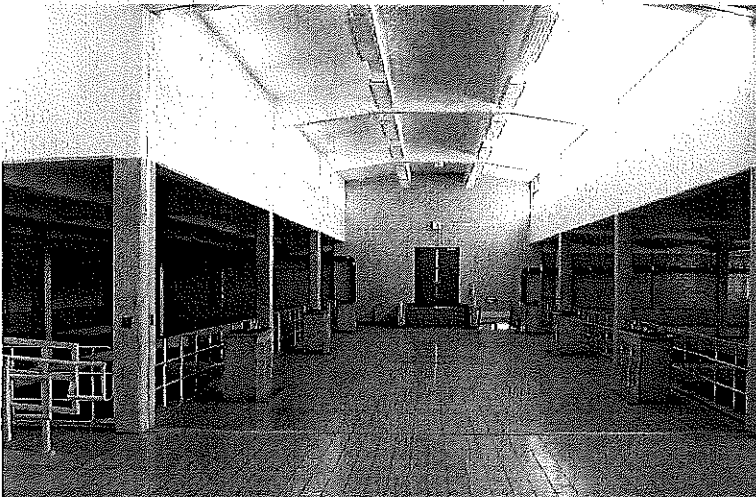
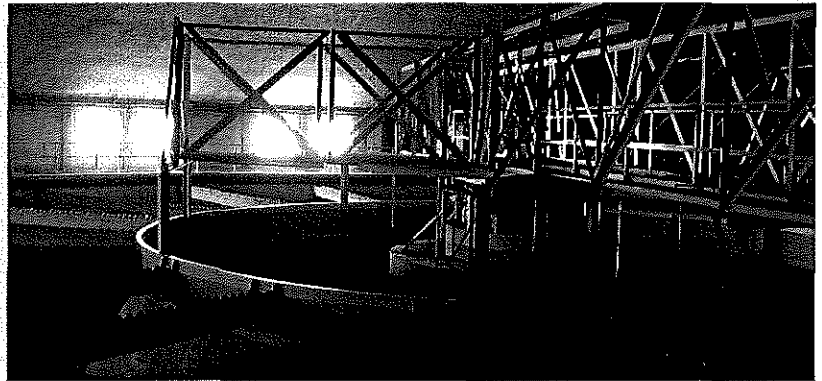
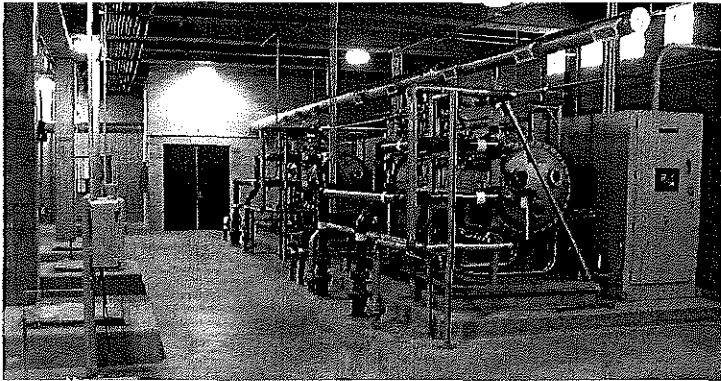
Operational Evaluation Report

City of Flint



Trihalomethane Formation Concern

November 2014



**Lockwood, Andrews
& Newnam, Inc.**
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EXECUTIVE SUMMARY

Environmental Protection Agency (EPA) and Michigan Department of Environmental Quality (MDEQ) regulations require that public water suppliers test drinking water quarterly throughout the distribution system for disinfectant by-products (DBP's). Two categories of DBP's, tri-halomethanes (THM) and halo-acetic acids (HAA5), are regulated and must be tested for. The City of Flint began operation of their water treatment plant (WTP) full time with the Flint River as the source on April 25, 2014. Since that time, two quarters of samples taken indicate that future violations are inevitable for total THM without some modifications to the water system. In response, the City hired Lockwood, Andrews & Newnam, Inc. (LAN) to complete this Operational Evaluation Report (OER) in conformance with EPA guidelines with the goal to determine the cause(s) of high levels of THM and evaluate possible solutions.

The EPA promulgated the Stage 2 Disinfectants and Disinfection By-Products Rule (DBPR) in January 2006 which set maximum contaminant levels (MCLs) for total trihalomethanes (TTHM) and HAA5 based on an annual running average, tested quarterly, for a given sampling location. The City of Flint reports levels from 8 sampling test locations. Of the two quarterly sampling cycles since Flint began operating the WTP full time, HAA5 levels have been acceptable but TTHM levels have been high at all 8 sampling sites.

According to the Stage 2 DBPR, the annual average value requires 3 quarters of sampling data with the most current period counting twice. Therefore, the City of Flint has not yet experienced a violation of the TTHM MCL because only 2 quarters of data have been obtained. However, levels recorded indicate the likelihood of an MCL exceedance later this year.

A number of issues have been identified as possibly contributing to the high THM levels measured.

1. Inefficient ozone system functionality which has resulted in increased chlorine feed.
2. Upstream influences in terms of increased chlorine demand.
3. Bypass stream around softening contributed to chlorine demand.
4. Unlined cast iron pipes in the distribution system contributing to chlorine demand.
5. Recirculating water in the distribution system due to less than ideal configuration of Cedar Street and West Side pump stations.
6. Broken valves resulting in stagnant water in some areas.
7. High chlorine demand in filters.
8. High THM formation potential (THMFP) in source water.
9. Less than optimal removal of THM precursors

ACTION PLAN

The City of Flint has signed an agreement with the Karegnondi Water Authority (KWA) to purchase raw water drawn from Lake Huron. The KWA system is currently under construction and expected to be operational by late 2016. The water supply from Lake Huron will have entirely different water quality characteristics from the Flint River and those characteristics are expected to yield drastically reduced DPB formation. With that, non-structural options to help reduce THM levels are much preferred over solutions requiring new construction. Therefore, two categories of actions have been devised: Stage 1 being actions that can be completed relatively quickly without major construction and Stage 2 consisting of either long term actions or solutions requiring major construction. The City has completed or intends to complete Stage 1 Actions by February 16, 2015, the week in which the next quarterly sampling is to be done. Stage 2 actions are to be implemented only if Stage 1

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actions are ineffective in adequately reducing TTHM levels and therefore Stage 2 is contingent upon the outcome of Stage 1.

Stage 1 – Immediate Actions

- Hire ozone system manufacturer to troubleshoot ozone system
- Bench scale jar testing
 - Match existing process and access possible areas of improvement
 - Simulate potential modifications to treatment process
 - Evaluate coagulation and flocculation polymer aid feeds to assist with TOC removal
- WTP operational changes
 - Discontinue softening bypass stream to reduce chlorine demand
 - Disinfection of filter beds to reduce chlorine demand
 - Possibly begin coagulation and flocculation polymer aid feeds to assist with TOC removal depending on bench scale test results
- Increase water main flushing efforts to minimize stagnant water
- Water system modeling to identify areas with high water age and potential solutions
 - Cedar Street Pump Station potential recirculation
 - West Side Pump Station potential recirculation
 - Storage tank volume use
 - Possible broken closed valve locations
 - Locations in need of flushing
 - Lower high water levels in storage tanks

Stage 2 – Contingent Actions

- Fix ozone system
- Start feeding coagulation and flocculation polymer aids to lower TOC, if not completed in Stage 1
- Convert to lime and soda ash softening
- Change disinfectant to chloramine or chlorine dioxide until KWA
- Install pre-oxidant feed at intake to optimize ozone disinfection
- Implement advanced treatment for THM precursor removal
- Increased main flushing based on water modeling results
- Continue valve replacements with water model assistance
- Emphasize cast iron pipes on water main replacement priority list

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I. BACKGROUND

The City of Detroit Water and Sewer Department (DWSD) has historically provided drinking water for the City of Flint and Genesee County. In the late 1990's growing concern regarding the reliability of the DWSD supply prompted the City of Flint to upgrade their existing water treatment plant (WTP). Those improvements, defined as Phase I, were completed in 2005 and were intended to allow the Flint WTP to operate, using the Flint River as the source, for an extended period of time in the event that supply from the DWSD was temporarily interrupted. Additionally, the Phase I improvements set the stage for Flint to break free from dependence on the DWSD supply and water charges over which they had no control.

A. WATER SUPPLY TRANSITION

1. Detroit Water and Sewer Department (DWSD)

Until recently the Genesee County and Flint region had been provided drinking water by the DWSD. However, due to excessive cost increases and reliability issues with the DWSD system other options had to be explored.

2. Karegnondi Water Authority (KWA)

In 2010 the Karegnondi Water Authority (KWA) was formed for the purpose of developing a new water supply from Lake Huron to serve the region in lieu of the DWSD supply and the City of Flint elected to join. The KWA expects the new system which is currently being constructed to become operational in the fall of 2016.

3. Flint River – Interim Period

With a renewing water supply agreement between Flint and the DWSD being terminated by the DWSD (effective April 30, 2014) and the KWA system not expected to be operational until late 2016, the City of Flint decided to initiate operation of the existing WTP full time utilizing the Flint River as the interim water source. A variety of WTP improvements were necessary for the Flint plant to become a full time plant. For purposes of this report, Phase II improvements to the Flint WTP are improvements which have been made to allow the plant to operate full time with either the Flint River as the source or the KWA supply as the source.

B. TTHM PENDING VIOLATIONS

The calculation for determining if the MCL has been violated for TTHM is:

$$(2 \times \text{current quarter value} + \text{previous 2 quarter values}) / 4$$

Flint has completed tests for 2 quarters and therefore has not violated an MCL limit to date. However, the third quarter of sample data is likely to provide MCL exceedances at all 8 sampling sites. Test results are tabulated below.

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TABLE 1 – 2014 DBP TEST RESULTS

Sample Location	TTHM			HAA5		
	1 st Qrt 5/21/14	2 nd Qrt 8/21/14	3 rd Qrt	1 st Qrt 5/21/14	2 nd Qrt 8/21/14	3 rd Qrt
1) 3719 Davison - McDonalds	162.4	145.3		64	43	
2) 822 S. Dort Hwy - BP Gas Sta.	111.6	112.0		52	40	
3) 3302 S. Dort Hwy – Liquor Pal.	96.5	127.2		48	31	
4) 3606 Corunna – Taco Bell	106.4	181.3		55	24	
5) 2501 Flushing – Univ. Market	75.1	196.2		38	17	
6) 3216 MLK – Salem Housing	82.2	112.4		41	25	
7) 5018 Clio – Rite Aid	88.2	144.4		49	30	
8) 6204 N. Saginaw – N. Flint Auto	79.2	118.3		50	37	

TTHM MCL = 80 ug/l

HAA5 MCL = 60 ug/l

C. WATER TREATMENT PLANT RECENT IMPROVEMENTS & STATUS

1. Phase I WTP Improvements

Since 1965, the Flint WTP has remained a secondary or backup supply system to the DWSD primary supply. Typically the secondary supply for a public water system is expected to be needed only during emergency situations and normally is designed for short term operation such as providing the average daily demand for a few days. Conversely, Phase I improvements were designed with the intent to upgrade the Flint WTP in order to allow for an extended short term period (6 weeks) because of the perceived high risk that the DWSD supply would fail and remain out of service for an extended duration. Regardless, the Flint WTP was still intended to serve as a standby plant and as such the Phase I improvements lacked redundancies that would be required for a primary supply WTP.

2. Past Pilot Study & Testing

During design of the Phase I improvements a treatability study was completed by Alvord, Burdick & Howson, LLC (AB&H) in 2002. The Treatability Study evaluated the current treatment processes that are in place at the Flint WTP today with the Flint River as the source. The report recommended the following:

TABLE 2 – 2002 WTP TREATMENT RECOMMENDATIONS

Treatment	Purpose	Point of Application	Dosage (mg/l)
Sodium permanganate	Zebra mussel control	Intake	0.3
Ozone	Taste & odor removal, disinfection	Diffusor basin	1.5
Ferric chloride	Coagulation	Rapid mix	40
Coag aid polymer	Turbidity & TOC removal	Rapid mix	2.0
Floc aid polymer	Turbidity & TOC removal	Floc basin	0.05
Lime	Softening	Softening basin	175
Soda ash	Softening	Softening basin	52
Carbon dioxide	pH adjustment	Recarb basin	37
Media filters	Filtration	Na	Na
Chlorine	Disinfection	Filter effluent	1.0



Of the recommended items, zebra mussel control, coagulant and flocculation polymer aids, and soda ash feed have not been incorporated into the treatment process.

3. Phase II WTP Improvements for Full Time Operation

Phase II WTP improvements are those needed to convert the Flint WTP from a back-up supply to a primary supply plant. A number of improvements have already been constructed as they were necessary to operate full time, treating water from the Flint River. The improvements under the title of Phase II that have been completed or are nearly complete include upgrades to the lime sludge lagoon, the lime sludge lagoon decant and disposal system, decant pump station and force main, installation of mid-point chlorination before filtration, and upgrade of the electric feed sub-station.

Additional improvements to the Flint WTP that are to be completed to become part of the normal treatment process using water supplied by the KWA are:

- New oxygen and nitrogen storage facilities for the ozone system (under construction)
- New coagulant feed system
- Electrical
 - Pump Station #4 upgrades (under construction)
 - SCADA and controls upgrades
 - Filter transfer pump station feeders
- Installation of the future raw water feed connection point for the KWA (under construction)
- Pump replacements and VFD installation in the low and high service pump station (under construction)
- Filter transfer pump station to Dort Reservoir
- Facility security improvements



II. SOURCE WATER EVALUATION

A. DATA ANALYSIS

Based on past data collected and the 2002 Treatability Study by AB&H, the Flint River water quality varies seasonally with higher hardness and alkalinity experienced in the winter. Higher magnesium concentrations are also experienced in the winter, adding difficulty to the settling process due to neutrally buoyant floc. General water quality average characteristics recorded for the 2002 Treatability Study as compared with average characteristics recorded this year are shown in Table 3 below.

TABLE 3 – FLINT RIVER WATER QUALITY CHARACTERISTICS						
Period	Turbidity NTU	TOC Mg/l	Alkalinity Mg/l	Hardness Mg/l as CaCO ₃	pH	Total Col. Count/day
2001 Apr–Oct	7.9	9.4	215	272	8.1	870-1230 (7300 max)
2014 May–Oct	8.3	10.3 5/22/14	207	252	8.2	1900-9000 (48,300 max)

Other than total Coliform, the Flint River characteristics do not appear to have changed significantly over the past 10+ years. Note that further investigation by City staff revealed a sewer leak upstream of the plant that may have contributed to the total Coliform count. The leak was subsequently repaired.

B. CONCLUSIONS

Considering the minor changes in Flint River water quality, much of the information contained in the 2002 Treatability Study by AB&H remains relevant today. Data from that report assumed to be consistent today include the following:

- Flint River is influenced by groundwater from a dolomitic aquifer
- Hardness varies seasonally with higher hardness and alkalinity in the winter
- Hardness, alkalinity, magnesium concentrations tend to be reduced by run-off
- Total THMFP is likely 380-440 micrograms per liter as measured between April 2001 and January 2002. The City intends to re-test the raw water to confirm the THMFP has not changed. Results are pending.

In development of the 2002 Treatability Study, processes were simulated which resulted in low THMFP. Therefore, information contained in that report will be used to assist with establishing a baseline jar testing procedure as discussed further in Section III.



III. TREATMENT PROCESS EVALUATION

A. EXISTING PROCESS DESCRIPTION

The existing WTP consists of an intake with screening from the Flint River, low lift pumping, ozonation, rapid mix, flocculation, settling, softening, recarbonation, filtration, storage and high service pumping. A process diagram is shown as Figure 1.

1. Intake

A 72" diameter pipe draws water from the Flint River through 2 traveling screens to the low lift pump structure. No chemicals are currently fed for Zebra mussel control or pre-oxidation as recommended by the 2002 Treatability Study. Manual removal of zebra mussels proved to be more economical than installation of chemical feed equipment considering the short term need.

2. Ozone

There are 2 ozone generators designed to provide adequate ozone for a WTP flow of up to 36 mgd. There are 3 ozone contact basins. The ozone generators were designed to produce 900 lbs/day at 10% concentration and up to 1300 lbs/day at 6% concentration each. Recent readings have indicated a production rate of approximately 700 lbs/day at 4% concentration. While serving the purposes of taste and odor control and disinfection, it is possible the current ozone feed might not be optimized to realize additional TOC removal benefits demonstrated by previous tests. Also, less than optimal ozonation has led to increased chlorine feed.

3. Rapid Mix

East and West rapid mix chambers allow chemical feed prior to the flocculation basins. Each rapid mix chamber is equipped with a 5 hp mixer.

4. Coagulation / Flocculation

The WTP contains two equally sized flocculation basins, east and west, and each basin provides tapered or gradually slowed mixing from inlet to outlet. There are fifteen 2 hp mixers for each basin with VFDs to control mixing speed. The 2002 Treatability Study recommended feeding both coagulation and flocculation polymer aids. Neither polymer aid is being used today because turbidity and TOC removals have been sufficient to meet regulatory requirements.

5. Settling

Primary clarification takes place within 3 basins containing plate settlers. The settlers are operating as designed.

6. Softening

Again, there are two basins for softening: east and west. Each basin is 120' in diameter and contains a solids contact softening unit. Each softening basin/unit has a design capacity of 18 mgd. Low lift pumping limitations, flow control to the basins, and fluctuating demands have made it difficult for WTP staff to stabilize the softening process. Softening is accomplished by feeding lime. The decision was made by the City not to feed soda ash in order to remove non-carbonate hardness because acceptable hardness levels could be achieved with lime feed only and softening is short term until Lake Huron water becomes available.



7. Recarbonation

Recarbonation for pH adjustment is accomplished in east and west recarbonation basins between and to the north of the softening basins. Carbon dioxide storage and feed equipment is located west of the recarbonation basins.

8. Filtration

Filtration is accomplished with 12 dual media filters, equally sized and designed to filter 3.0 mgd each. Media consists of 12" of sand and 18" of anthracite. The filters have been operated intermittently over the years due to the standby nature of the WTP and until recently, chlorine injection took place downstream of the filters. It is possible some microbial growth has developed in the filters.

9. Disinfection

Limited disinfection is provided by ozonation, but the primary form of disinfection is chlorine fed prior to filtration and prior to finish water storage / high service pumping. The intermediate chlorine injection location was recently constructed under the Phase II, Segment 1 contract.

10. Clear Well & Pumping

The pump building sits adjacent to a 3 MG clear well and contains both low and high service pumps.

B. JAR TESTS / EXPERIMENTS

1. Approach

There are several well practiced methods by which DBPs can be reduced. First, the disinfectant can be changed to an alternate that has a lower tendency to form DBPs. Second, additional treatment systems such as activated carbon or air stripping (depending on the nature of the precursors) can be added to remove DBP precursors. Lastly, the existing treatment processes can be optimized to remove as much DBP precursor as possible. Of these options, optimizing existing treatment processes is the only strategy that does not require the construction of new and expensive facilities. It is anticipated that Flint will be receiving Lake Huron water in approximately two years and this water will have a completely different chemistry from the Flint River. Major process changes instituted to address THM levels using Flint River water are likely to be unnecessary for Lake Huron water and may even be inappropriate. Therefore, those options which require addition of new treatment processes are undesirable at this time. In recognition of this upcoming change in water source, this study will concentrate on improving the existing processes, rather than adding new ones. New treatment processes will only be recommended if operational changes to the existing treatment train prove ineffective.

Recent sample test results suggest that most of the DBPs are formed in the distribution system rather than within the treatment plant. Therefore, the most logical approach is to reduce the DBP formation potential (DBPFP) rather than simply lowering the levels of DBPs leaving the plant. During bench scale testing, formation potential (FP) levels will be the primary indicator of success or failure of any proposed process modifications.

2. Protocol

Bench scale pilot testing is intended to reflect actual plant operating and hydraulic conditions so the bench scale treatment units will be sized based on various dimensionless factors to ensure the pilot treatment matches the actual system. Bench scale ozonation is not practical due to time and cost limitations. Therefore, water

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samples will be withdrawn following the plant ozone basin. These samples will be transported to the laboratory where they will be dispensed into square testing jars. The jars will act as rapid mix, three-stage flocculation, and settling. Rapid mix and flocculation conditions will be matched to the plant based on "Gt" values. The "G" value is a measure of the mixing intensity and is a function of mix time, viscosity of the liquid, and mixing power applied to the water. "Gt" then, is a size scaling factor where time has been accounted for. Settling time will be scaled to match the shorter settling depth of the testing jars. After settling, samples will be decanted from the test jars. The decanted samples will then be lime softened; softening conditions will be similarly matched on the basis of "Gt". Fluoride will be added and carbon dioxide sparged into the samples to reduce the pH. The water will then be vacuum filtered through filter paper, sized to simulate the plant's dual media filters. The samples will be dosed with excess chlorine and allowed to react for seven days before testing for DBPs to determine the formation potential.

Although these conditions may be refined based on new information, we anticipate the following:

TABLE 4 – BENCH SCALE TEST MIXING INTENSITIES

Process	G	Duration
Ozonation	Plant	-
Rapid Mix	350	25 sec
Flocculation, Stage 1	50	9 min
Flocculation, Stage 1	25	9 min
Flocculation, Stage 1	12	9 min
Settling	na	10 min
Softening	TBD	10 min
Recarbonation	na	na

It is expected that the primary variables during the testing will be chemical additions and chemical dosages. Specific chemicals and dosages used for initial testing conditions will be selected to reflect current plant usage and the recommendations of the 2002 Treatability Study:

TABLE 5 – BENCH SCALE TEST CHEMICAL FEED RATES

Chemical	Current Usage	2002 Study
Ozonation	4.66 mg/l	1.5 mg/l
Ferric Chloride	7.7 mg/l	40 mg/l
Coagulant Aid Polymer	Not used	2.0 mg/l
Flocculation Aid Polymer	Not used	0.05 mg/l
Lime	120 mg/l	175 mg/l
Soda Ash	Not used	52 mg/l
Cationic Softening Polymer	3.13 mg/l	Not used
Anionic Softening Polymer	0.88 mg/l	Not used
Fluoride	0.45 mg/l	1 mg/l
Carbon Dioxide	32 mg/l	37 mg/l
Chlorine	6.3 mg/l	1 mg/l



3. Considerations

The 2002 Treatability Study did not note significant formation of DBPs. This may be a function of different Flint River water chemistry at that time. However, recognizing the considerable differences in chemical usage and dosages between that study and current operations, those differences in chemical use and dosage are an obvious starting point for optimizing treatment to prevent DBP limit exceedance.

Although it is believed that optimization of current treatment can correct the DBP issue, should optimization of present treatment prove insufficient, alternate residual disinfectants (chloramines and chlorine dioxide) will be investigated as additional treatment measures.

4. Results

[To be completed following jar testing and experimentation]

5. Conclusions

[To be completed following jar testing and experimentation]

DRAFT



IV. DISTRIBUTION SYSTEM EVALUATION

EPA guidance for the distribution evaluation portion of an OER is focused on identification and isolation of a specific portion of the distribution system that led to the exceedance. The circumstances of Flint's apparent pending TTHM exceedances are unusual in that a new supply has been implemented which clearly corresponds to the high TTHM sample results. Despite obvious implications to the primary cause of increased TTHM levels, value remains in evaluating the distribution system as there may still be distribution improvements that can be made to help alleviate the problem.

Evaluation of the distribution system, including modeling, was recently added to LAN's scope of services. When finished, information will be provided to complete the following topics in this section.

A. INFRASTRUCTURE

1. Piping

According to the most recent MDEQ Sanitary Survey, the distribution system is estimated to contain 70% cast iron, 20% ductile iron, 2% concrete and 8% steel water mains. Unlined cast iron pipe can become pitted, allowing colonization sites for microorganisms leading to chlorine demand. Additionally, much of the piping in the system is aged and in poor condition. Increased chlorine demand could be resulting from biofilm in older pipes and from main breaks/repairs.

The City utilizes City Point software and GPS equipment to document main breaks and prioritize replacements. Areas that have been targeted for main replacements include Fenton Road, Atherton Road, Dort Highway, Averil Street, and Boulevard Drive. The extent of contribution is not known but any water main replacement project will contribute to decreasing chlorine demand somewhat if constructed properly.

2. Storage

[To be completed]

- *Appropriate capacity*
- *Mixing, baffling, other provided to prevent stagnant water*
- *Condition*

3. Pump Stations

[To be completed]

- *Condition*
- *Pump capacity evaluation*
- *Valve condition and pressure zones*

B. OPERATIONS AND MAINTENANCE

1. Pump Station & Storage Operations

[To be completed]

- *Control of pressure districts*
- *WTP Pump Station (No. 4)*
- *Cedar Street Pump Station*
- *Westside Pump Station*



- *Torrey Road Pump Station*
- *High and low levels in tanks*

2. Booster Disinfection Practices

Booster disinfection is provided at the Cedar Street and Westside pump stations. Sodium hypochlorite is applied while the reservoirs are being filled.

3. Changes in System Demands

[To be completed]

- *Long term decline in demands*
- *Short term fluctuations – max day in winter due to high volume of main breaks*

C. WATER SYSTEM HYDRAULIC MODELING

[To be completed]

1. Simulation of Existing System

Match existing conditions, particularly chlorine residual. We have chlorine feed data at plant and residuals at 10 locations in each MOR, May-October.

2. Identification of Deficiencies

Specific issues to look at:

*Worst case at minimum daily demands
 Water age in entire system
 Recirculating water through pump stations
 Use of storage tanks
 Indications of broken valves
 Effectiveness of booster disinfection*



V. RECOMMENDATIONS TO MINIMIZE FUTURE OEL EXCEEDANCES

A. SOURCE

The City of Flint has already committed to the change from the Flint River as the water source to Lake Huron under the KWA system, planned for late 2016. The risk of future TTHM limit violations will decline substantially with the use of water from Lake Huron due to much lower DBP precursors. It is important to recognize that the Flint River will become strictly an emergency supply when the KWA supply becomes available and any investments toward the Flint River should be contemplated accordingly. Recommendations discussed below in this section apply to the Flint River as the source.

Reverting to supply from the DWSD until the KWA supply is available as an option. However, the DWSD has stipulated that a \$4 million connection fee would apply and current water rates would include approximately \$900,000 / month flat fee plus usage charges. Therefore, utilizing the DWSD for interim supply is cost prohibitive under the terms defined by the DWSD.

1. Watershed Management

A volunteer group entitled the Watershed Coalition performs various tasks related to managing the Flint River watershed such as spring cleanups and annual benthic studies to evaluate the river 'health'. No additional action is recommended at this time.

2. Monitoring

The City documents typical raw water characteristics as part of standard preparation of Monthly Operating Reports (MOR). No changes are recommended at this time.

3. Intake Operations

The 2002 Treatability Study recommended pre-oxidation in the form of sodium permanganate as a feed at the intake. However, pre-oxidation with sodium permanganate is unlikely to provide significant oxidizing of organics beyond that provided by ozonation. It is possible the addition of hydrogen peroxide would enhance the ozone process.

4. Seasonal Strategies

Past data indicates the Flint River is influenced by groundwater and in particular, dolomitic spring water. The result is hard water with high concentrations of magnesium and sulfate. Also, hardness and alkalinity are higher during the winter. Upon initiation of supply from the Flint River, the City made the decision to soften with lime only to focus on removal of carbonate hardness. One potential modification that could assist with TOC removal and thus decrease THMFP would be lime and soda ash softening. If implemented soon, the procedural change would be timely as it would also address increased hardness expected going into this winter.

5. Upstream Contamination Issues

Upstream contamination issues are extremely difficult to prevent and even if detected are difficult to locate. Evaluation of raw water data collected for MORs is the easiest manner in which to detect upstream contamination issues because the data is already collected for treatment purposes. In fact, high total Coliform readings signaled a potential issue recently that the City identified and removed.

An upstream monitoring and warning system could be established to attempt to detect spill event type contamination early enough to cease intake prior to the



contamination reaching the WTP. However, given the imminent conversion to the KWA supply, the period of full time use would likely be far too short to achieve payback on the capital expenditures.

B. TREATMENT PROCESS

1. Operational Recommendations

- Coagulation and flocculation polymer aids: The 2002 Treatability Study suggested the use of coagulation and flocculation polymer aids. These polymer aids were shown in the 2002 Treatability Study to increase TOC removal and thereby reduce THMFP. Further evaluation will be completed during jar testing.
- Discontinue softening bypass: The City was previously bypassing a portion of flow around the softening basins because hardness levels did not warrant softening of the full stream. However, this practice was discontinued because it was believed the bypass stream was contributing to chlorine demand and preliminary data has supported that belief. Chlorine demand dropped 0.5 – 1.0 mg/l following elimination of the bypass stream in early November 2014.
- Softening with lime and soda ash: Research has shown that enhanced softening with both lime and soda ash may provide additional TOC removal. The efficacy of this option will be evaluated during jar testing.
- Disinfection of filter beds: In case there has been microbial growth it is recommended the filters be 'shock' treated with chlorine and rinsed. A chlorine injection point was added upstream of the filters during the first segment of Phase II so future growth in the filters should not be an issue.
- Optimization of all existing treatment processes: Depending on bench scale testing conditions and results, slight modifications to all treatment processes might in order to replicate lower DPBFP.

2. Infrastructure Change Recommendations

- Fix and/or replace faulty ozone equipment: Since the ozone equipment was installed it has not been used extensively so the hope is that major components remain in good condition and the system can be easily modified to restore proper functionality. The City has scheduled the equipment manufacturer to field inspect the system on December 15, 2014.
- Change disinfectant to chloramine or chlorine dioxide: If other options prove to be ineffective, conversion to another disinfectant should be fully evaluated. Various characteristics of chloramination indicate an advantage over chlorine dioxide, but a full analysis would provide clarity as to which would be preferred.
- Install pre-oxidant chemical feed: Hydrogen peroxide as a pre-oxidant can enhance the activity of the ozone. This option is listed as a consideration only if problems continue with ozonation.
- Repair upstream sewer leak: a sewer leak upstream of the WTP intake was discovered and has already been repaired by the City.



C. DISTRIBUTION SYSTEM

Recommendations will be incorporated into this report when available. It is anticipated details will be provided for the following topics. [To be completed]

- 1. Manage Water Age**
 - a) Storage Tanks**
 - b) Residence Time in Pipes**

- 2. Reduce Disinfectant Demand**
 - a) Flushing**
 - b) Cast Iron Pipes**

- 3. Water Modeling of Recommendations**

*Determine best flushing locations to reduce water age
 Changes to storage tank operating levels to reduce water age
 Valves to close/add to improve pressure zones, reduce recirculation
 Optimization of pump station use – smaller pumps? Shut down?
 Evaluate booster disinfection*

A number of actions have already been taken in terms of the distribution system. Water main flushing efforts were increased until late November when freezing weather became prevalent. Also, numerous valves that were broken in the closed position and believed to have been contributing to stagnant water were replaced.

D. BOOSTER DISINFECTION

Decreasing chlorine feed at the WTP and adding booster disinfection in the distribution system is an alternative intended to reduce the reaction time at higher concentrations of chlorine to reduce DPB formation. Extensive looping and branching within the existing system complicate how to best implement and utilize booster disinfection. Water system modeling is recommended to determine the most effective feed point locations and dosages. Further discussion and details will be provided when the distribution evaluation results are available.

E. CATEGORIZATION OF ACTIONS

Considering that the Flint River is being used as the water source only until the KWA supply is available (expected late 2016), options to address high THM formation that require new construction or extensive time to implement are not preferred. On the other hand, the City understands THM sample results to date dictate that some action is necessary. Two categories have been developed to assist the City in prioritizing actions to take. Stage 1 consists of actions that can be completed relatively quickly without major construction and Stage 2 actions are either long term actions or solutions requiring major construction. Stage 1 actions are to be completed first followed by evaluation of the results prior to consideration of Stage 2 actions. Grouping of actions are shown in the table below.

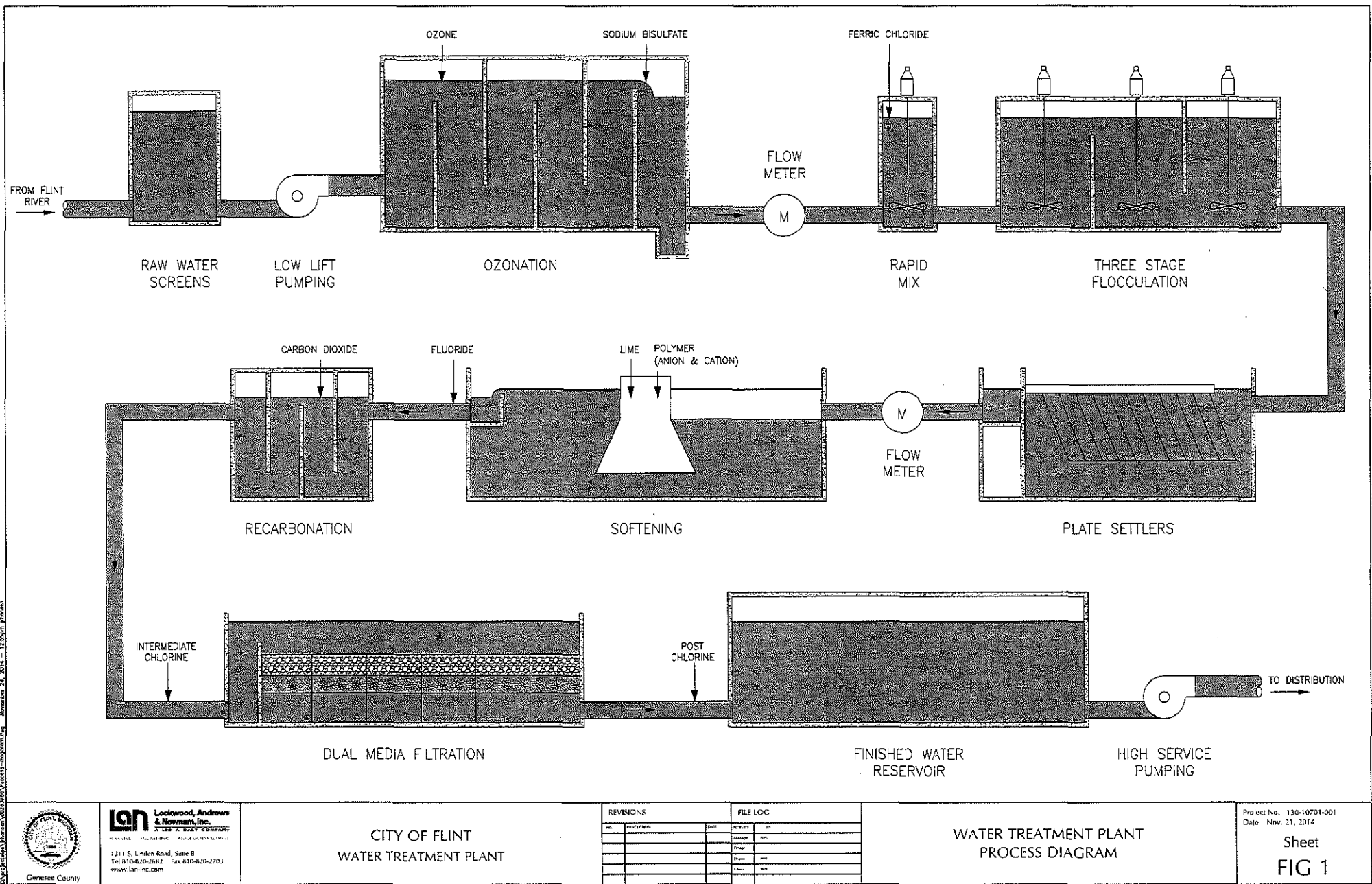
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TABLE 6 – ACTION PLAN

	Action	Purpose
Stage 1	Troubleshoot ozone feed system	Reduce chlorine feed and increase TOC removal
	Bench scale jar testing	Optimize treatment process and evaluate possible modifications
	Discontinue softening bypass	Reduce chlorine demand
	Disinfect filters	Reduce chlorine demand
	Increased water main flushing	Reduce water age / stagnant water
	Water system modeling evaluation	Determine areas with high water age and reasons
	Implement coag. & floc. polymer aids, if appropriate	Increase TOC removal
	Modify booster disinfection feeds, if appropriate	Decrease water age
Stage 2	Repair ozone system	Reduce chlorine feed and increase TOC removal
	Continue increased water main flushing	Reduce water age / stagnant water
	Convert to lime and soda ash softening	Increase TOC removal
	Continue valve replacements based on water model	Reduce water age / stagnant water
	Change disinfectant to chlorine dioxide	Reduce THMFP
	Install pre-oxidant feed at intake	Optimize ozone disinfection, reduce chlorine
	Place priority on replacing cast iron water mains	Reduce chlorine demand

Samples were taken the week of November 17th for the 3rd quarter of testing. Although the City has begun implementation of Stage 1 actions, THM results are not expected to be noticeably affected since there has not been enough time for a response. The next quarter of sampling is due to be completed the third week in February. It is the City's intent to implement Stage 1 actions prior to the 3rd quarter of THM sampling.



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CITY OF FLINT
 WATER TREATMENT PLANT

REVISIONS

NO.	DESCRIPTION	DATE

FILE LOG

NO.	DATE	BY

WATER TREATMENT PLANT
 PROCESS DIAGRAM

Project No. 130-10701-001
 Date Nov. 21, 2014

Sheet
 FIG 1

Rennaker, Joanne (DEQ)

From: Hansen, Jeff <jrhansen@lan-inc.com>
Sent: Monday, December 01, 2014 4:18 PM
To: Prysby, Mike (DEQ); Busch, Stephen (DEQ); Cook, Pat (DEQ)
Cc: Brent Wright (bwright@cityofflint.com); Daugherty Johnson (djohnson@cityofflint.com); hcroft@cityofflint.com; Green, Warren; Matta, Samir; mglasgow@cityofflint.com
Subject: Flint THM Operational Evaluation Report Draft
Attachments: Flint-TTHM-OER-DRAFT_toMDEQ.pdf

Mike,

In response to your letter dated 9/10/14 and our meeting on 11/07/14 please find attached a draft of the OER for your review and comment.

Jeffrey R. Hansen
Senior Project Manager

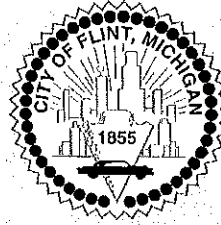


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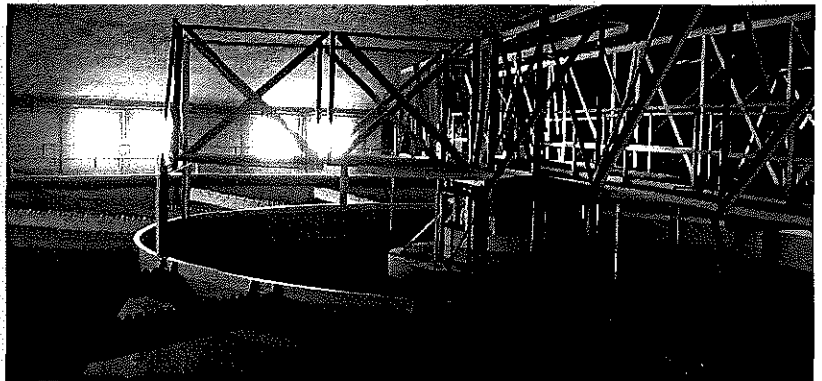
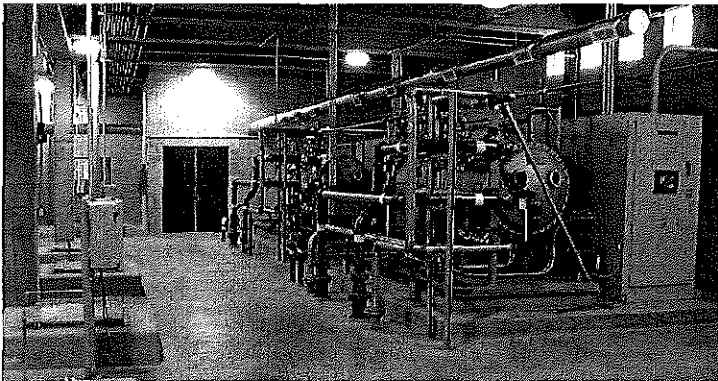
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Operational Evaluation Report City of Flint



Trihalomethane Formation Concern

November 2014



**Lockwood, Andrews
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EXECUTIVE SUMMARY

Environmental Protection Agency (EPA) and Michigan Department of Environmental Quality (MDEQ) regulations require that public water suppliers test drinking water quarterly throughout the distribution system for disinfectant by-products (DBP's). Two categories of DBP's, tri-halomethanes (THM) and halo-acetic acids (HAA5), are regulated and must be tested for. The City of Flint began operation of their water treatment plant (WTP) full time with the Flint River as the source on April 25, 2014. Since that time, two quarters of samples taken indicate that future violations are inevitable for total THM without some modifications to the water system. In response, the City hired Lockwood, Andrews & Newnam, Inc. (LAN) to complete this Operational Evaluation Report (OER) in conformance with EPA guidelines with the goal to determine the cause(s) of high levels of THM and evaluate possible solutions.

The EPA promulgated the Stage 2 Disinfectants and Disinfection By-Products Rule (DBPR) in January 2006 which set maximum contaminant levels (MCLs) for total trihalomethanes (TTHM) and HAA5 based on an annual running average, tested quarterly, for a given sampling location. The City of Flint reports levels from 8 sampling test locations. Of the two quarterly sampling cycles since Flint began operating the WTP full time, HAA5 levels have been acceptable but TTHM levels have been high at all 8 sampling sites.

According to the Stage 2 DBPR, the annual average value requires 3 quarters of sampling data with the most current period counting twice. Therefore, the City of Flint has not yet experienced a violation of the TTHM MCL because only 2 quarters of data have been obtained. However, levels recorded indicate the likelihood of an MCL exceedance later this year.

A number of issues have been identified as possibly contributing to the high THM levels measured.

1. Inefficient ozone system functionality which has resulted in increased chlorine feed.
2. Upstream influences in terms of increased chlorine demand.
3. Bypass stream around softening contributed to chlorine demand.
4. Unlined cast iron pipes in the distribution system contributing to chlorine demand.
5. Recirculating water in the distribution system due to less than ideal configuration of Cedar Street and West Side pump stations.
6. Broken valves resulting in stagnant water in some areas.
7. High chlorine demand in filters.
8. High THM formation potential (THMFP) in source water.
9. Less than optimal removal of THM precursors

ACTION PLAN

The City of Flint has signed an agreement with the Karegnondi Water Authority (KWA) to purchase raw water drawn from Lake Huron. The KWA system is currently under construction and expected to be operational by late 2016. The water supply from Lake Huron will have entirely different water quality characteristics from the Flint River and those characteristics are expected to yield drastically reduced DPB formation. With that, non-structural options to help reduce THM levels are much preferred over solutions requiring new construction. Therefore, two categories of actions have been devised: Stage 1 being actions that can be completed relatively quickly without major construction and Stage 2 consisting of either long term actions or solutions requiring major construction. The City has completed or intends to complete Stage 1 Actions by February 16, 2015, the week in which the next quarterly sampling is to be done. Stage 2 actions are to be implemented only if Stage 1



actions are ineffective in adequately reducing TTHM levels and therefore Stage 2 is contingent upon the outcome of Stage 1.

Stage 1 – Immediate Actions

- Hire ozone system manufacturer to troubleshoot ozone system
- Bench scale jar testing
 - Match existing process and access possible areas of improvement
 - Simulate potential modifications to treatment process
 - Evaluate coagulation and flocculation polymer aid feeds to assist with TOC removal
- WTP operational changes
 - Discontinue softening bypass stream to reduce chlorine demand
 - Disinfection of filter beds to reduce chlorine demand
 - Possibly begin coagulation and flocculation polymer aid feeds to assist with TOC removal depending on bench scale test results
- Increase water main flushing efforts to minimize stagnant water
- Water system modeling to identify areas with high water age and potential solutions
 - Cedar Street Pump Station potential recirculation
 - West Side Pump Station potential recirculation
 - Storage tank volume use
 - Possible broken closed valve locations
 - Locations in need of flushing
 - Lower high water levels in storage tanks

Stage 2 – Contingent Actions

- Fix ozone system
- Start feeding coagulation and flocculation polymer aids to lower TOC, if not completed in Stage 1
- Convert to lime and soda ash softening
- Change disinfectant to chloramine or chlorine dioxide until KWA
- Install pre-oxidant feed at intake to optimize ozone disinfection
- Implement advanced treatment for THM precursor removal
- Increased main flushing based on water modeling results
- Continue valve replacements with water model assistance
- Emphasize cast iron pipes on water main replacement priority list



I. BACKGROUND

The City of Detroit Water and Sewer Department (DWSD) has historically provided drinking water for the City of Flint and Genesee County. In the late 1990's growing concern regarding the reliability of the DWSD supply prompted the City of Flint to upgrade their existing water treatment plant (WTP). Those improvements, defined as Phase I, were completed in 2005 and were intended to allow the Flint WTP to operate, using the Flint River as the source, for an extended period of time in the event that supply from the DWSD was temporarily interrupted. Additionally, the Phase I improvements set the stage for Flint to break free from dependence on the DWSD supply and water charges over which they had no control.

A. WATER SUPPLY TRANSITION

1. Detroit Water and Sewer Department (DWSD)

Until recently the Genesee County and Flint region had been provided drinking water by the DWSD. However, due to excessive cost increases and reliability issues with the DWSD system other options had to be explored.

2. Karegnondi Water Authority (KWA)

In 2010 the Karegnondi Water Authority (KWA) was formed for the purpose of developing a new water supply from Lake Huron to serve the region in lieu of the DWSD supply and the City of Flint elected to join. The KWA expects the new system which is currently being constructed to become operational in the fall of 2016.

3. Flint River – Interim Period

With a renewing water supply agreement between Flint and the DWSD being terminated by the DWSD (effective April 30, 2014) and the KWA system not expected to be operational until late 2016, the City of Flint decided to initiate operation of the existing WTP full time utilizing the Flint River as the interim water source. A variety of WTP improvements were necessary for the Flint plant to become a full time plant. For purposes of this report, Phase II improvements to the Flint WTP are improvements which have been made to allow the plant to operate full time with either the Flint River as the source or the KWA supply as the source.

B. TTHM PENDING VIOLATIONS

The calculation for determining if the MCL has been violated for TTHM is:

$$(2 \times \text{current quarter value} + \text{previous 2 quarter values}) / 4$$

Flint has completed tests for 2 quarters and therefore has not violated an MCL limit to date. However, the third quarter of sample data is likely to provide MCL exceedances at all 8 sampling sites. Test results are tabulated below.

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TABLE 1 – 2014 DBP TEST RESULTS

Sample Location	TTHM			HAA5		
	1 st Qrt 5/21/14	2 nd Qrt 8/21/14	3 rd Qrt	1 st Qrt 5/21/14	2 nd Qrt 8/21/14	3 rd Qrt
1) 3719 Davison - McDonalds	162.4	145.3		64	43	
2) 822 S. Dort Hwy - BP Gas Sta.	111.6	112.0		52	40	
3) 3302 S. Dort Hwy – Liquor Pal.	96.5	127.2		48	31	
4) 3606 Corunna – Taco Bell	106.4	181.3		55	24	
5) 2501 Flushing – Univ. Market	75.1	196.2		38	17	
6) 3216 MLK – Salem Housing	82.2	112.4		41	25	
7) 5018 Clio – Rite Aid	88.2	144.4		49	30	
8) 6204 N. Saginaw – N. Flint Auto	79.2	118.3		50	37	

TTHM MCL = 80 ug/l

HAA5 MCL = 60 ug/l

C. WATER TREATMENT PLANT RECENT IMPROVEMENTS & STATUS

1. Phase I WTP Improvements

Since 1965, the Flint WTP has remained a secondary or backup supply system to the DWSD primary supply. Typically the secondary supply for a public water system is expected to be needed only during emergency situations and normally is designed for short term operation such as providing the average daily demand for a few days. Conversely, Phase I improvements were designed with the intent to upgrade the Flint WTP in order to allow for an extended short term period (6 weeks) because of the perceived high risk that the DWSD supply would fail and remain out of service for an extended duration. Regardless, the Flint WTP was still intended to serve as a standby plant and as such the Phase I improvements lacked redundancies that would be required for a primary supply WTP.

2. Past Pilot Study & Testing

During design of the Phase I improvements a treatability study was completed by Alvord, Burdick & Howson, LLC (AB&H) in 2002. The Treatability Study evaluated the current treatment processes that are in place at the Flint WTP today with the Flint River as the source. The report recommended the following:

TABLE 2 – 2002 WTP TREATMENT RECOMMENDATIONS

Treatment	Purpose	Point of Application	Dosage (mg/l)
Sodium permanganate	Zebra mussel control	Intake	0.3
Ozone	Taste & odor removal, disinfection	Diffusor basin	1.5
Ferric chloride	Coagulation	Rapid mix	40
Coag aid polymer	Turbidity & TOC removal	Rapid mix	2.0
Floc aid polymer	Turbidity & TOC removal	Floc basin	0.05
Lime	Softening	Softening basin	175
Soda ash	Softening	Softening basin	52
Carbon dioxide	pH adjustment	Recarb basin	37
Media filters	Filtration	Na	Na
Chlorine	Disinfection	Filter effluent	1.0



Of the recommended items, zebra mussel control, coagulant and flocculation polymer aids, and soda ash feed have not been incorporated into the treatment process.

3. Phase II WTP Improvements for Full Time Operation

Phase II WTP improvements are those needed to convert the Flint WTP from a back-up supply to a primary supply plant. A number of improvements have already been constructed as they were necessary to operate full time, treating water from the Flint River. The improvements under the title of Phase II that have been completed or are nearly complete include upgrades to the lime sludge lagoon, the lime sludge lagoon decant and disposal system, decant pump station and force main, installation of mid-point chlorination before filtration, and upgrade of the electric feed sub-station.

Additional improvements to the Flint WTP that are to be completed to become part of the normal treatment process using water supplied by the KWA are:

- New oxygen and nitrogen storage facilities for the ozone system (under construction)
- New coagulant feed system
- Electrical
 - Pump Station #4 upgrades (under construction)
 - SCADA and controls upgrades
 - Filter transfer pump station feeders
- Installation of the future raw water feed connection point for the KWA (under construction)
- Pump replacements and VFD installation in the low and high service pump station (under construction)
- Filter transfer pump station to Dort Reservoir
- Facility security improvements



II. SOURCE WATER EVALUATION

A. DATA ANALYSIS

Based on past data collected and the 2002 Treatability Study by AB&H, the Flint River water quality varies seasonally with higher hardness and alkalinity experienced in the winter. Higher magnesium concentrations are also experienced in the winter, adding difficulty to the settling process due to neutrally buoyant floc. General water quality average characteristics recorded for the 2002 Treatability Study as compared with average characteristics recorded this year are shown in Table 3 below.

TABLE 3 – FLINT RIVER WATER QUALITY CHARACTERISTICS

Period	Turbidity NTU	TOC Mg/l	Alkalinity Mg/l	Hardness Mg/l as CaCO ₃	pH	Total Col. Count/day
2001 Apr–Oct	7.9	9.4	215	272	8.1	870-1230 (7300 max)
2014 May–Oct	8.3	10.3 5/22/14	207	252	8.2	1900-9000 (48,300 max)

Other than total Coliform, the Flint River characteristics do not appear to have changed significantly over the past 10+ years. Note that further investigation by City staff revealed a sewer leak upstream of the plant that may have contributed to the total Coliform count. The leak was subsequently repaired.

B. CONCLUSIONS

Considering the minor changes in Flint River water quality, much of the information contained in the 2002 Treatability Study by AB&H remains relevant today. Data from that report assumed to be consistent today include the following:

- Flint River is influenced by groundwater from a dolomitic aquifer
- Hardness varies seasonally with higher hardness and alkalinity in the winter
- Hardness, alkalinity, magnesium concentrations tend to be reduced by run-off
- Total THMFP is likely 380-440 micrograms per liter as measured between April 2001 and January 2002. The City intends to re-test the raw water to confirm the THMFP has not changed. Results are pending.

In development of the 2002 Treatability Study, processes were simulated which resulted in low THMFP. Therefore, information contained in that report will be used to assist with establishing a baseline jar testing procedure as discussed further in Section III.



III. TREATMENT PROCESS EVALUATION

A. EXISTING PROCESS DESCRIPTION

The existing WTP consists of an intake with screening from the Flint River, low lift pumping, ozonation, rapid mix, flocculation, settling, softening, recarbonation, filtration, storage and high service pumping. A process diagram is shown as Figure 1.

1. Intake

A 72" diameter pipe draws water from the Flint River through 2 traveling screens to the low lift pump structure. No chemicals are currently fed for Zebra mussel control or pre-oxidation as recommended by the 2002 Treatability Study. Manual removal of zebra mussels proved to be more economical than installation of chemical feed equipment considering the short term need.

2. Ozone

There are 2 ozone generators designed to provide adequate ozone for a WTP flow of up to 36 mgd. There are 3 ozone contact basins. The ozone generators were designed to produce 900 lbs/day at 10% concentration and up to 1300 lbs/day at 6% concentration each. Recent readings have indicated a production rate of approximately 700 lbs/day at 4% concentration. While serving the purposes of taste and odor control and disinfection, it is possible the current ozone feed might not be optimized to realize additional TOC removal benefits demonstrated by previous tests. Also, less than optimal ozonation has led to increased chlorine feed.

3. Rapid Mix

East and West rapid mix chambers allow chemical feed prior to the flocculation basins. Each rapid mix chamber is equipped with a 5 hp mixer.

4. Coagulation / Flocculation

The WTP contains two equally sized flocculation basins, east and west, and each basin provides tapered or gradually slowed mixing from inlet to outlet. There are fifteen 2 hp mixers for each basin with VFDs to control mixing speed. The 2002 Treatability Study recommended feeding both coagulation and flocculation polymer aids. Neither polymer aid is being used today because turbidity and TOC removals have been sufficient to meet regulatory requirements.

5. Settling

Primary clarification takes place within 3 basins containing plate settlers. The settlers are operating as designed.

6. Softening

Again, there are two basins for softening: east and west. Each basin is 120' in diameter and contains a solids contact softening unit. Each softening basin/unit has a design capacity of 18 mgd. Low lift pumping limitations, flow control to the basins, and fluctuating demands have made it difficult for WTP staff to stabilize the softening process. Softening is accomplished by feeding lime. The decision was made by the City not to feed soda ash in order to remove non-carbonate hardness because acceptable hardness levels could be achieved with lime feed only and softening is short term until Lake Huron water becomes available.



7. Recarbonation

Recarbonation for pH adjustment is accomplished in east and west recarbonation basins between and to the north of the softening basins. Carbon dioxide storage and feed equipment is located west of the recarbonation basins.

8. Filtration

Filtration is accomplished with 12 dual media filters, equally sized and designed to filter 3.0 mgd each. Media consists of 12" of sand and 18" of anthracite. The filters have been operated intermittently over the years due to the standby nature of the WTP and until recently, chlorine injection took place downstream of the filters. It is possible some microbial growth has developed in the filters.

9. Disinfection

Limited disinfection is provided by ozonation, but the primary form of disinfection is chlorine fed prior to filtration and prior to finish water storage / high service pumping. The intermediate chlorine injection location was recently constructed under the Phase II, Segment 1 contract.

10. Clear Well & Pumping

The pump building sits adjacent to a 3 MG clear well and contains both low and high service pumps.

B. JAR TESTS / EXPERIMENTS

1. Approach

There are several well practiced methods by which DBPs can be reduced. First, the disinfectant can be changed to an alternate that has a lower tendency to form DBPs. Second, additional treatment systems such as activated carbon or air stripping (depending on the nature of the precursors) can be added to remove DBP precursors. Lastly, the existing treatment processes can be optimized to remove as much DBP precursor as possible. Of these options, optimizing existing treatment processes is the only strategy that does not require the construction of new and expensive facilities. It is anticipated that Flint will be receiving Lake Huron water in approximately two years and this water will have a completely different chemistry from the Flint River. Major process changes instituted to address THM levels using Flint River water are likely to be unnecessary for Lake Huron water and may even be inappropriate. Therefore, those options which require addition of new treatment processes are undesirable at this time. In recognition of this upcoming change in water source, this study will concentrate on improving the existing processes, rather than adding new ones. New treatment processes will only be recommended if operational changes to the existing treatment train prove ineffective.

Recent sample test results suggest that most of the DBPs are formed in the distribution system rather than within the treatment plant. Therefore, the most logical approach is to reduce the DBP formation potential (DBPFP) rather than simply lowering the levels of DBPs leaving the plant. During bench scale testing, formation potential (FP) levels will be the primary indicator of success or failure of any proposed process modifications.

2. Protocol

Bench scale pilot testing is intended to reflect actual plant operating and hydraulic conditions so the bench scale treatment units will be sized based on various dimensionless factors to ensure the pilot treatment matches the actual system. Bench scale ozonation is not practical due to time and cost limitations. Therefore, water

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samples will be withdrawn following the plant ozone basin. These samples will be transported to the laboratory where they will be dispensed into square testing jars. The jars will act as rapid mix, three-stage flocculation, and settling. Rapid mix and flocculation conditions will be matched to the plant based on "Gt" values. The "G" value is a measure of the mixing intensity and is a function of mix time, viscosity of the liquid, and mixing power applied to the water. "Gt" then, is a size scaling factor where time has been accounted for. Settling time will be scaled to match the shorter settling depth of the testing jars. After settling, samples will be decanted from the test jars. The decanted samples will then be lime softened; softening conditions will be similarly matched on the basis of "Gt". Fluoride will be added and carbon dioxide sparged into the samples to reduce the pH. The water will then be vacuum filtered through filter paper, sized to simulate the plant's dual media filters. The samples will be dosed with excess chlorine and allowed to react for seven days before testing for DBPs to determine the formation potential.

Although these conditions may be refined based on new information, we anticipate the following:

TABLE 4 – BENCH SCALE TEST MIXING INTENSITIES

Process	G	Duration
Ozonation	Plant	-
Rapid Mix	350	25 sec
Flocculation, Stage 1	50	9 min
Flocculation, Stage 1	25	9 min
Flocculation, Stage 1	12	9 min
Settling	na	10 min
Softening	TBD	10 min
Recarbonation	na	na

It is expected that the primary variables during the testing will be chemical additions and chemical dosages. Specific chemicals and dosages used for initial testing conditions will be selected to reflect current plant usage and the recommendations of the 2002 Treatability Study:

TABLE 5 – BENCH SCALE TEST CHEMICAL FEED RATES

Chemical	Current Usage	2002 Study
Ozonation	4.66 mg/l	1.5 mg/l
Ferric Chloride	7.7 mg/l	40 mg/l
Coagulant Aid Polymer	Not used	2.0 mg/l
Flocculation Aid Polymer	Not used	0.05 mg/l
Lime	120 mg/l	175 mg/l
Soda Ash	Not used	52 mg/l
Cationic Softening Polymer	3.13 mg/l	Not used
Anionic Softening Polymer	0.88 mg/l	Not used
Fluoride	0.45 mg/l	1 mg/l
Carbon Dioxide	32 mg/l	37 mg/l
Chlorine	6.3 mg/l	1 mg/l



3. Considerations

The 2002 Treatability Study did not note significant formation of DBPs. This may be a function of different Flint River water chemistry at that time. However, recognizing the considerable differences in chemical usage and dosages between that study and current operations, those differences in chemical use and dosage are an obvious starting point for optimizing treatment to prevent DBP limit exceedance.

Although it is believed that optimization of current treatment can correct the DBP issue, should optimization of present treatment prove insufficient, alternate residual disinfectants (chloramines and chlorine dioxide) will be investigated as additional treatment measures.

4. Results

[To be completed following jar testing and experimentation]

5. Conclusions

[To be completed following jar testing and experimentation]

DRAFT



IV. DISTRIBUTION SYSTEM EVALUATION

EPA guidance for the distribution evaluation portion of an OER is focused on identification and isolation of a specific portion of the distribution system that led to the exceedance. The circumstances of Flint's apparent pending TTHM exceedances are unusual in that a new supply has been implemented which clearly corresponds to the high TTHM sample results. Despite obvious implications to the primary cause of increased TTHM levels, value remains in evaluating the distribution system as there may still be distribution improvements that can be made to help alleviate the problem.

Evaluation of the distribution system, including modeling, was recently added to LAN's scope of services. When finished, information will be provided to complete the following topics in this section.

A. INFRASTRUCTURE

1. Piping

According to the most recent MDEQ Sanitary Survey, the distribution system is estimated to contain 70% cast iron, 20% ductile iron, 2% concrete and 8% steel water mains. Unlined cast iron pipe can become pitted, allowing colonization sites for microorganisms leading to chlorine demand. Additionally, much of the piping in the system is aged and in poor condition. Increased chlorine demand could be resulting from biofilm in older pipes and from main breaks/repairs.

The City utilizes City Point software and GPS equipment to document main breaks and prioritize replacements. Areas that have been targeted for main replacements include Fenton Road, Atherton Road, Dort Highway, Averil Street, and Boulevard Drive. The extent of contribution is not known but any water main replacement project will contribute to decreasing chlorine demand somewhat if constructed properly.

2. Storage

[To be completed]

- *Appropriate capacity*
- *Mixing, baffling, other provided to prevent stagnant water*
- *Condition*

3. Pump Stations

[To be completed]

- *Condition*
- *Pump capacity evaluation*
- *Valve condition and pressure zones*

B. OPERATIONS AND MAINTENANCE

1. Pump Station & Storage Operations

[To be completed]

- *Control of pressure districts*
- *WTP Pump Station (No. 4)*
- *Cedar Street Pump Station*
- *Westside Pump Station*



- Torrey Road Pump Station
- High and low levels in tanks

2. Booster Disinfection Practices

Booster disinfection is provided at the Cedar Street and Westside pump stations. Sodium hypochlorite is applied while the reservoirs are being filled.

3. Changes in System Demands

[To be completed]

- Long term decline in demands
- Short term fluctuations – max day in winter due to high volume of main breaks

C. WATER SYSTEM HYDRAULIC MODELING

[To be completed]

1. Simulation of Existing System

Match existing conditions, particularly chlorine residual. We have chlorine feed data at plant and residuals at 10 locations in each MOR, May-October.

2. Identification of Deficiencies

Specific issues to look at:

Worst case at minimum daily demands
 Water age in entire system
 Recirculating water through pump stations
 Use of storage tanks
 Indications of broken valves
 Effectiveness of booster disinfection



V. RECOMMENDATIONS TO MINIMIZE FUTURE OEL EXCEEDANCES

A. SOURCE

The City of Flint has already committed to the change from the Flint River as the water source to Lake Huron under the KWA system, planned for late 2016. The risk of future TTHM limit violations will decline substantially with the use of water from Lake Huron due to much lower DBP precursors. It is important to recognize that the Flint River will become strictly an emergency supply when the KWA supply becomes available and any investments toward the Flint River should be contemplated accordingly. Recommendations discussed below in this section apply to the Flint River as the source.

Reverting to supply from the DWSD until the KWA supply is available as an option. However, the DWSD has stipulated that a \$4 million connection fee would apply and current water rates would include approximately \$900,000 / month flat fee plus usage charges. Therefore, utilizing the DWSD for interim supply is cost prohibitive under the terms defined by the DWSD.

1. Watershed Management

A volunteer group entitled the Watershed Coalition performs various tasks related to managing the Flint River watershed such as spring cleanups and annual benthic studies to evaluate the river 'health'. No additional action is recommended at this time.

2. Monitoring

The City documents typical raw water characteristics as part of standard preparation of Monthly Operating Reports (MOR). No changes are recommended at this time.

3. Intake Operations

The 2002 Treatability Study recommended pre-oxidation in the form of sodium permanganate as a feed at the intake. However, pre-oxidation with sodium permanganate is unlikely to provide significant oxidizing of organics beyond that provided by ozonation. It is possible the addition of hydrogen peroxide would enhance the ozone process.

4. Seasonal Strategies

Past data indicates the Flint River is influenced by groundwater and in particular, dolomitic spring water. The result is hard water with high concentrations of magnesium and sulfate. Also, hardness and alkalinity are higher during the winter. Upon initiation of supply from the Flint River, the City made the decision to soften with lime only to focus on removal of carbonate hardness. One potential modification that could assist with TOC removal and thus decrease THMFP would be lime and soda ash softening. If implemented soon, the procedural change would be timely as it would also address increased hardness expected going into this winter.

5. Upstream Contamination Issues

Upstream contamination issues are extremely difficult to prevent and even if detected are difficult to locate. Evaluation of raw water data collected for MORs is the easiest manner in which to detect upstream contamination issues because the data is already collected for treatment purposes. In fact, high total Coliform readings signaled a potential issue recently that the City identified and removed.

An upstream monitoring and warning system could be established to attempt to detect spill event type contamination early enough to cease intake prior to the



contamination reaching the WTP. However, given the imminent conversion to the KWA supply, the period of full time use would likely be far too short to achieve payback on the capital expenditures.

B. TREATMENT PROCESS

1. Operational Recommendations

- Coagulation and flocculation polymer aids: The 2002 Treatability Study suggested the use of coagulation and flocculation polymer aids. These polymer aids were shown in the 2002 Treatability Study to increase TOC removal and thereby reduce THMFP. Further evaluation will be completed during jar testing.
- Discontinue softening bypass: The City was previously bypassing a portion of flow around the softening basins because hardness levels did not warrant softening of the full stream. However, this practice was discontinued because it was believed the bypass stream was contributing to chlorine demand and preliminary data has supported that belief. Chlorine demand dropped 0.5 – 1.0 mg/l following elimination of the bypass stream in early November 2014.
- Softening with lime and soda ash: Research has shown that enhanced softening with both lime and soda ash may provide additional TOC removal. The efficacy of this option will be evaluated during jar testing.
- Disinfection of filter beds: In case there has been microbial growth it is recommended the filters be 'shock' treated with chlorine and rinsed. A chlorine injection point was added upstream of the filters during the first segment of Phase II so future growth in the filters should not be an issue.
- Optimization of all existing treatment processes: Depending on bench scale testing conditions and results, slight modifications to all treatment processes might in order to replicate lower DPBFP.

2. Infrastructure Change Recommendations

- Fix and/or replace faulty ozone equipment: Since the ozone equipment was installed it has not been used extensively so the hope is that major components remain in good condition and the system can be easily modified to restore proper functionality. The City has scheduled the equipment manufacturer to field inspect the system on December 15, 2014.
- Change disinfectant to chloramine or chlorine dioxide: If other options prove to be ineffective, conversion to another disinfectant should be fully evaluated. Various characteristics of chloramination indicate an advantage over chlorine dioxide, but a full analysis would provide clarity as to which would be preferred.
- Install pre-oxidant chemical feed: Hydrogen peroxide as a pre-oxidant can enhance the activity of the ozone. This option is listed as a consideration only if problems continue with ozonation.
- Repair upstream sewer leak: a sewer leak upstream of the WTP intake was discovered and has already been repaired by the City.



C. DISTRIBUTION SYSTEM

Recommendations will be incorporated into this report when available. It is anticipated details will be provided for the following topics. [To be completed]

- 1. Manage Water Age**
 - a) *Storage Tanks*
 - b) *Residence Time in Pipes*

- 2. Reduce Disinfectant Demand**
 - a) *Flushing*
 - b) *Cast Iron Pipes*

- 3. Water Modeling of Recommendations**

Determine best flushing locations to reduce water age

Changes to storage tank operating levels to reduce water age

Valves to close/add to improve pressure zones, reduce recirculation

Optimization of pump station use – smaller pumps? Shut down?

Evaluate booster disinfection

A number of actions have already been taken in terms of the distribution system. Water main flushing efforts were increased until late November when freezing weather became prevalent. Also, numerous valves that were broken in the closed position and believed to have been contributing to stagnant water were replaced.

D. BOOSTER DISINFECTION

Decreasing chlorine feed at the WTP and adding booster disinfection in the distribution system is an alternative intended to reduce the reaction time at higher concentrations of chlorine to reduce DPB formation. Extensive looping and branching within the existing system complicate how to best implement and utilize booster disinfection. Water system modeling is recommended to determine the most effective feed point locations and dosages. Further discussion and details will be provided when the distribution evaluation results are available.

E. CATEGORIZATION OF ACTIONS

Considering that the Flint River is being used as the water source only until the KWA supply is available (expected late 2016), options to address high THM formation that require new construction or extensive time to implement are not preferred. On the other hand, the City understands THM sample results to date dictate that some action is necessary. Two categories have been developed to assist the City in prioritizing actions to take. Stage 1 consists of actions that can be completed relatively quickly without major construction and Stage 2 actions are either long term actions or solutions requiring major construction. Stage 1 actions are to be completed first followed by evaluation of the results prior to consideration of Stage 2 actions. Grouping of actions are shown in the table below.

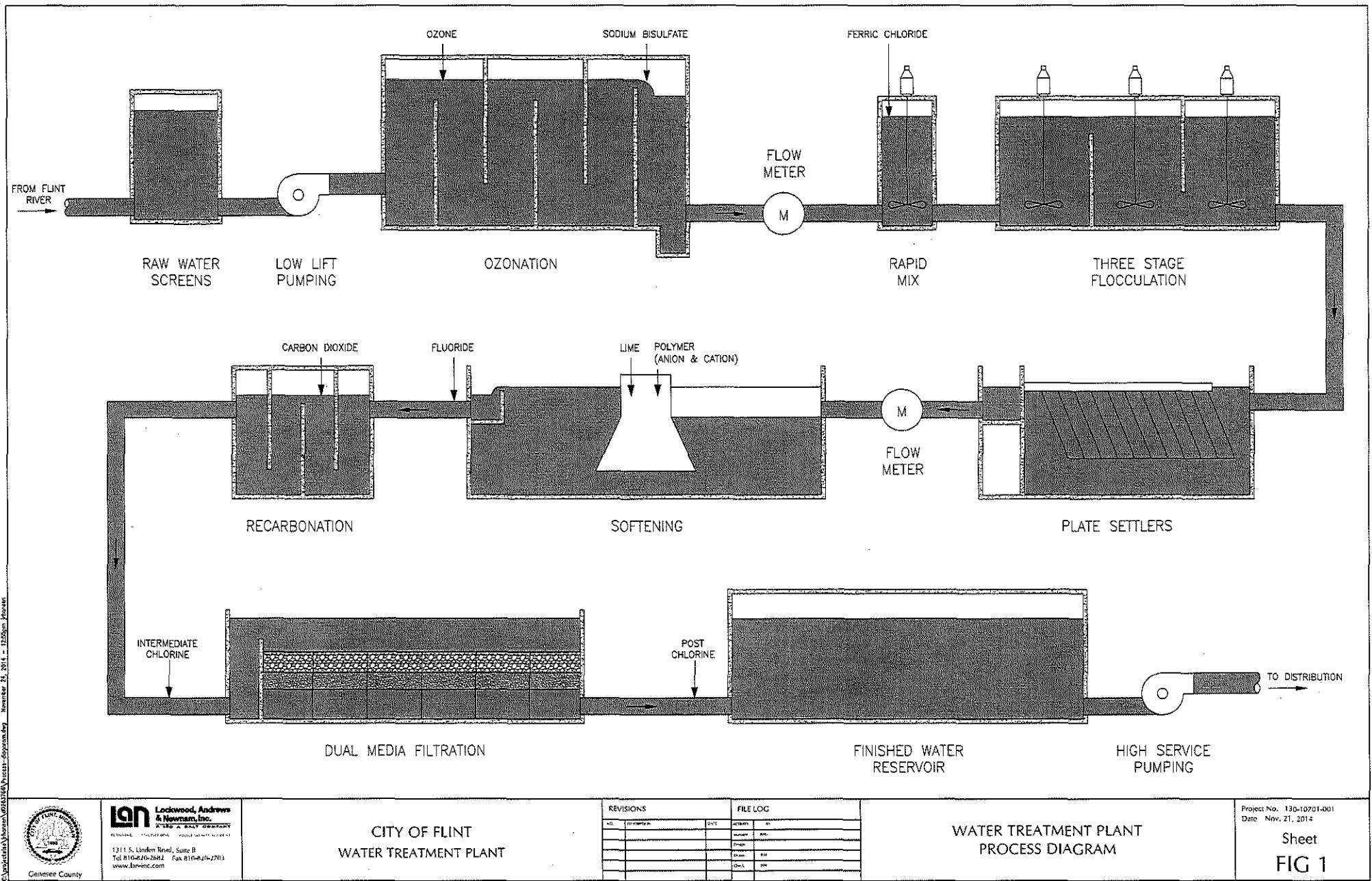
CITY OF FLINT
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TABLE 6 – ACTION PLAN

	Action	Purpose
Stage 1	Troubleshoot ozone feed system	Reduce chlorine feed and increase TOC removal
	Bench scale jar testing	Optimize treatment process and evaluate possible modifications
	Discontinue softening bypass	Reduce chlorine demand
	Disinfect filters	Reduce chlorine demand
	Increased water main flushing	Reduce water age / stagnant water
	Water system modeling evaluation	Determine areas with high water age and reasons
	Implement coag. & floc. polymer aids, if appropriate	Increase TOC removal
	Modify booster disinfection feeds, if appropriate	Decrease water age
Stage 2	Repair ozone system	Reduce chlorine feed and increase TOC removal
	Continue increased water main flushing	Reduce water age / stagnant water
	Convert to lime and soda ash softening	Increase TOC removal
	Continue valve replacements based on water model	Reduce water age / stagnant water
	Change disinfectant to chlorine dioxide	Reduce THMFP
	Install pre-oxidant feed at intake	Optimize ozone disinfection, reduce chlorine
	Place priority on replacing cast iron water mains	Reduce chlorine demand

Samples were taken the week of November 17th for the 3rd quarter of testing. Although the City has begun implementation of Stage 1 actions, THM results are not expected to be noticeably affected since there has not been enough time for a response. The next quarter of sampling is due to be completed the third week in February. It is the City's intent to implement Stage 1 actions prior to the 3rd quarter of THM sampling.



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**CITY OF FLINT
 WATER TREATMENT PLANT**

REVISIONS			FILE LOG	
NO.	DESCRIPTION	DATE	BY	CHK.

**WATER TREATMENT PLANT
 PROCESS DIAGRAM**

Project No. 130-10701-001
 Date: Nov. 21, 2014

Sheet
FIG 1

Rennaker, Joanne (DEQ)

From: Dykema, Linda D. (DHHS)
Sent: Wednesday, October 14, 2015 1:30 PM
To: Henry, James; Howard Croft; Reynolds, Lawrence
Cc: Lane, Mike; Lytle, Darren; Andy Leavitt; Marc Edwards; Amy Hovey; Brent Wright; Dayne Walling; donna. cole; Krisztian, George (DEQ); Gerald (Jed) Natzke; Jamie Gaskin; Jason Lorenz; jmikewright; JoAnne Herman; John O'Brien; Kirk Smith; larry.koehler@mcc.edu; Groetsch, Kory J. (DHHS); Laura Sullivan; Michael Glasgow; Wright, Michael; Prysby, Mike (DEQ); Natasha Henderson; Norb Birchmeier; Pete Levine; Robert Bincsik; rosejo@msu.edu; Russell Hudson; Samir Matta; Schock, Michael; Sean Kammer; Busch, Stephen (DEQ); Warren Green; Wurfel, Brad (DEQ); Anthony Chubb; Kevin Keane; Valacak, Mark; Groetsch, Kory J. (DHHS); Bruneau, Michelle (DHHS); Wells, Eden (DHHS); Moran, Susan (DHHS); Lasher, GERALYN (DHHS); Miller, Corinne (DHHS)
Subject: RE: 3rd Quarter Water Report
Importance: High

Jim,

We've prepared 2 documents for you: one a fact sheet regarding lead in Flint water the other a more general infographic regarding the health effects of lead. We will send these to you for review as soon as we receive approval from the MDHHS communications office, hopefully today.

Earlier today, Kory Groetsch provided information we received from CDC regarding the 3 questions from Hamilton Health Center.

Linda D. Dykema, Ph.D.

Environmental Public Health Director
 Division of Environmental Health
 Michigan Department of Health & Human Services
 517.335.8566
dykemal@michigan.gov

From: Henry, James [mailto:jhenry@gchd.us]
Sent: Wednesday, October 14, 2015 12:55 PM
To: Howard Croft; Reynolds, Lawrence
Cc: Lane, Mike; Lytle, Darren; Andy Leavitt; Marc Edwards; Amy Hovey; Brent Wright; Dayne Walling; donna. cole; Dykema, Linda D. (DHHS); Krisztian, George (DEQ); Gerald (Jed) Natzke; Jamie Gaskin; Jason Lorenz; jmikewright; JoAnne Herman; John O'Brien; Kirk Smith; larry.koehler@mcc.edu; Laura Sullivan; Michael Glasgow; Wright, Michael; Prysby, Mike (DEQ); Natasha Henderson; Norb Birchmeier; Pete Levine; Robert Bincsik; rosejo@msu.edu; Russell Hudson; Samir Matta; Schock, Michael; Sean Kammer; Busch, Stephen (DEQ); Warren Green; Wurfel, Brad (DEQ); Anthony Chubb; Kevin Keane; Valacak, Mark
Subject: RE: 3rd Quarter Water Report

Hello everyone,

Similar to many of your organizations the Genesee County Health Department has been receiving many specific questions regarding risks from lead. We have partnered with MDEQ's Toxicology Division to try to get some answers. Our research has provided only limited information. Attached are EPA, CDC and a few other documents that have been extremely helpful, but they do not address many of the specific questions. Also, copied below is a CDC response to some of the questions.

Please feel free to comment and add to the list below. If anyone has official, scientific or generally accepted guidance, please share it. I'll compile a comprehensive FAQ document and share it back with the group.

Public FAQ's

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Jim Henry RS, MBA
Environmental Health Supervisor
Genesee County Health Department www.gchd.us
630 S. Saginaw St., Suite 4
Flint, MI 48502-1540
Phone (810) 257-3618 Fax (810) 257-3125
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Sent: Tuesday, October 13, 2015 5:59 PM

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Subject: Re: 3rd Quarter Water Report

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Michael Lane

Director, Environment, Health and Safety

The University of Michigan-Flint

810-766-6763

810-919-1709 cell

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From: Lytle, Darren [<mailto:Lytle.Darren@epa.gov>]

Sent: Tuesday, October 13, 2015 7:40 AM

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Cc: Marc Edwards; Amy Hovey; Brent Wright; Dayne Walling; donna. cole; dykemal; George Krisztian (DEQ); Gerald (Jed) Natzke; James Henry; Jamie Gaskin; Jason Lorenz; jmikewright; JoAnne Herman; John O'Brien; Kirk Smith; larry.koehler@mcc.edu; Laura Sullivan; Lawrence Reynolds; Lawrence Reynolds; Michael Glasgow; Wright, Michael; Lane, Mike; Mike Prysby (DEQ); Natasha Henderson; Norb Birchmeier; Pete Levine; Robert Bincsik; rosejo@msu.edu; Russell Hudson; Samir Matta; Schock, Michael; Sean Kammer; Stephen Busch (DEQ); Warren Green; Wurfel, Brad (DEQ); Anthony Chubb; Kevin Keane

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Cincinnati, Ohio 45268

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Fax: (513) 487-2543

email: lytle.darren@epa.gov

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Subject: 3rd Quarter Water Report

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Rennaker, Joanne (DEQ)

From: Marc Edwards <edwardsm@vt.edu>
Sent: Wednesday, October 14, 2015 1:08 PM
To: 'Henry, James'; 'Howard Croft'; 'Reynolds, Lawrence'
Cc: 'Lane, Mike'; 'Lytle, Darren'; 'Andy Leavitt'; 'Amy Hovey'; 'Brent Wright'; 'Dayne Walling'; 'donna. cole'; Dykema, Linda D. (DHHS); Krisztian, George (DEQ); 'Gerald (Jed) Natzke'; 'Jamie Gaskin'; 'Jason Lorenz'; 'jmikewright'; 'JoAnne Herman'; 'John O'Brien'; 'Kirk Smith'; larry.koehler@mcc.edu; 'Laura Sullivan'; 'Michael Glasgow'; 'Wright, Michael'; Prysby, Mike (DEQ); 'Natasha Henderson'; 'Norb Birchmeier'; 'Pete Levine'; 'Robert Bincsik'; rosejo@msu.edu; 'Russell Hudson'; 'Samir Matta'; 'Schock, Michael'; 'Sean Kammer'; Busch, Stephen (DEQ); 'Warren Green'; Wurfel, Brad (DEQ); 'Anthony Chubb'; 'Kevin Keane'; 'Valacak, Mark'
Subject: RE: 3rd Quarter Water Report

I agree that with one or two rare exceptions, it is ok to do all of the activities below. We did measure an average of 2000 ppb lead in one Flint home, over a flushing period of 25 minutes, in which case we redid the exposure calculations and showed that it could be significant.

That was a very exceptional case based on our sampling. I hope that this helps. So I agree with Dr. Arias.

Marc

From: Henry, James [mailto:jhenry@gchd.us]
Sent: Wednesday, October 14, 2015 12:55 PM
To: Howard Croft; Reynolds, Lawrence
Cc: Lane, Mike; Lytle, Darren; Andy Leavitt; Marc Edwards; Amy Hovey; Brent Wright; Dayne Walling; donna. cole; dykemal; George Krisztian (DEQ); Gerald (Jed) Natzke; Jamie Gaskin; Jason Lorenz; jmikewright; JoAnne Herman; John O'Brien; Kirk Smith; larry.koehler@mcc.edu; Laura Sullivan; Michael Glasgow; Wright, Michael; Mike Prysby (DEQ); Natasha Henderson; Norb Birchmeier; Pete Levine; Robert Bincsik; rosejo@msu.edu; Russell Hudson; Samir Matta; Schock, Michael; Sean Kammer; Stephen Busch (DEQ); Warren Green; Wurfel, Brad (DEQ); Anthony Chubb; Kevin Keane; Valacak, Mark
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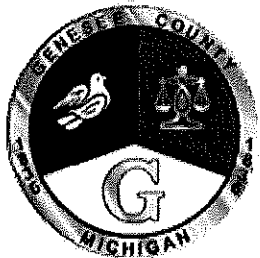
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Subject: RE: 3rd Quarter Water Report
Attachments: CDC - Lead - Tips - Sources of Lead - Water.website; EPA Is there lead in my drinking water.pdf; MDH Let it Run.pdf; WI DNR Lead in Drinking Water.pdf; Lead Brochure.pdf

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 Environmental Health Supervisor
 Genesee County Health Department www.gchd.us
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For a copy of the Health Department's Notice of Information Practices, contact the Health Department or visit the Health Department's website at <http://www.gchd.us/>

From: Howard Croft [<mailto:hcroft@cityofflint.com>]

Sent: Tuesday, October 13, 2015 5:59 PM

To: Reynolds, Lawrence

Cc: Lane, Mike; Lytle, Darren; Andy Leavitt; Marc Edwards; Amy Hovey; Brent Wright; Dayne Walling; donna. cole; dykemal; George Krisztian (DEQ); Gerald (Jed) Natzke; Henry, James; Jamie Gaskin; Jason Lorenz; jmikewright; JoAnne Herman; John O'Brien; Kirk Smith; larry.koehler@mcc.edu; Laura Sullivan; Michael Glasgow; Wright, Michael; Mike Prysby (DEQ); Natasha Henderson; Norb Birchmeier; Pete Levine; Robert Bincsik; rosejo@msu.edu; Russell Hudson; Samir Matta; Schock, Michael; Sean Kammer; Stephen Busch (DEQ); Warren Green; Wurfel, Brad (DEQ); Anthony Chubb; Kevin Keane; Valacak, Mark

Subject: Re: 3rd Quarter Water Report

All,

The comments continue to be helpful and I am making adjustments as we go. I spent two hours at the Health Department today at their board meeting and we have greatly enhanced the communication between the City and the GCHD. I will be attending their future board meetings and will keep Mark and Jim not just appraised but involved in directional decisions as we continue to craft short and long term plans.

On Tue, Oct 13, 2015 at 10:39 AM, Reynolds, Lawrence <LawrenceR@mottchc.org> wrote:

Thank you Mr. Lane. These points will help medical providers stay on message with information our families can act on .

From: Lane, Mike [mailto:mjlane@umflint.edu]

Sent: Tuesday, October 13, 2015 9:53 AM

To: 'Lytle, Darren'; Howard Croft; Andy Leavitt

Cc: Marc Edwards; Amy Hovey; Brent Wright; Dayne Walling; donna. cole; dykema; George Krisztian (DEQ); Gerald (Jed) Natzke; James Henry; Jamie Gaskin; Jason Lorenz; jmikewright; JoAnne Herman; John O'Brien; Kirk Smith; larry.koehler@mcc.edu; Laura Sullivan; Reynolds, Lawrence; Reynolds, Lawrence; Michael Glasgow; Wright, Michael; Mike Prysby (DEQ); Natasha Henderson; Norb Birchmeier; Pete Levine; Robert Bincsik; rosejo@msu.edu; Russell Hudson; Samir Matta; Schock, Michael; Sean Kammer; Stephen Busch (DEQ); Warren Green; Wurfel, Brad (DEQ); Anthony Chubb; Kevin Keane

Subject: RE: 3rd Quarter Water Report

Howard,

I agree with Darren that it may be a good idea to let the community know and prepare them that while switching back to Detroit water in the near future they will likely see discolored water, particulates, etc. during the transition.

Also, providing specific details on how to sample water in their homes would be helpful... the first draw, how long to flush before taking the second sample, how long water should sit in pipes before the first draw, etc.

It would further help to rebuild trust with the community to share the City's plan/timeline of more aggressive water quality sampling, specifically as it relates to lead exposure in homes and schools. Is there a timeline that can be shared which the City is working with to identify homes with lead service lines, and how can the City and State work together to assist those homeowners with mitigation. Perhaps indicating that the issue of lead is and will remain a high priority for the City until all households, schools, etc. have reliable/safe water quality regardless of whether the source of lead is from city transmission lines or a property owner's service line and home fixtures would also be helpful.

Mike

** ** *

Michael Lane

Director, Environment, Health and Safety

The University of Michigan-Flint

810-766-6763

810-919-1709 cell

mjlane@umflint.edu

From: Lytle, Darren [<mailto:Lytle.Darren@epa.gov>]

Sent: Tuesday, October 13, 2015 7:40 AM

To: Howard Croft; Andy Leavitt

Cc: Marc Edwards; Amy Hovey; Brent Wright; Dayne Walling; donna. cole; dykemal; George Krisztian (DEQ); Gerald (Jed) Natzke; James Henry; Jamie Gaskin; Jason Lorenz; jmikewright; JoAnne Herman; John O'Brien; Kirk Smith; larry.kochler@mcc.edu; Laura Sullivan; Lawrence Reynolds; Lawrence Reynolds; Michael Glasgow; Wright, Michael; Lane, Mike; Mike Prysby (DEQ); Natasha Henderson; Norb Birchmeier; Pete Levine; Robert Bincsik; rosejo@msu.edu; Russell Hudson; Samir Matta; Schock, Michael; Sean Kammer; Stephen Busch (DEQ); Warren Green; Wurfel, Brad (DEQ); Anthony Chubb; Kevin Keane

Subject: RE: 3rd Quarter Water Report

Howard,

I am in agreement with past comments and suggestions. Is this the time to let the public know your future plans? Are you expecting to be back to Detroit water next quarter? If so, that does not necessarily come without issues. It is a change and the potential for a brief upset (e.g., "red" water, particles, etc) exists. Would it be worth letting the public know in advance? Under "current drinking water issues", do you want to let residents know how and where to take samples here? A sampling plan (beyond LCR compliance sampling) is very important to understand the relative lead source (brass, solder and service lines) contributions, assess the current situation and the effectiveness of the return to Detroit water to reduce lead. You could state that one is being developed.

Darren

Darren A. Lytle, Ph.D., P.E.

Branch Chief (Acting)

U.S. Environmental Protection Agency

26 West Martin Luther King Dr.

Cincinnati, Ohio 45268

Phone: (513) 569-7432

Fax: (513) 487-2543

email: lytle.darren@epa.gov

From: Howard Croft [<mailto:hcroft@cityofflint.com>]

Sent: Sunday, October 11, 2015 7:29 AM

To: Andy Leavitt

Cc: Marc Edwards; Amy Hovey; Brent Wright; Lytle, Darren; Dayne Walling; donna. cole; dykema; George Krisztian (DEQ); Gerald (Jed) Natzke; James Henry; Jamie Gaskin; Jason Lorenz; jmikewright; JoAnne Herman; John O'Brien; Kirk Smith; larry.koehler@mcc.edu; Laura Sullivan; Lawrence Reynolds; Lawrence Reynolds; Michael Glasgow; Wright, Michael; Mike Lane; Mike Prysby (DEQ); Natasha Henderson; Norb Birchmeier; Pete Levine; Robert Bincsik; rosejo@msu.edu; Russell Hudson; Samir Matta; Schock, Michael; Sean Kammer; Stephen Busch (DEQ); Warren Green; Wurfel, Brad (DEQ); Anthony Chubb; Kevin Keane

Subject: Re: 3rd Quarter Water Report

All,

The comments were very helpful and I have made several revisions to the report that was sent yesterday, please review the amendments and forward any additional recommendations. I would like to solicit comments from anyone in the medical community that is willing to be quoted.

On Sat, Oct 10, 2015 at 12:03 PM, Andy Leavitt <aleavitt@senatedems.org> wrote:

I would echo Marc's sentiment on the bold language agreeing with his points but I would also add that trust needs to be rebuilt and the public simply will not believe anything in the document if you start by telling them it still meets standards. They do not differentiate between regs and rules but they know the water does not meet the standard of the physician community.

I would also recommend opening with timeline of going back to Detroit and what steps people can take to mitigate lead issues. Preferably with an excerpt from a physician.

The technical information matters for transparency but the trust gap is so wide that most people will be skeptical of all of it.

On Sat, Oct 10, 2015 at 11:48 AM Marc Edwards <edwardsm@vt.edu> wrote:

Hi Howard,

I think it is universally acknowledged now, that 30 seconds to 2 minutes flushing are not adequate, and **all public education should say 5 minutes flushing.**

I also think that given results of our team sampling 277 homes, the high levels of lead MDEQ detected in the Flint schools (a 90%ile over 15 ppb..which is horrible because they are not tier 1 plumbing sites), and the problems in the official LCR sampling conducted in late 2014-2015, that the following statement (in bold) is not really helpful in getting the message out about the current health risks. The bold statement seems more like wishful thinking or a legal position, and detracts from the goal of telling the public about the known problems.

*After 16 months of treating water from the Flint River, the City became aware that the while **still meeting all Safe Drinking Water Standards**, the level of corrosiveness could result in more lead leaching from service lines and household plumbing.*

That is my input. I am available at 540 231-7236 or 540 320-8740, if anyone should have questions about this.

Best Regards,

Marc Edwards

From: Howard Croft [mailto:heroft@cityofflint.com]

Sent: Saturday, October 10, 2015 8:33 AM

To: Amy Hovey; Andy Leavitt; Brent Wright; Darren Lytle; Dayne Walling; donna. cole; dykemal; edwardsm; George Krisztian (DEQ); Gerald (Jed) Natzke; Howard Croft; James Henry; Jamie Gaskin; Jason Lorenz; jmikewright; JoAnne Herman; John O'Brien; Kirk Smith; larry.koehler@mcc.edu; Laura Sullivan; Lawrence Reynolds; Lawrence Reynolds; Michael Glasgow; Michael Wright; Mike Lane; Mike Prysby (DEQ); Natasha Henderson; Norb Birchmeier; Pete Levine; Robert Bincsik; rosejo@msu.edu; Russell Hudson; Samir Matta; schock.michael@epa.gov; Sean Kammer; Stephen Busch (DEQ); Warren Green; Wurfel, Brad (DEQ); Anthony Chubb; Kevin Keane

Subject: 3rd Quarter Water Report

Team,

Included in this email is a copy of the first quarter water quality report that has been developed by the Utilities Division. Please take a look and offer any comments that you may have regarding content. There will be an additional one page insert containing three months test data inserted prior to distribution.

The purpose of the quarterly mailer is to increase communication, provide more transparency, and put more information into the hands of the public about what's occurring within the water system and with the infrastructure.

I will be putting together a separate weekly report for this Committee.

Thank you,

--

Howard Croft

Public Works Director

City of Flint

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Flint, MI 48502

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Centers for Disease
Control and Prevention
CDC 24/7: Saving Lives, Protecting People™

Water

How does lead get into my tap water?

Measures taken during the last two decades have greatly reduced exposures to lead in tap water. These measures include actions taken under the requirements of the 1986 and 1996 amendments to the Safe Drinking Water Act (<http://www.epa.gov/safewater/sdwa/index.html>) and the U.S. Environmental Protection Agency's (EPA's) Lead and Copper Rule (<http://www.epa.gov/safewater/lcrmr/index.html>).

Even so, lead still can be found in some metal water taps, interior water pipes, or pipes connecting a house to the main water pipe in the street. Lead found in tap water usually comes from the corrosion of older fixtures or from the solder that connects pipes. When water sits in leaded pipes for several hours, lead can leach into the water supply.

How do I know if my tap water is contaminated with lead?

The only way to know whether your tap water contains lead is to have it tested. You cannot see, taste, or smell lead in drinking water. Therefore, you must ask your water provider whether your water has lead in it. For homes served by public water systems, data on lead in tap water may be available on the Internet from your local water authority. If your water provider does not post this information, you should call and find out.

Does a high lead level in my tap water cause health effects?

High levels of lead in tap water can cause health effects if the lead in the water enters the bloodstream and causes an elevated blood lead level.

Most studies show that exposure to lead-contaminated water alone would not be likely to elevate blood lead levels in most adults, even exposure to water with a lead content close to the EPA action level for lead of 15 parts per billion (ppb). Risk will vary, however, depending on the individual, the circumstances, and the amount of water consumed. For example, infants who drink formula prepared with lead-contaminated water may be at a higher risk because of the large volume of water they consume relative to their body size.

What can I do to reduce or eliminate lead in my tap water?

If your tap water contains lead at levels exceeding EPA's action level of 15 ppb, you should take action to minimize your exposure to the lead in the water.

You should begin by asking your water authority these questions:

1. Does my water have lead in it above EPA's action level of 15 parts per billion (ppb)?

If the answer is no, no action is needed.

If the answer is yes, also ask the next question:

2. Does the service pipe at the street (header pipe) have lead in it?

This information is very important. It determines which of the next two actions (A or B) you should follow to protect your household's health.

A) If the pipe in the street (header pipe) DOES NOT have lead, the lead in your tap water may be coming from fixtures, pipes, or elsewhere inside your home.

Until you eliminate the source, you should take the following steps any time you wish to use tap water for drinking or cooking, especially when the water has been off and sitting in the pipes for **more than 6 hours**:

a. Before using any tap water for drinking or cooking, flush your water system by running the kitchen tap (or any other tap you take drinking or cooking water from) on **COLD** for **1–2 minutes**;

b. Then, fill a clean container(s) with water from this tap. This water will be suitable for drinking, cooking, preparation of baby formula, or other consumption. To conserve water, collect multiple containers of water at once (after you have fully flushed the water from the tap as described).

B) If the pipe at the street (header pipe) DOES contain lead, lead in the tap water may be coming from that pipe or connected pipes (it may also be coming from sources inside your home).

Until the lead source is eliminated, you should take the following steps any time you wish to use tap water for drinking or cooking, especially when the water has been off and sitting in the pipes for **more than 6 hours**. Please note that **additional flushing is necessary**:

a. Before using any tap water for drinking or cooking, run high-volume taps (such as your shower) on **COLD** for 5 minutes or more;

b. Then, run the kitchen tap on **COLD** for **1–2 additional minutes**;

c. Fill a clean container(s) with water from this tap. This water will be suitable for drinking, cooking, preparation of baby formula, or other consumption. To conserve water, collect multiple containers of water at once (after you have fully flushed the water from the tap as described).

3. In all situations, drink or cook only with water that comes out of the tap cold. Water that comes out of the tap warm or hot can contain much higher levels of lead. Boiling this water will NOT reduce the amount of lead in your water.

4. You can also reduce or eliminate your exposure to lead in drinking water by consuming only bottled water or water from a filtration system that has been certified by an independent testing organization to reduce or eliminate lead. See resources below.

5. Children and pregnant women are especially vulnerable to the effects of lead exposure. Therefore, for homes with children or pregnant women and with water lead levels exceeding EPA's action level of 15 ppb, CDC recommends using bottled water or water from a filtration system that has been certified by an independent testing organization to reduce or eliminate lead for cooking, drinking, and baby formula preparation. Because most bottled water does not contain fluoride, a fluoride supplement may be necessary.

Also, some bottled waters have not been tested and may not be appropriate for consumption. Contact independent testing organizations that certify bottled water. See [resources](#) below.

6. Make sure that repairs to copper pipes do not use lead solder.

Advice for lead safe water practices after plumbing work in housing with lead water lines or lead solder.

These practices include

1. Testing water after plumbing work in older housing. Please contact your [state lead program](#) (<http://www.cdc.gov/HealthyHomes/programs.html>) for information about water testing in your area.
2. Inspecting the aerator on the end of the faucet and removing any debris such as metal particles.
3. Flushing water lines before using the water for drinking or cooking.

If you own your home, you may also consider full replacement of lead water lines by removing the private lines running from the water meter into your home. This precaution has not been adequately studied, however, because the data available to CDC included too few homes having had full replacement of lead water lines. Contact your water authority for information about replacing water service lines.

If my water has high lead levels, is it safe to take a bath or shower?

Yes. Bathing and showering should be safe for you and your children, even if the water contains lead over EPA's action level. Human skin does not absorb lead in water.

This information applies to most situations and to a large majority of the population, but individual circumstances may vary. Some situations, such as cases involving highly corrosive water, may require additional recommendations or more stringent actions. Your local water authority is always your first source for testing and identifying lead contamination in your tap water. Many public water authorities have websites that include data on drinking water quality, including results of lead testing. Links to such data can be found on the EPA website: <http://www.epa.gov/safewater/dwinfo.htm> (<http://www.epa.gov/safewater/dwinfo.htm>).

Resources

Please visit the following sites for more information:

General:

[Blood Lead Levels in Residents of Homes with Elevated Lead in Tap Water---District of Columbia, 2004.](#) *MMWR*. April 2, 2004; 53(12):268-270.

Addendum: After release of the *MMWR* article titled "Blood Lead Levels in Residents of Homes with Elevated Lead in Tap Water -- District of Columbia, 2004," some reports have suggested erroneously that CDC determined that lead in residential tap water at concentrations as high as 300 parts per billion is 'safe.' CDC reiterates the key message from the 2004 article: because no safe blood level has been identified for young children, all sources of lead exposure for children should be controlled or eliminated. Lead concentrations in drinking water should be below the EPA action level of 15 parts per billion.

[EPA Ground Water & Drinking Water](http://www.epa.gov/safewater/lead/index.html) (<http://www.epa.gov/safewater/lead/index.html>)

This site includes comprehensive information on lead in drinking water. Safe Drinking Water Hotline: 1-800-426-4791.

Water Fluoridation:

CDC Oral Health Resources

This site includes water fluoridation fact sheets, frequently asked questions, and publications.

Bottled Water and Water Filters:

NSF International (<http://www.nsf.org/>)

A nonprofit organization that certifies bottled water

(http://www.nsf.org/consumer/bottled_water/index.asp?program=BottledWat) and water filters

(http://www.nsf.org/consumer/drinking_water/dw_treatment.asp?program=WaterTre).

Consumer Affairs Office toll-free hotline: 1-800-673-8010.

International Bottled Water Association (<http://www.bottledwater.org>)

The trade association that represents the bottled water industry.

Information Hotline: 1-800-WATER-11.

- Links to non-federal organizations are provided solely as a service to our users. These links do not constitute an endorsement of these organizations or their programs by CDC or the federal government, and none should be inferred. CDC is not responsible for the content of the individual organization Web pages found at these links.

Page last reviewed: June 15, 2013

Page last updated: October 15, 2013

Content source: National Center for Environmental Health (/nceh), Division of Emergency and Environmental Health Services (/nceh/eehs/default.htm)

WHAT IS LEAD?

- Lead is a toxic metal that is harmful if inhaled or swallowed.
- Lead can be found in air, soil, dust, food, and water.

HOW CAN I BE EXPOSED TO LEAD?

- The greatest exposure to lead is swallowing or breathing in lead paint chips and dust.
- Lead also can be found in some household plumbing materials and water service lines.

WHO IS AT RISK?

- Children ages 6 and under are at the greatest risk. Pregnant women and nursing mothers should avoid exposure to lead to protect their children.
 - Exposure to lead can result in delays in physical and mental development.
- Your child is also at risk if:

- your home or a home that your child spends a lot of time in was built before lead paint was banned in 1978.
- renovation work is being done in such a home.
- the adults in the home work with lead.

HOTLINES & INFORMATION

EPA Safe Drinking Water Hotline:
800-426-4791

National Lead Information Center:
800-424-LEAD
www.epa.gov/lead

NSF International:
www.nsf.org

Lead in Drinking Water Web Site:
www.epa.gov/safewater/lead

Additional Information:

Read the annual report you get from your water utility to find out about how they are working to reduce levels of lead in drinking water and other information about your drinking water. Call them if you have any questions.

Contact your local public health department or talk to your doctor about reducing your family's exposure to lead.



IS THERE LEAD IN MY DRINKING WATER?

You can reduce the risk
of lead exposure
from drinking water
in your home.



**Tips For
Protecting
Your Family's
Health**

Office of Water (4606 M)
EPA 816-F-05-001
February 2005

Printed on Recycled Paper

HOW DOES LEAD GET INTO WATER?

Lead enters the water ("leaches") through contact with the plumbing.

Lead leaches into water through:

- Corrosion* of
 - Pipes
 - Solder
 - Fixtures and Faucets (brass)
 - Fittings

*Corrosion is a dissolving or wearing away of metal caused by a chemical reaction between water and your plumbing.

The amount of lead in your water also depends on the types and amounts of minerals in the water, how long the water stays in the pipes, the amount of wear in the pipes, the water's acidity and its temperature.

HEALTH TIP

To help block the storage of lead in your child's body, serve your family meals that are low in fat and high in calcium and iron, including dairy products and green vegetables.



What should I do if I suspect that my water contains high lead levels?

- If you want to know if your home's drinking water contains unsafe levels of lead, have your water tested.
- Testing is the only way to confirm if lead is present or absent.
- Most water systems test for lead as a regular part of water monitoring. These tests give a system-wide picture and do not reflect conditions at a specific drinking water outlet.
- For more information on testing your water, call EPA's Safe Drinking Water Hotline at 800-426-4791.

Should I test my children for exposure to lead?

- Children at risk of exposure to lead should be tested.
- Your doctor or local health center can perform a simple blood test to determine your child's blood-lead level.
- If your child has a blood lead level at or above 10ug/dl, should take preventive measures.

QUICK TIPS TO REDUCE YOUR FAMILY'S EXPOSURE TO LEAD



Boiling your water will not get rid of lead.

- Use cold water for drinking or cooking. Never cook or mix infant formula using hot water from the tap.
- Make it a practice to **run the water at each tap** before use.
- Do not consume water that has sat in your home's plumbing for more than six hours. First, make sure to **run the water** until you feel the temperature change before cooking, drinking, or brushing your teeth, unless otherwise instructed by your utility.
- Some faucet and pitcher filters can remove lead from drinking water. If you use a filter, be sure you get one that is certified to remove lead by the NSF International.

Let it run. . . and get the lead out!

Important information on how to protect your health

Lead is a common metal that has been in many consumer products but is now known to be harmful to human health if ingested or inhaled. It can be found in lead-based paint, air, soil, household dust, food, some types of pottery, and drinking water. When people come in contact with lead, it may enter their bodies and accumulate over time, resulting in damage to the brain, nervous system, red blood cells, and kidneys.

The following is information about lead in drinking water: why it is a cause for concern, how it enters water, and most importantly, simple precautions you can take to protect you and your family.

Why is lead in drinking water a problem?

Drinking water is not our only source of lead exposure. However, combined with other sources, lead in water can increase the build-up of lead in our bodies. Lead in water can be a special problem for infants, whose diets may be mostly liquids, such as baby formulas or concentrated juices mixed with water. Smaller bodies can absorb lead more rapidly than bigger ones, so amounts of lead that won't hurt an adult can be very harmful to a child. A child's mental and physical growth can be permanently harmed by too much lead.

How does lead get into my drinking water?

Lead is rarely found in natural sources of water such as rivers and lakes or underground aquifers. However, it may work its way into drinking water after the water has left the treatment plant and is on its way to people's faucets. This usually happens through the corrosion of materials containing lead in household plumbing. These materials include brass faucets, lead solder on copper pipes, lead pipes, or lead service lines connecting the water main to the inside plumbing.

Lead pipes are no longer installed for service lines or in household plumbing, and lead solder has been outlawed in Minnesota since 1985. The amount of lead allowed in brass faucets has also been limited, but can still contribute some lead to drinking water (note that many faucets are made of brass even if they do not have a "brass" color). Even with these restrictions in place, some homes—especially older homes—may still have significant amounts of lead in their plumbing systems.

How can I reduce lead in my drinking water?

Let It Run. Flush taps before using water from them for drinking or cooking. Water that stands idle in pipes for long periods of time—such as overnight or during the day when people are gone to work and school—is more likely to absorb materials from the plumbing system. The best way to rid the pipes of water that may contain lead is to let the cold-water faucet run until you feel that the water is as cold as it will get. The amount of time this takes will depend on your home and how its plumbing is arranged—but you should always run the water for at least 60 seconds. If your home has a lead service line (which you can determine by asking your local water utility), you should flush water for an additional 2 to 3 minutes to make sure you are getting fresh water from the water main. Be sure to flush standing water before using any water for drinking or cooking purposes.

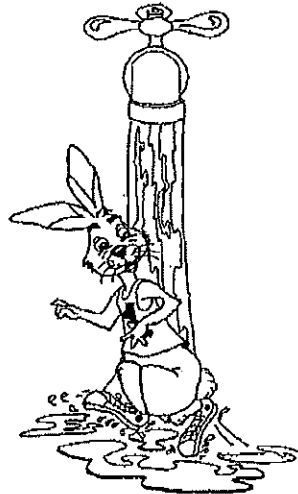
Tips for flushing:

- 💧 Other household water uses will also help clear standing water from your home's plumbing. For example, you may want to establish a routine of doing household tasks that use water—such as showering, flushing the toilet, or running the dishwasher—first thing in the morning before using water for drinking or cooking. Keep in mind that you'll still need to flush individual faucets for a short time before using them for drinking water.
- 💧 The water you run from drinking water taps does not have to be wasted. You can use this water for cleaning purposes or for watering plants.
- 💧 You may want to keep a container of drinking water in your refrigerator, so you don't have to run water every time you need it.

Use Only Cold Water for Cooking and Drinking. Hot water dissolves lead more quickly than cold water, so don't use water from your hot-water faucet for cooking or drinking. If you need hot water for cooking or drinking, take water from the cold tap and heat it. It is especially important not to use the hot water for making baby formula.

Will water treatment devices help?

Some treatment devices can reduce the amount of lead in your drinking water. Reverse-osmosis and distillation units can be used for that purpose. A few types of water filters also remove lead. Check the product literature to be sure it has been certified for lead removal by NSF International (<http://nsf.org>). Also, you must follow the manufacturer's recommendations for operation and maintenance to ensure that the treatment equipment works correctly.



Let it run!

How can I get my water tested for lead?

Testing for lead can help determine if there is too much in your drinking water. Many laboratories can test your water to see if there is a lead problem. Fees will vary between labs. Check your Yellow Pages under "Laboratories-Testing."



Minnesota Department of Health *Division of Environmental Health*
625 North Robert Street P. O. Box 64975 St. Paul, Minnesota 55164-0975
<http://www.health.state.mn.us/divs/eh/water>



141-0715
September 2007

WHAT IS LEAD?

- Lead is a toxic metal that is harmful if inhaled or swallowed.

WHAT HEALTH EFFECTS CAN LEAD CAUSE?

- At high levels, lead can cause serious illness affecting many parts of the body.
- More often, low levels cause learning disabilities without any obvious illness.

WHO IS AT RISK?

- Children ages 6 and under are at greatest risk.
- Pregnant women and nursing mothers should also avoid exposure.

MORE INFORMATION

Information on lead in water:

EPA Safe Drinking Water Hotline
800-426-4791

Lead in Drinking Water Website
www.epa.gov/safewater/lead

To get your water tested:

Calhoun County
Environmental Health Division
269-969-6341

Information on lead in general:

National Lead Information Center
800-424-LEAD



Calhoun County Public Health Department
190 E. Michigan Avenue
Battle Creek, Michigan 49014
(269) 969-6370 (Tel)
(269) 966-1489 (Fax)
www.calhouncountymi.gov/publichealth



CALHOUN COUNTY PUBLIC HEALTH DEPARTMENT

IS THERE
LEAD
IN MY
DRINKING
WATER?



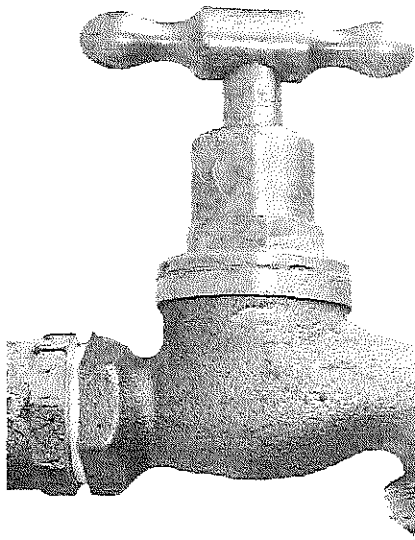
Tips for Protecting Your Family's Health

HOW DOES LEAD GET INTO WATER?

Lead enters tap water through contact with your plumbing.

Some plumbing parts contain lead. Water can absorb lead as it flows through them.

Today, plumbing parts made for drinking water contain very little or no lead. However, the plumbing installed in your home probably has more lead in it than plumbing being installed today. Here are some examples of plumbing materials that contain lead:



- Interior lead pipes, which were often installed in new homes until around 1930.

- For city water users, an underground lead pipe connecting your home to the water main. This is most likely for homes built before 1950.

- Lead solder at copper pipe joints. Lead solder was banned for use on drinking water pipes in 1987.

- Brass or bronze parts, including chrome-plated faucets. Brass tends to contain about 5% lead, but the percentage used in faucets has dropped, starting in the late 1990s.
- Laundry room faucets and outdoor faucets, which can be higher in lead, since they are not intended for drinking use.

HOW DO I KNOW IF THERE IS LEAD IN MY WATER?

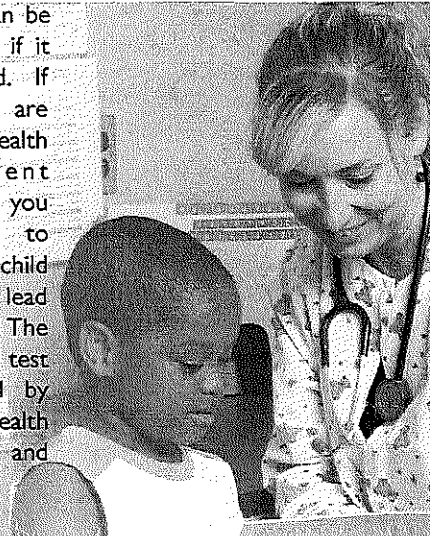
Testing the water at the faucet is the only way to know for sure. Testing the faucets you use for drinking water is a good idea for both well owners and city water users. City water departments test their water for lead, but these tests can't rule out problems caused by your home's plumbing.

You can visit the Environmental Health office to pick up a test kit. We are located at 190 E. Michigan Ave., Battle Creek. The test costs \$24. Or, you can purchase a mail-in test kit from a home improvement store.

If a test shows a high level of lead (above 15 ug/L or 0.015 mg/L), call the Safe Drinking Water Hotline at 1-800-426-4791 to learn more about reducing the level.

SHOULD MY CHILD BE TESTED?

A simple blood test can check for lead in your child's body. Thousands of children in Calhoun County get tested every year. You can ask your health care provider if testing is recommended for your child. The test is usually done at 12 and 24 months of age, but can be done later if it was missed. If the results are high, the health department will help you find ways to keep your child away from lead sources. The cost of the test is covered by most health plans and Medicaid.



QUICK TIPS TO REDUCE LEAD IN YOUR DRINKING WATER

- Don't drink water that stood in your plumbing for more than 6 hours. First run the water until the temperature stops changing.
- Don't run hot water for drinking or cooking. For infant formula, heat cold tap water with a stove or microwave.
- Once a month, remove the aerator from your faucet, and clean the inside.
- If you plan to buy a home water filter, check the box to see if it's certified to remove lead.
- To help block the effects of lead, serve your family meals that are low in fat and high in calcium and iron, including dairy products and green vegetables.
- Boiling your water will NOT get rid of lead.

DON'T FORGET ABOUT LEAD PAINT

The most dangerous source of lead is lead paint. Old lead paint releases chips or dust that children can get into their mouths. Most homes built before 1978 have some lead paint. A lead professional can check your house or apartment for lead paint. If you qualify for assistance, the state government can help pay for this, and for fixing any problems that are found. Call MI Healthy Homes at 1-866-691-LEAD to find a certified professional or to find out if you qualify for assistance.

Rennaker, Joanne (DEQ)

From: Crooks, Jennifer <crooks.jennifer@epa.gov>
Sent: Tuesday, July 28, 2015 9:47 AM
To: Shekter Smith, Liane (DEQ); Benzie, Richard (DEQ); Philip, Kris (DEQ); Monosmith, Carrie (DEQ); DeBruyn, Dana (DEQ); Dettweiler, Dan (DEQ); Busch, Stephen (DEQ); Prysby, Mike (DEQ); Cook, Pat (DEQ); Holdwick, Kevin (DEQ)
Cc: Poy, Thomas; Bair, Rita; Damato, Nicholas; Shoven, Heather; Kuefler, Janet; Murphy, Thomas; Porter, Andrea; Deltoral, Miguel
Subject: Final Notes from Michigan semi-annual call on 6/10

I was supposed to finalize these in mid-July, but I didn't receive any changes from anyone, so these notes are final now. Thank you all again for participating.
 Jennifer

From: Crooks, Jennifer
Sent: Wednesday, July 01, 2015 5:31 PM
To: Shekter Smith, Liane (DNRE); Richard Benzie; kris philip; Monosmith, Carrie (DNRE); DeBruyn, Dana (DEQ); Dettweiler, Dan (DEQ); Busch, Stephen (DEQ); 'Prysby, Mike (DEQ)'; 'cookp@michigan.gov'; Holdwick, Kevin (DEQ)
Cc: Thomas Poy; Bair, Rita; Damato, Nicholas; Shoven, Heather; Kuefler, Janet; Murphy, Thomas; Porter, Andrea; Deltoral, Miguel
Subject: Draft Notes from Michigan semi-annual call on 6/10

All—Below are my draft notes from our call last week, June 10, 2015. Thank you all for participating. I apologize for the delay in getting these out in draft to you all for review—I was hoping to get a couple of items ironed out that were fuzzy during our discussions, but hasn't happened yet. Several ACTION items below. So, please review to make sure I documented our discussion/agreements correctly, and feel free to edit as needed. I you could get back to me by July 13, that would be great. Thank you!

Jennifer

Attendees:

MDEQ: Liane Shekter-Smith, Richard Benzie, Carrie Monosmith, Kris Philip, Dan Dettweiler, Marjorie Rodriguez (Student), Kevin Holdwick, Mike Prysby, Dana DeBruyn, Steve Busch
 EPA Region 5: Tom Poy, Rita Bair, Nick Damato, Janet Kuefler, Michele Palmer, Tom Murphy, Heather Shoven, Cary McElhinney, Andrea Porter, Miguel Deltoral, Mostafa Nouredin

Summary:

1.Changes in Lead Disinvestments and Commitments for FY 2016 ARDP—for discussion: Due to our extreme focus on lead in drinking water, this is the consensus here.

a. Consumer notification of tap results at NTNCWSs:

(Suggested wording) The NCWS program commits to full implementation of the lead consumer notification of tap results requirement, to begin in CY 2016. Region 5 will assist in a notification outreach effort in late FY 2015 to remaining 698 NTNCWSs that are not schools/daycares, to begin providing lead consumer notice in CY 2016. NCWS program commits

to include information on providing lead consumer notice in the annual monitoring letter sent to all NTNCWSs for CY 2016.

STATE: The State found this change in the wording acceptable.

b. Collection of Lead samples at NTNCWSs during June – September 2016 timeframe

(Suggested wording) NCWS program commits to including information in the applicable NTNCWS annual monitoring letters of the requirement to collect their annual/triennial lead sample between June and September only, during CY 2016. The MDEQ NCWS program currently does not have the capability to easily track lead sampling compliance within this specific timeframe.

STATE: The State found this change in the wording acceptable.

c. Follow-up Actions for NTNCWSs that sample outside of June-September 2015 timeframe

(From 5/5/15 call notes w/EPA) MDEQ commits to providing Region 5 with all CY 2015 lead (and copper?) sample data for all NTNCWSs by March 2016 so that EPA can analyze how many PWSs monitored outside the June through October timeframe. EPA commits to follow-up with MDEQ to discuss follow-up actions.

STATE: The State agreed to providing EPA R5 the raw lead and copper data for all CY 2015 for all NTNCWSs. The WaterTrack database does have data, but it can't generate violations. MDEQ doesn't commit to enforcing against 2016 violators in FY 2016. The State said, it is planning on disinvesting in enforcing against these violators due to limited capability of WaterTrack; however, if the State's noncommunity data management capabilities improve during FY 2016, implementation of this disinvestment may become a reality. The State has not designated an alternate timeframe, or done system specific documentation as to why the system qualifies for a different timeframe.

d. Submittal of the lead and copper reporting form

(Suggested wording) MDEQ commits to requiring CWSs and NTNCWSs to submit the lead and copper reporting form via the annual monitoring letters to each system, tracking CWSs and NTNCWSs submittal of the lead and copper reporting form, and commits to issuing violations for failure to submit the lead and copper reporting form. The reporting form provides the address of the sample site, designates sampling site selection criteria, and explanation(s) for any changes in sampling sites.

STATE: Dan Dettweiler stated that the NCWS program was not in a position to do this for the NTNCWSs at this time. Tom Murphy asked how does WaterTrack handle/track high lead results? Tom M said there is a truncation issue on the sample location name field. Dan acknowledged that this problem has been identified, and the Department of Technology Management and Budget (DTMB) has been trying to fix this problem, but it is a challenging problem. Dan stated that sample sites for NTNCWSs are actually identified by LHDs during the sanitary survey and are documented in the sanitary survey. The LHDs check the pdf of the laboratory results that clearly states where the sample was taken, and calculates the 90th percentile. However, Dan stated that the requirement to send in the lead and copper reporting form is not currently in the LHD annual monitoring letter sent to each system. The NTNCWSs do not couple this form to the Lead Consumer Notice, as does the CWSs. Kris Philip pointed out that the LHDs select the sample sites, thus when they are calculating the 90th percentile, they are actually double checking the sites with the results.

From our discussion, the Region concluded that at this time, the LHDs are actively reviewing the lead and copper results and the sample locations when they calculate the 90th percentiles to ensure proper LCR monitoring is conducted by ALL NTNCWSs at the proper sample sites. After our call, I asked for verification of this statement, and Dan Dettweiler

responded, "Just as with an exceeding value of an MCL, WaterTrack alerts the LHD when at least one sample for a water system exceeds the AL. A 90th percentile calculation is made only when an exceeding result alerts the LHD. For cases where there are no exceeding results, private lab samples are reviewed at the time LHDs hand-enter them into WaterTrack. State lab samples, which flow electronically via nightly downloads from the state lab database, are reviewed when pdfs of the analysis reports are, routinely, emailed by the state lab to LHDs. Beyond that, MDEQ's annual evaluation of the LHDs provides another opportunity for us to oversee the proper assigning and use of designated sampling locations."

ACTION: The Region will discuss Dan's response internally, and get back to the State with any issues/concerns.

Kris Philip said that the CWS program is requiring that the systems submit the form, but they are not enforcing whether or not the system submits the form. Often, the CWS will submit the Lead Consumer Notice and the Lead and Copper reporting form together. Kris said if 90%+ are already submitting the forms, then the State will agree to follow-up and enforce this requirement. But, if less than that, will probably be too much of a burden. Kris said they may change the way DEQ is tracking in SDWIS during FY 2016. But, the Region said SDWIS-Prime probably won't be available until 2017 at the earliest.

ACTION: Kris Philip will research with the District Offices to determine the current submittal rate of the lead and copper reporting form from CWSs; and report back to the Region.

2. Enforcement Update with Heather

NTNCWSs under Bottled Water agreements due to Arsenic MCL violations:

Per discussions with Region 5 and the February 2014 EPA/OECA memo, MDEQ has closed the old Arsenic open-ended MCL violations; however, no further quarterly monitoring is being conducted at the (± 27) systems that are still under bottled water agreements. Thus, no more arsenic MCL violations will be reported for these systems and these systems will not become priority systems (ETT score of 11 or more) since only one arsenic MCL violation will be reported (5 points) even though they have a longstanding issue with arsenic noncompliance. The Region would like to discuss the pros and cons of placing these PWSs with arsenic MCL violations on quarterly monitoring as required under 40 CFR Section 141.23(c)(7); and brainstorm possible solutions.

Heather provided an update on how the State is doing in returning ETT systems to compliance; the State is doing very well in achieving its commitment for FY 2015. Heather said the Region is glad to see the State and LHD prioritization of implementation of the drinking water program and NTNCWS schools and daycares.

Referring to the NTNCWSs under BW agreements that are in violation of the Arsenic MCL, Heather said that since there are no more open-ended MCL violations in SDWIS, that no MCL violations can be reported to SDWIS unless there is monitoring to show the system is in non-compliance. Even though the LHD has indicated that these systems are drinking bottled water for public health protection, the use of bottled water cannot be a permanent solution to the fact that the system's drinking water at the tap continues to exceed the MCL for arsenic. Dan said there are 22 systems, where 8 are schools, that should be conducting quarterly monitoring. Dana said that letters have been sent (OR drafted?) to these 22 systems to require quarterly sampling for arsenic; these 22 systems are in 10 different counties so the message from the State is consistent. A secondary effect of this new requirement for the systems, may be that they transition to another water source or install treatment sooner.

The State voiced a concern that multiple quarterly violations could potentially affect the State's relationship with the LHDs financially. Genesee and Oakland Counties have quite a number of noncommunity water systems. Multiple quarterly violations could affect the Dept of Community Health's determination as to whether the LHDs are meeting their minimum program requirements; thus receive full funding for their work with the noncommunity systems for the drinking water program. The LHDs cannot have more than 20% of their systems with violations. The Region wonders how much funding would be cut from a LHD contract if it exceeds the 20% noncompliance level set in the contract?

3. Status of Flint

a. TTHM levels for May—Due to MDEQ district engineer June 10-RECEIVED; see link to results

<https://www.cityofflint.com/2015/06/01/may-water-testing-results-show-all-locations-are-within-acceptable-limits-for-tthm/>

All samples below the TTHM MCL; one site still has an LRAA above the MCL but decreased from 105 ppb in Feb to 93.5 ppb in May.

Mike Prysby said he is getting ready to issue the construction permit to the City of Flint to install a GAC filter in July, that will remove more TOC to further reduce the potential of developing TTHMs. Mike said he has already issued a construction permit for a transmission line within the City that will help reduce water age.

b. Lead in Flint

Our discussions with MDEQ indicate that no phosphates/corrosion control has been added to the system since April 2014 when the source of drinking water changed to the Flint River. We understand that the City is just finishing up its second set of 6-month initial monitoring for lead; where the results will probably warrant a Corrosion Control Study to be conducted. Since Flint has lead service lines, we understand some citizen-requested lead sampling is exceeding the Action Level, and the source of drinking water will be changing again in 2016, so to start a Corrosion Control Study now doesn't make sense. The idea to ask Flint to simply add phosphate may be premature; there are many other issues and factors that must be taken into account which would require a comprehensive look at the water quality and the system before any treatment recommendations can/should be made. Miguel is recommending MDEQ and EPA? approach Flint about formally requesting EPA's Office of Research and Development in Cincinnati support on the lead in Flint drinking water issue, and request that Mike Schock, ORD, and possibly Darren Lytle, ORD, to participate in Flint's drinking water advisory committee so that a comprehensive evaluation on how to proceed can be discussed.

Miguel provided a brief summary of the high lead results found at the residence of Ms. Leeanne Walters in Flint. Miguel will follow up with a written summary of the work conducted, sample results, and conclusions.

Miguel believes that lead levels in Flint are being affected by the lack of Corrosion Control being conducted by the City, since the LCR requires 2 6-month initial monitoring for a new source. Steve Busch stated that in the Lead sampling pool, almost all of the lead sample sites are lead service lines, and the State is not seeing large increases in lead levels at the tap. Miguel suggested that EPA experts in Lead, Mike Schock; and in distribution systems, Darren Lytle, be added to the Flint drinking water advisory committee to assist the City/State in determining the best way to proceed to minimize lead in the City's drinking water during the interim use of the Flint River, and subsequent use of Lake Huron water.

Miguel said he will send Mike Schock and Darren Lytle's contact information to Steve and Mike. Steve pointed out that the City is following the LCR requirements, and completing the requirements in a timely manner. Miguel's point is that since the LCR was promulgated 20+ years ago, that research and different situations, like Washington D.C., have educated scientists, experts, and regulators that the existing requirements in the LCR may not be as protective as previously thought. Thus, he can only make recommendations as to how to revise sampling protocols. And Miguel acknowledges that it may be another year before these regulation changes are promulgated in the Long-Term Lead and Copper Rule. In December 2015, the NDWAC recommendation is expected.

The Region asked the State if the Flint River will be a permanent supplemental source of drinking water, once the City of Flint connects with the Karegdodi pipeline from Lake Huron. Mike Prysby said that the City is currently pumping 22MGD, but the City has 40-50 MG of storage. The City is currently working on reducing its unaccounted for water losses, and these water losses are dropping. The State, through the Governor's office, provided disadvantaged system funding, \$2M which includes \$900K for lead detection, and pipe inspection.

4. Update on WaterTrack to SDWIS-State: The migration of WaterTrack data to SDWIS-State was number 39 on the Dept of Technology Management and Budget's (DTMB) project list last year; this year it is

number 30. It doesn't appear this project has a high priority. Does the State have any new information on the progress of this project?

Dan said that the migration of WaterTrack data to SDWIS-State has moved to a priority of 26 with DTMB so far this year. But Dan said they are going to take this project out of the queue, since Ronda Page has returned to the drinking water program from DTMB. Ronda said she re-estimated DTMB's involvement in this project to be far less than originally thought, so there is no need for any program developers or the tech team. This project will only need the Data Team and the web designers only. Ronda said they can set-up on a new server and migrate the data from WaterTrack to SDWIS-State themselves; in-house. Kris Philip remembers migrating the CWS data to SDWIS-State, so she can be a resource for this project. The parts that are needed to be completed by DTMB could be contracted out. Cary McElhinney said that there is a process of withholding PWSS grant funds and re-directing the funds to a HQ contract with SAIC. Richard Benzie said the process worked well last year when MI used PWSS funds to contract with a HQ contractor to conduct NEEDS survey training.

ACTION: Jen will follow up with State and Tribal Programs Branch about the process and timing of holding back funds from the PWSS grant for the purpose of contracting with SAIC.

5. Consequences of cutting the State drinking water program to a "minimal program"

Jennifer had a discussion with Richard Benzie regarding the possibility of the Michigan State Legislature looking to have just a minimal drinking water program, meaning only a program with activities that are required by the Federal SDWA. Jennifer ultimately discussed this internally with Tom Poy. The minimal program suggested would cut out Operator Certification, Capacity Development, Plan Review, Cross Connection Control, Source Water Protection, among other programs that are State required. Operator Certification and Capacity Development, while not required by the Federal regulations, do have financial strings attached. And Plan review/construction permits are required by the SRF program for a loan. Any recent communication with the State Legislature that they might proceed and make this possibility a reality?

Richard and Liane said there is no current threat from the State Legislature to cut the State-funded PWSS program activities. But there is a State-wide impetus to delete old programs and regulations, so this could lead to questioning the purpose of State-funded PWSS program activities. Richard is just being proactive in preparing a justification. Richard remembers a discussion many years ago about what constitutes a "comprehensive drinking water program". Tom Poy and Jennifer commented in a previous communication with Richard that the EPA PWSS primacy program and the State-funded activities in the drinking water program were meant to complement each other. To support this statement, Jennifer sent Richard some PWSS Priority guidance from the 90's, some preamble language from the 1976 SDWA found by our attorney, and language from Section 142 of the SDWA regulations from 1976 that might assist him in his justification.

6. EPA's Resource Message at the LHD Workshop in April

From the 2014 analysis of Shared Goals 2013 data, which is compliance data, for noncommunity systems, there are increasing trends of nitrate M/R violations for both NTNCWSs and TNCWSs. We discussed this on the last semi-annual call. Analysis of the 2015 Shared Goals 2014 data (April 2015) shows an improvement—that of decreasing numbers of bacte/nitrate M/R violations.

However, in light of the upcoming implementation of RTRC in 2016, the question raised here in the Region is:

Does the State have a plan with the LHDs as to what activities must be prioritized, and what will fall off the plate? Not all LHDs will need to disinvest based upon each LHD's resources, but some poorly funded LHDs may have to disinvest in some activities/drop activities that have no risk to public health.

Carrie Monosmith said that she met with the RTCR workgroup, comprised of LHD Directors/sanitarions, last fall to identify activities that the state can disinvest in during the next several years as the LHDs begin implementation of RTCR. They could not identify any activity that could be dropped. The main thing that will help the LHDs save time is to get the electronic DWR (eDWR) going, or the CMD portal, which will drastically reduce the LHDs time in inputting laboratory data into WaterTrack/SDWIS-State. From there, they can develop electronic data forms (CROMEER compliant) that the systems can submit.

Thank you!

Jennifer

shekterl@michigan.gov; 'Richard Benzie' <benzier@michigan.gov>; 'kris philip' <philipk@michigan.gov>; 'Monosmith, Carrie (DNRE)' <MONOSMITHC@michigan.gov>; 'DeBruyn, Dana (DEQ)' <DebruynD@michigan.gov>; Dettweiler, Dan (DEQ) <DETTWEILERD@michigan.gov>; Poy, Thomas <poy.thomas@epa.gov>; Kuefler, Janet <kuefler.janet@epa.gov>; Damato, Nicholas <damato.nicholas@epa.gov>; Shoven, Heather <shoven.heather@epa.gov>; Murphy, Thomas <murphy.thomas@epa.gov>; Bair, Rita <bair.rita@epa.gov>; McElhinney, Cary <mcelhinney.cary@epa.gov>; Pniak, Edward <pniak.edward@epa.gov>; 'cookp@michigan.gov'; 'Prysby, Mike (DEQ)' <PRYSBYM@michigan.gov>; Busch, Stephen (DEQ) <BUSCHS@michigan.gov>

Rennaker, Joanne (DEQ)

From: Crooks, Jennifer <crooks.jennifer@epa.gov>
Sent: Thursday, September 10, 2015 5:58 PM
To: Shekter Smith, Liane (DEQ)
Cc: Benzie, Richard (DEQ); Busch, Stephen (DEQ); Prysby, Mike (DEQ); Poy, Thomas; Porter, Andrea; Devereaux, Tracy Jo (DEQ); Kuefler, Janet; Shoven, Heather; Deltoral, Miguel
Subject: Final Notes from call Tuesday 8/31/15 with MI DEQ RE: Flint

Thank you, Liane, for your edits—I incorporated all of your edits, and further clarified who said what.
 Jennifer

Date: August 31, 2015
Present: Liane Shekter Smith, Richard Benzie, Steve Busch, (2 other MDEQ staff?), Tom Poy, Andrea Porter, Janet Kuefler, Jennifer Crooks

STRATEGIC NEXT STEPS FOR FLINT TO ADDRESS LEAD CORROSION CONCERNS

Tom Poy discussed Marc Edwards' website, "Flint, MI Water Study Updates" (<https://flintwaterstudyupdates.wordpress.com/>). The discussion focused on the lead sampling and analytical results Marc Edwards' team posted to their website. Tom emphasized that EPA is not involved with Marc Edwards' work in Flint. Tom mentioned that the Edwards team's samples may not have been analyzed by a certified lab (which is only required for compliance samples) nor taken from sites that qualify as Tier 1 for LCR compliance sampling, but the results give further evidence that lead levels in Flint are trending upward. (The conclusion that there is an increasing trend of lead concentrations at consumer taps builds upon earlier compliance sampling taken by Flint in 2014 and 2015 that showed the 90th percentile of the 1st 6-month sampling period at 6ppb, then the 90th percentile of the 2nd 6-month sampling period at 11ppb.) Everyone at the meeting agreed that Flint is in compliance with the Safe Drinking water Act action level for lead. However, because the city's population exceeds 50,000 persons, MDEQ stated that Flint needs to additionally optimize their treatment process to reduce lead levels further, if possible.

The "Flint, MI Water Study Updates" website is putting added pressure on MDEQ and EPA to ensure that Flint addresses their lack of optimized corrosion control treatment in an expedited manner in order to protect the residents from exposure to high lead levels. Richard noted that there are numerous systems across the country that have installed corrosion control treatment, have optimized their corrosion control, but did not necessarily reduce their lead levels. We all acknowledged that this is true. MDEQ acknowledged that implementing installation of corrosion control treatment in Flint is prudent to protect public health since there are approximately 15,000 lead service lines within the city. EPA acknowledged that to delay installation of corrosion control treatment in Flint would likely cause even higher levels of lead over time as Flint's many lead service lines are continuously in contact with corrosive water.

Region 5 and MDEQ brainstormed on strategic next steps for Flint to address lead corrosion concerns. These steps included:

1. **Public Education for Flint Residents.** Liane has contacted the Department of Community Health to discuss developing a consumer lead education piece outlining the consumer's options to lower the lead in their drinking water. The Region was glad to hear of a plan to initiate Lead Public Education since this will provide the public immediate actions they can take. The educational material could include steps consumers can take to reduce their exposure to lead in drinking water (flushing their lines after long stagnation periods, using filters certified to remove lead, etc.) as well as longer term fixes to remove lead sources (for example, financing the cost to

remove any part of a lead service line on the owner's property at the same time as Flint is replacing its portion of the lead service line).

2. **Gathering Information on Flint's Future Treatment Plans.** Steve Busch said Flint and their engineering consultants were meeting this week (Sept 1) to discuss conceptually the necessary optimized corrosion control treatment at Flint. Tom Poy shared EPA lead experts' (Mike Schock and Darren Lytle of EPA's Office of Research and Development in Cincinnati) caution against simply adding orthophosphate without first studying the water quality and existing distribution system conditions to ensure that any installed treatment has a good chance of working. EPA lead experts have research and field experience showing the complexity of optimizing corrosion control treatment when water quality is significantly changed, as is the case for Flint.
3. **Offering Flint Free Help from EPA Experts.** Steve Busch has already provided the names of EPA lead experts (Mike Schock and Darren Lytle) to Flint, as has Susan Hedman, R5 Administrator. MDEQ and Region 5 agree that, to successfully control lead corrosion in the distribution system, Flint needs to review this situation holistically, while also addressing the lead issue in an expedited manner.
4. **Laying Groundwork for MDEQ/EPA Collaboration with Flint.** If Flint accepts the offer of technical assistance for optimizing corrosion control, Tom Poy suggested that MDEQ and EPA lead experts (Mike Schock and Darren Lytle) form a partnership to provide such help. EPA experts are able to provide pipe scale analyses, as well as other laboratory support. Although Flint (using their consultant) bears the ultimate responsibility for designing and installing corrosion control, MDEQ and EPA experts are willing and able to provide advice throughout the process.

END

Jennifer

Jennifer Kurtz Crooks
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Rennaker, Joanne (DEQ)

From: Shekter Smith, Liane (DEQ)
Sent: Monday, August 03, 2015 3:34 PM
To: Cook, Pat (DEQ); Busch, Stephen (DEQ)
Subject: FW: FOR REVIEW: MDEQ - Flint Call Notes
Attachments: MDEQ Call on July 21_call notes v4.docx

Just received the attached. Haven't reviewed it yet.

From: Hyde, Tinka [<mailto:hyde.tinka@epa.gov>]
Sent: Monday, August 03, 2015 3:31 PM
To: Shekter Smith, Liane (DEQ)
Cc: Poy, Thomas; Bair, Rita
Subject: FOR REVIEW: MDEQ - Flint Call Notes

Hi Liane – Attached are our notes from our call on 7/21 regarding Flint Drinking Water System. Please take a look and let me know if you have any questions or comments. Thanks

Rennaker, Joanne (DEQ)

From: Laura Sullivan <dr.laura2@gmail.com>
Sent: Tuesday, October 13, 2015 7:00 PM
To: Howard Croft
Cc: Gerald (Jed) Natzke; Andy Leavitt; Marc Edwards; Amy Hovey; Brent Wright; Lytle, Darren; Flint Mayor; donna.cole; Dykema, Linda D. (DHHS); Krisztian, George (DEQ); Henry, James; James Gaskin; Jason Lorenz; jmikewright; JoAnne Herman; John O'Brien; Kirk Smith; larry.koehler@mcc.edu; Lawrence Reynolds; Lawrence Reynolds; Michael Glasgow; Wright, Michael; Lane, Mike; Prysby, Mike (DEQ); Natasha Henderson; Norb Birchmeier; Pete Levine; Robert Bincsik; rosejo@msu.edu; Russell Hudson; Samir Matta; schock.michael@epa.gov; Sean Kammer; Busch, Stephen (DEQ); Warren Green; Wurfel, Brad (DEQ); Anthony Chubb; Kevin Keane
Subject: Re: 3rd Quarter Water Report

Howard,

Am I reading this correctly? Does this say that only 16 of 189 water test samples collected between January and September had lead levels exceeding 15 ppb?

What was the 90th percentile value?

Could you provide the committee with the sample collection date, lead level, and address for these 189 residences? If not that, then the zip codes and collection dates for each?

Laura Sullivan

On Monday, October 12, 2015, Howard Croft <hcroft@cityofflint.com> wrote:
 All,

In addition to the text, here is the single page of data that will accompany the mailer.
 We can add any specific information that is requested.

We will be tracking all of the Flint River testing data prior to the switch and it will be available to this group.
 We will work with Genesee County to obtain any water data that they have as well.

On Sun, Oct 11, 2015 at 5:57 PM, <gd2@aol.com> wrote:

Hi Howard,

The thoughts that both Andy and Marc shared sound wise. I'm curious though as to whether the TAC could be privy to the actual results of the Flint City water testing prior to the switch and this years values? Also, it would seem prudent to obtain the present Detroit Water System testing if available as well?

Thank you,
 Gerald Natzke DO

-----Original Message-----

From: Andy Leavitt <aleavitt@senatedems.org>
 To: Marc Edwards <edwardsm@vt.edu>; Howard Croft <hcroft@cityofflint.com>; Amy Hovey <Amy.Hovey@mail.house.gov>; Brent Wright <bwright@cityofflint.com>; Darren Lytle <lytle.darren@epa.gov>; Dayne Walling <dwalling@cityofflint.com>; donna.cole <donna.cole@genesys.org>; dykemal <dykemal@mich.gov>; George

Krisztian (DEQ) <krisztian@michigan.gov>; Gerald (Jed) Natzke <gdn2@aol.com>; James Henry <jhenry@gchd.us>; Jamie Gaskin <jgaskin@unitedwaygenesee.org>; Jason Lorenz <jlorenz@cityofflint.com>; jmikewright <jmikewright@yahoo.com>; JoAnne Herman <jherman@genesys.org>; John O'Brien <jfobrien@gcdcwws.com>; Kirk Smith <ksmith@flint.org>; Larry Koehler <larry.koehler@mcc.edu>; Laura Sullivan <dr.laura2@gmail.com>; Lawrence Reynolds <LawrenceR@mottchc.org>; Lawrence Reynolds <reynolds@mottchc.org>; Michael Glasgow <mglasgow@cityofflint.com>; Michael Wright <Wright.Michael@epa.gov>; Mike Lane <mjlane@umflint.edu>; Mike Prysby (DEQ) <prysbym@michigan.gov>; Natasha Henderson <nhenderson@cityofflint.com>; Norb Birchmeier <nbirchm1@hurleymc.com>; Pete Levine <plevine@gcms.org>; Robert Bincsik <rbincsik@cityofflint.com>; rosejo <rosejo@msu.edu>; Russell Hudson <Russell.Hudson@mclaren.org>; Samir Matta <SFMatta@lan-inc.com>; schock.michael <schock.michael@epa.gov>; Sean Kammer <skammer@cityofflint.com>; Stephen Busch (DEQ) <BUSCHS@michigan.gov>; Warren Green <jwgreen@lan-inc.com>; Wurfel, Brad (DEQ) (DEQ) <WurfelB@michigan.gov>; Anthony Chubb <achubb@cityofflint.com>; Kevin Keane <KEVIN.KEANE@cmsenergy.com>
 Sent: Sat, Oct 10, 2015 12:09 pm
 Subject: Re: 3rd Quarter Water Report

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From: Howard Croft [mailto:hcroft@cityofflint.com]

Sent: Saturday, October 10, 2015 8:33 AM

To: Amy Hovey; Andy Leavitt; Brent Wright; Darren Lytle; Dayne Walling; donna.cole; dykemal; edwardsm; George Krisztian (DEQ); Gerald (Jed) Natzke; Howard Croft; James Henry; Jamie Gaskin; Jason Lorenz; jmikewright; JoAnne Herman; John O'Brien; Kirk Smith; larry.koehler@mcc.edu; Laura Sullivan; Lawrence Reynolds; Lawrence Reynolds; Michael Glasgow; Michael Wright; Mike Lane; Mike Prysby (DEQ); Natasha Henderson; Norb Birchmeier; Pete Levine; Robert Bincsik; rosejo@msu.edu; Russell Hudson; Samir Matta; schock.michael@epa.gov; Sean Kammer; Stephen Busch (DEQ); Warren Green; Wurfel, Brad (DEQ); Anthony Chubb; Kevin Keane

Subject: 3rd Quarter Water Report

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Thank you,

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--

Laura L. Sullivan, Ph. D.
3101 Hawthorne Drive
Flint, Michigan 48503
dr.laura2@gmail.com

Human(kind). Be both.

Rennaker, Joanne (DEQ)

From: Howard Croft <hcroft@cityofflint.com>
Sent: Tuesday, October 13, 2015 5:59 PM
To: Reynolds, Lawrence
Cc: Lane, Mike; Lytle, Darren; Andy Leavitt; Marc Edwards; Amy Hovey; Brent Wright; Dayne Walling; donna. cole; Dykema, Linda D. (DHHS); Krisztian, George (DEQ); Gerald (Jed) Natzke; James Henry; Jamie Gaskin; Jason Lorenz; jmikewright; JoAnne Herman; John O'Brien; Kirk Smith; larry.koehler@mcc.edu; Laura Sullivan; Michael Glasgow; Wright, Michael; Prysby, Mike (DEQ); Natasha Henderson; Norb Birchmeier; Pete Levine; Robert Bincsik; rosejo@msu.edu; Russell Hudson; Samir Matta; Schock, Michael; Sean Kammer; Busch, Stephen (DEQ); Warren Green; Wurfel, Brad (DEQ); Anthony Chubb; Kevin Keane; MVALACAK@gchd.us
Subject: Re: 3rd Quarter Water Report

All,

The comments continue to be helpful and I am making adjustments as we go. I spent two hours at the Health Department today at their board meeting and we have greatly enhanced the communication between the City and the GCHD. I will be attending their future board meetings and will keep Mark and Jim not just appraised but involved in directional decisions as we continue to craft short and long term plans.

On Tue, Oct 13, 2015 at 10:39 AM, Reynolds, Lawrence <LawrenceR@mottchc.org> wrote:

Thank you Mr. Lane. These points will help medical providers stay on message with information our families can act on .

From: Lane, Mike [mailto:mjlane@umflint.edu]
Sent: Tuesday, October 13, 2015 9:53 AM
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Cc: Marc Edwards; Amy Hovey; Brent Wright; Dayne Walling; donna. cole; dykemal; George Krisztian (DEQ); Gerald (Jed) Natzke; James Henry; Jamie Gaskin; Jason Lorenz; jmikewright; JoAnne Herman; John O'Brien; Kirk Smith; larry.koehler@mcc.edu; Laura Sullivan; Reynolds, Lawrence; Reynolds, Lawrence; Michael Glasgow; Wright, Michael; Mike Prysby (DEQ); Natasha Henderson; Norb Birchmeier; Pete Levine; Robert Bincsik; rosejo@msu.edu; Russell Hudson; Samir Matta; Schock, Michael; Sean Kammer; Stephen Busch (DEQ); Warren Green; Wurfel, Brad (DEQ); Anthony Chubb; Kevin Keane

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Mike

** ** *

Michael Lane

Director, Environment, Health and Safety

The University of Michigan-Flint

810-766-6763

810-919-1709 cell

mjlane@umflint.edu

From: Lytle, Darren [<mailto:Lytle.Darren@epa.gov>]

Sent: Tuesday, October 13, 2015 7:40 AM

To: Howard Croft; Andy Leavitt

Cc: Marc Edwards; Amy Hovey; Brent Wright; Dayne Walling; donna. cole; dykemal; George Krisztian (DEQ); Gerald (Jed) Natzke; James Henry; Jamie Gaskin; Jason Lorenz; jmikewright; JoAnne Herman; John O'Brien; Kirk Smith; larry.koehler@mcc.edu; Laura Sullivan; Lawrence Reynolds; Lawrence Reynolds; Michael Glasgow; Wright, Michael; Lane, Mike; Mike Prysby (DEQ); Natasha Henderson; Norb Birchmeier; Pete Levine; Robert Bincsik; rosejo@msu.edu; Russell Hudson; Samir Matta; Schock, Michael; Sean Kammer; Stephen Busch (DEQ); Warren Green; Wurfel, Brad (DEQ); Anthony Chubb; Kevin Keane

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Darren

Darren A. Lytle, Ph.D., P.E.

Branch Chief (Acting)

U.S. Environmental Protection Agency

26 West Martin Luther King Dr.

Cincinnati, Ohio 45268

Phone: (513) 569-7432

Fax: (513) 487-2543

email: lytle.darren@epa.gov

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Sent: Sunday, October 11, 2015 7:29 AM

To: Andy Leavitt

Cc: Marc Edwards; Amy Hovey; Brent Wright; Lytle, Darren; Dayne Walling; donna. cole; dykemal; George Krisztian (DEQ); Gerald (Jed) Natzke; James Henry; Jamie Gaskin; Jason Lorenz; jmikewright; JoAnne Herman; John O'Brien; Kirk Smith; larry.koehler@mcc.edu; Laura Sullivan; Lawrence Reynolds; Lawrence Reynolds; Michael Glasgow; Wright, Michael; Mike Lane; Mike Prysby (DEQ); Natasha Henderson; Norb Birchmeier; Pete Levine; Robert Bincsik; rosejo@msu.edu; Russell Hudson; Samir Matta; Schock, Michael; Sean Kammer; Stephen Busch (DEQ); Warren Green; Wurfel, Brad (DEQ); Anthony Chubb; Kevin Keane

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Rennaker, Joanne (DEQ)

From: Prysby, Mike (DEQ)
Sent: Tuesday, October 13, 2015 4:33 PM
To: Krisztian, George (DEQ)
Cc: Shekter Smith, Liane (DEQ); Busch, Stephen (DEQ)
Subject: Action Steps Update

George,

Below is a status update on the action steps assigned to me:

Action Step 6: Approve Flint Plan for waterline

The city and the county flushed the pipeline beginning yesterday just after 4pm and the free chlorine residual dropped to less than 2.0 ppm by 2:00am this morning. Based upon my discussion with Genesee County operators, the first set of samples for total coliform analysis were collected around 2:30am at the mid-point location along the 3.5 mile of de-commissioned pipeline and at Control Station 3 (on Flint WTP grounds).

The highly chlorinated water (approx 3.5 Mgal) was passed through to the Dort Reservoir (on WTP grounds) and was to be diluted by filling the reservoir to its 20 Mgal capacity; however, I suspect that some wasting of the water to the sanitary sewer will be necessary since the chlorine residual (3.5 mgal) was approx 100 mg/l. I was unable to confirm this with Flint operators (I tried to contact them several times today with no success).

Genesee County will be collecting their second sample for bacteriological analysis between 6 and 8pm at the pipeline mid-point. I suspect that it will take additional time to flush the Dort Reservoir before it is ready to be sampled and may set back the time that the pipeline is ready to be placed into operation (Thurs the soonest possible). The yard piping configuration at the WTP does allow for flexibility in operation and ability to take Dort out of service and maintain supply from Detroit; however, I have not been able to confirm that this is the way the city plans to proceed.

Action Step 19: Expedite 399 plan and P04 plan

I contacted Samir Matta from LAN (Flint's consultant) for an update on the corrosion control plan and submittal of the Act 399 permit application. Flint operators, with the assistance of LAN, conducted bench tests using a corrosion inhibitor (orthophosphate) and are making comparisons for use with (treated water from Detroit vs. water treated from the Flint River). LAN is currently preparing plans and a design for installation of an orthophosphate

feed system at Control Station 2 and Pump Station #4 (on WTP grounds) with the ability to re-locate the feed equipment when Flint switches to the KWA. LAN expects to submit the Act 399 permit application to the DEQ by no later than the end of this week.

Action Step 18: Contact KWA to find out if there are any bottlenecks that need to be removed to expedite completion of the KWA pipeline.

I contacted John O'Brien (Genesee County Drain Commissioner's Office). The most significant bottleneck involves road restrictions currently being imposed by the Lapeer County Road Commission and include:

- All Lapeer County secondary north-south roads are tagged "no construction traffic" for this project except for primary roads (M-19, M-53, and M-24). This significantly increases distances that construction vehicles must travel (upwards of 15 to 20 miles) to accomplish a short jog either north or south.
- Weight restrictions in the spring will cause construction to slow or stop for one to two months. The county has indicated that St. Clair and Sanilac are not imposing the weight restrictions; however, Lapeer County will maintain their restrictions.

Michael Prysby, P.E.

District Engineer

Office of Drinking Water and Municipal Assistance

517 290-8817

Rennaker, Joanne (DEQ)

From: Reynolds, Lawrence <LawrenceR@mottchc.org>
Sent: Tuesday, October 13, 2015 10:39 AM
To: Lane, Mike; Lytle, Darren; Howard Croft; Andy Leavitt
Cc: Marc Edwards; Amy Hovey; Brent Wright; Dayne Walling; donna. cole; Dykema, Linda D. (DHHS); Krisztian, George (DEQ); Gerald (Jed) Natzke; James Henry; Jamie Gaskin; Jason Lorenz; jmikewright; JoAnne Herman; John O'Brien; Kirk Smith; larry.koehler@mcc.edu; Laura Sullivan; Michael Glasgow; Wright, Michael; Prysby, Mike (DEQ); Natasha Henderson; Norb Birchmeier; Pete Levine; Robert Bincsik; rosejo@msu.edu; Russell Hudson; Samir Matta; Schock, Michael; Sean Kammer; Busch, Stephen (DEQ); Warren Green; Wurfel, Brad (DEQ); Anthony Chubb; Kevin Keane
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Darren A. Lytle, Ph.D., P.E.
 Branch Chief (Acting)
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Also, providing specific details on how to sample water in their homes would be helpful... the first draw, how long to flush before taking the second sample, how long water should sit in pipes before the first draw, etc.

It would further help to rebuild trust with the community to share the City's plan/timeline of more aggressive water quality sampling, specifically as it relates to lead exposure in homes and schools. Is there a timeline that can be shared which the City is working with to identify homes with lead service lines, and how can the City and State work together to assist those homeowners with mitigation. Perhaps indicating that the issue of lead is and will remain a high priority for the City until all households, schools, etc. have reliable/safe water quality regardless of whether the source of lead is from city transmission lines or a property owner's service line and home fixtures would also be helpful.

Mike

*** **

Michael Lane
 Director, Environment, Health and Safety
 The University of Michigan-Flint
 810-766-6763
 810-919-1709 cell
mjlane@umflint.edu

From: Lytle, Darren [mailto:Lytle.Darren@epa.gov]
Sent: Tuesday, October 13, 2015 7:40 AM
To: Howard Croft; Andy Leavitt
Cc: Marc Edwards; Amy Hovey; Brent Wright; Dayne Walling; donna. cole; dykemal; George Krisztian (DEQ); Gerald (Jed) Natzke; James Henry; Jamie Gaskin; Jason Lorenz; jmikewright; JoAnne Herman; John O'Brien; Kirk Smith; larry.koehler@mcc.edu; Laura Sullivan; Lawrence Reynolds; Lawrence Reynolds;

Michael Glasgow; Wright, Michael; Lane, Mike; Mike Prysby (DEQ); Natasha Henderson; Norb Birchmeier; Pete Levine; Robert Bincsik; rosejo@msu.edu; Russell Hudson; Samir Matta; Schock, Michael; Sean Kammer; Stephen Busch (DEQ); Warren Green; Wurfel, Brad (DEQ); Anthony Chubb; Kevin Keane
Subject: RE: 3rd Quarter Water Report

Howard,

I am in agreement with past comments and suggestions. Is this the time to let the public know your future plans? Are you expecting to be back to Detroit water next quarter? If so, that does not necessarily come without issues. It is a change and the potential for a brief upset (e.g., "red" water, particles, etc) exists. Would it be worth letting the public know in advance? Under "current drinking water issues", do you want to let residents know how and where to take samples here? A sampling plan (beyond LCR compliance sampling) is very important to understand the relative lead source (brass, solder and service lines) contributions, assess the current situation and the effectiveness of the return to Detroit water to reduce lead. You could state that one is being developed.

Darren

Darren A. Lytle, Ph.D., P.E.
 Branch Chief (Acting)
 U.S. Environmental Protection Agency
 26 West Martin Luther King Dr.
 Cincinnati, Ohio 45268
 Phone: (513) 569-7432
 Fax: (513) 487-2543
 email: lytle.darren@epa.gov

From: Howard Croft [<mailto:hcroft@cityofflint.com>]

Sent: Sunday, October 11, 2015 7:29 AM

To: Andy Leavitt

Cc: Marc Edwards; Amy Hovey; Brent Wright; Lytle, Darren; Dayne Walling; donna. cole; dykemal; George Krisztian (DEQ); Gerald (Jed) Natzke; James Henry; Jamie Gaskin; Jason Lorenz; jmikewright; JoAnne Herman; John O'Brien; Kirk Smith; larry.koehler@mcc.edu; Laura Sullivan; Lawrence Reynolds; Lawrence Reynolds; Michael Glasgow; Wright, Michael; Mike Lane; Mike Prysby (DEQ); Natasha Henderson; Norb Birchmeier; Pete Levine; Robert Bincsik; rosejo@msu.edu; Russell Hudson; Samir Matta; Schock, Michael; Sean Kammer; Stephen Busch (DEQ); Warren Green; Wurfel, Brad (DEQ); Anthony Chubb; Kevin Keane
Subject: Re: 3rd Quarter Water Report

All,

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I would echo Marc's sentiment on the bold language agreeing with his points but I would also add that trust needs to be rebuilt and the public simply will not believe anything in the document if you start by telling them it still meets standards. They do not differentiate between regs and rules but they know the water does not meet the standard of the physician community.

I would also recommend opening with timeline of going back to Detroit and what steps people can take to

mitigate lead issues. Preferably with an excerpt from a physician.

The technical information matters for transparency but the trust gap is so wide that most people will be skeptical of all of it.

On Sat, Oct 10, 2015 at 11:48 AM Marc Edwards <edwardsm@vt.edu> wrote:

Hi Howard,

I think it is universally acknowledged now, that 30 seconds to 2 minutes flushing are not adequate, and **all public education should say 5 minutes flushing.**

I also think that given results of our team sampling 277 homes, the high levels of lead MDEQ detected in the Flint schools (a 90%ile over 15 ppb..which is horrible because they are not tier 1 plumbing sites), and the problems in the official LCR sampling conducted in late 2014-2015, that the following statement (in bold) is not really helpful in getting the message out about the current health risks. The bold statement seems more like wishful thinking or a legal position, and detracts from the goal of telling the public about the known problems.

*After 16 months of treating water from the Flint River, the City became aware that the while **still meeting all Safe Drinking Water Standards**, the level of corrosiveness could result in more lead leaching from service lines and household plumbing.*

That is my input. I am available at 540 231-7236 or 540 320-8740, if anyone should have questions about this.

Best Regards,

Marc Edwards

From: Howard Croft [mailto:heroft@cityofflint.com]

Sent: Saturday, October 10, 2015 8:33 AM

To: Amy Hovey; Andy Leavitt; Brent Wright; Darren Lytle; Dayne Walling; donna. cole; dykemal; edwardsm; George Krisztian (DEQ); Gerald (Jed) Natzke; Howard Croft; James Henry; Jamie Gaskin; Jason Lorenz; jmikewright; JoAnne Herman; John O'Brien; Kirk Smith; larry.koehler@mcc.edu; Laura Sullivan; Lawrence Reynolds; Lawrence Reynolds; Michael Glasgow; Michael Wright; Mike Lane; Mike Prysby (DEQ); Natasha Henderson; Norb Birchmeier; Pete Levine; Robert Bincsik; rosejo@msu.edu; Russell Hudson; Samir Matta; schock.michael@epa.gov; Sean Kammer; Stephen Busch (DEQ); Warren Green; Wurfel, Brad (DEQ); Anthony Chubb; Kevin Keane

Subject: 3rd Quarter Water Report

Team,

Included in this email is a copy of the first quarter water quality report that has been developed by the Utilities Division. Please take a look and offer any comments that you may have regarding content. There will be an additional one page insert containing three months test data inserted prior to distribution.

The purpose of the quarterly mailer is to increase communication, provide more transparency, and put more information into the hands of the public about what's occurring within the water system and with the infrastructure.

I will be putting together a separate weekly report for this Committee.

Thank you,

--

Howard Croft

Public Works Director

City of Flint

1101 S. Saginaw Street

Flint, MI 48502

PH# 810.766.7135 Ext.2043

hcroft@cityofflint.com

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Flint, MI 48502

PH# 810.766.7135 Ext.2043

hcroft@cityofflint.com

Rennaker, Joanne (DEQ)

From: Prysby, Mike (DEQ)
Sent: Tuesday, October 13, 2015 7:37 AM
To: Krisztian, George (DEQ)
Subject: RE: GCHD Contact Information Request

George,

I do not have Mark's phone #, however, you may want to contact Jim Henry, Director of Environmental Health, at the GCHD. Jim may be able to provide you with Mark's contact info. Jim's contact number is 810 257-3618 office and 517 404-8401 - mobile

Michael Prysby, P.E.
District Engineer
Office of Drinking Water and Municipal Assistance
517 290-8817

From: Krisztian, George (DEQ)
Sent: Monday, October 12, 2015 4:22 PM
To: Shekter Smith, Liane (DEQ); Busch, Stephen (DEQ); Prysby, Mike (DEQ); Cook, Pat (DEQ)
Subject: GCHD Contact Information Request
Importance: High

Does anyone have the contact information for Mark Valacak?

George L. Krisztian
Flint Action Plan Coordinator
Laboratory Director
Michigan Department of Environmental Quality
Desk ph (517) 284-6719
Cell ph (517) 204-0381

Rennaker, Joanne (DEQ)

From: Howard Croft <hcroft@cityofflint.com>
Sent: Monday, October 12, 2015 4:41 PM
To: larry.koehler@mcc.edu; rosejo@msu.edu; schock.michael@epa.gov; Amy Hovey; Andy Leavitt; Brent Wright; Darren Lytle; Dayne Walling; donna. cole; edwardsm; Krisztian, George (DEQ); Gerald (Jed) Natzke; Howard Croft; James Henry; Jamie Gaskin; Jason Lorenz; jmikewright; JoAnne Herman; John O'Brien; Kirk Smith; Laura Sullivan; Lawrence Reynolds; Lawrence Reynolds; Michael Glasgow; Michael Wright; Mike Lane; Prysby, Mike (DEQ); Natasha Henderson; Norb Birchmeier; Pete Levine; Robert Bincsik; Russell Hudson; Samir Matta; Sean Kammer; Busch, Stephen (DEQ); Warren Green; Kevin Keane; Shekter Smith, Liane (DEQ); Dykema, Linda D. (DHHS)
Subject: TAC Update 10_12_15
Attachments: TAC Update 10_12_15.pdf

All,

Here is the template that I anticipate using on a weekly basis to share information with the group. This aligns with other weekly updates that are provided by our engineering team and gives a good overview of the system as a whole. This is likely more information than some want and I will modify the report as requested to make sure everyone has adequate information going forward. The report is geared toward bringing KWA online and the goal of providing clean safe water for the residents.

I cannot commit to delivering this every Monday but I plan to get something out each week. Please let me know if there are items missing or that you would like to see added.

As always, comments are welcome.

Thank you,

--

Howard Croft
 Public Works Director
 City of Flint
 1101 S. Saginaw Street
 Flint, MI 48502
 PH# 810.766.7135 Ext.2043
hcroft@cityofflint.com



City of Flint Technical Advisory Committee - Weekly Report

October 12, 2015

Last meeting: 10-7-15

Next meeting: 11-11-15, 2:00 pm (tentative)

I. Overview –

This weekly report will contain an overview of the water system or a narrative of events that are occurring. I intend to maintain this current format of identifying new issues, ongoing issues, needs to use KWA when ready, accomplishments, and testing data that is available. The weekly report will also be forwarded to Treasury each week and certain information will be posted on the website.

II. New Issues of concern this week

A. Transition from Flint River back to previous water source.

1. **Contractual** – Being worked on by Attorneys – expect final documents today.
2. **Operational** – Physically ready by Monday pending volume of water from Detroit.
3. **Corrosion Control** – Ready to begin equipment installation, evaluation of dosing to be discussed with engineering and DEQ. Jar testing has started in the Plant.
4. **Staffing** – Evaluation this week of personnel needed to run in pass-through mode. We will also be evaluating the needs when KWA is here with SCADA upgrades taking place in the Treatment Plant.

B. Shut off Plan

- The inability to perform shut offs due to a court ordered injunction is impacting collections and the system as a whole. A plan is required on how to safely re-engage this function including when and in what manor.

III. Ongoing Issues of concern or in process

Issue	Description	Action Item	Owner
Corrosion Control	To help rebuild bio-film	LAN has purchased chemicals and started jar testing to determine dosing.	LAN
Transfer Station	Buffer for water supply from KWA	Engineers are starting design and identifying the lead time items.	LAN
Surge Protection	Water hammer and transient events causing main breaks	Halfway through leak detection - Pursuing surge protection	City Staff
Prep for KWA	Design and installation of final improvements needed	See Item IV	LAN/City
High water loss	Unaccounted for water has numerous facets	Replacing meters, performing leak detection, pursuing theft to narrow down cause	City Staff
Bray Rd. Lime sludge removal	Remediation of site required by consent decree	Will not be needed when using Detroit water but consent decree is still in effect.	City Staff
Hydraulic Model	Filling with data	Need to verify broken valve locations for model to be accurate.	LAN/City
SCADA Upgrades	Used to develop automation within the system.	First phases went in in FY15 second and final phase due to be installed prior to KWA's arrival.	City Staff

IV. Needs for treating and using water from KWA

- A. Design and construction of transfer station to Dort Reservoir
 - Needed to buffer the volume of water that KWA is capable of delivering prior to their reservoir tank being activated (most significant item & longest lead time).
- B. Raw water line to pump station #4
 - Needed to connect into existing 72" for raw water to reach the Plant.
- C. Phosphoric acid feed system
 - Needed for corrosion control.
- D. Alum feed system
 - Needed for coagulant change to raw water and to reduce chloride.

V. Accomplishments

- A. We are installing new water meters for the next three weeks prior to suspending the contract due to budget. We will have installed ~4000 of the 9000 irregular reading meters by the end of the month.
- B. We are halfway through the leak detection by "echologics" that was a \$900,000 spend on a Distressed City Grant from Treasury. To date there have been over three dozen leaks detected that range from minor (1.5 gpm) to moderate (3.4 gpm).

VI. Testing Data

- A. The following test data is what we put together on a weekly basis while tracking the TTHM concerns. We will look to construct a different set of metrics going forward that can help track system status and hopefully convey when the entire system is on Detroit. The TTHM leaving the WTP on 8/06/15 clearly shows the impact of the GAC being installed and put into use.

Date	Flint River Water Temp	Flint River TOC	Chlorine Feed at WTP	TTHM Leaving WTP
10/7/15	14.8	-	4.5	32
10/1/15	17.3	-	4.5	30
9/23/15	20.3	-	4.5	38
9/17/15	22.0	8.2	4.7	46
9/10/15	23.7	-	4.5	42
9/03/15	-	-	-	-
8/27/15	-	-	-	-
8/20/15	25.1	9.25	6.0	25
8/13/15	24.4	9.8	5.4	20
8/06/15	24.4	10.0	5.5	20
7/29/15	27.8	-	9.1	81
7/23/15	24.8	12.5	6.8	73
7/17/15	23.8	10	7.1	80
7/08/15	23.3	12.2	6.7	60
7/02/15	21.6	8.59	6.8	60

Rennaker, Joanne (DEQ)

From: Prysby, Mike (DEQ)
Sent: Monday, October 12, 2015 4:25 PM
To: Krisztian, George (DEQ)
Cc: Shekter Smith, Liane (DEQ); Busch, Stephen (DEQ)
Subject: Disinfection of Pipeline - Status update

George,

Based upon my discussion with water utility operators from the city of Flint and Genesee County, chlorination of the 72-inch transmission main (pipeline) began Friday night and concluded late Saturday. Chlorine residuals were measured mid-way along the pipeline (3.5 miles being disinfected) and at the downstream end (Control Sta. #3 at the Flint WTP) early Sunday and were approximately 120 mg/l based on field titration. The Sunday morning sample at CS #3 was mistakenly reported at 10 ppm due to an incorrect ratio used in the titration calculation. The city and the county performed another chlorine residual test around noon today and confirmed the residual ranging between 110 and 120 mg/l at both locations. I instructed the city to hold the water for an additional 3 hours to conform to the "slug" method of disinfection. Flushing of the pipeline to the Dort Reservoir is to proceed after 4pm today. The chlorinated water will be sent to Dort and diluted with water from Detroit until the concentration is reduced to normal distribution system levels. Water from the Dort Reservoir will be distributed to the city after acceptable bacteriological sample results are obtained (see below).

Both parties anticipate having the pipeline and Dort reservoir ready for the collection of samples for bacteriological analysis tomorrow (set of three samples) with the second set of samples to be collected on Wednesday. The pipeline that will provide the city with water from Detroit could be placed into service by this Thursday (the soonest) if no glitches are encountered with the start-up procedure.

Michael Prysby, P.E.
District Engineer
Office of Drinking Water and Municipal Assistance
517 290-8817

Rennaker, Joanne (DEQ)

From: Howard Croft <hcroft@cityofflint.com>
Sent: Monday, October 12, 2015 12:35 PM
To: Shekter Smith, Liane (DEQ)
Cc: Devereaux, Tracy Jo (DEQ); Busch, Stephen (DEQ); Prysby, Mike (DEQ); Krisztian, George (DEQ)
Subject: Re: Vendor Inquiries

Liane,

Thank you, I am comfortable with guiding vendors in the right direction.

On Mon, Oct 12, 2015 at 9:47 AM, Shekter Smith, Liane (DEQ) <SHEKTERL@michigan.gov> wrote:

Howard –

I anticipate that we will be receiving various inquiries from vendors that are interested in providing products or services to assist the City of Flint with water concerns. Since these contacts are more appropriately handled by the city, it is our intention to forward them City contact information so that they can connect with you directly.

As a reminder, you'll want to make sure that any products or devices being proposed for use are appropriately certified by NSF for drinking water use. The appropriate certification status should be established before any further consideration given.

Liane J. Shekter Smith, P.E., Chief

Office of Drinking Water and Municipal Assistance

Michigan Department of Environmental Quality

517-284-6543

--

Howard Croft
Public Works Director
City of Flint
1101 S. Saginaw Street
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To: Gerald (Jed) Natzke
Cc: Andy Leavitt; Marc Edwards; Amy Hovey; Brent Wright; Lytle, Darren; Flint Mayor; donna.cole; Dykema, Linda D. (DHHS); Krisztian, George (DEQ); Henry, James; James Gaskin; Jason Lorenz; jmikewright; JoAnne Herman; John O'Brien; Kirk Smith; larry.koehler@mcc.edu; Laura Sullivan; Lawrence Reynolds; Lawrence Reynolds; Michael Glasgow; Wright, Michael; Lane, Mike; Prysby, Mike (DEQ); Natasha Henderson; Norb Birchmeier; Pete Levine; Robert Bincsik; rosejo@msu.edu; Russell Hudson; Samir Matta; schock.michael@epa.gov; Sean Kammer; Busch, Stephen (DEQ); Warren Green; Wurfel, Brad (DEQ); Anthony Chubb; Kevin Keane
Subject: Re: 3rd Quarter Water Report
Attachments: Quarterly CCR -Test Results.docx

All,

In addition to the text, here is the single page of data that will accompany the mailer.
 We can add any specific information that is requested.

We will be tracking all of the Flint River testing data prior to the switch and it will be available to this group.
 We will work with Genesee County to obtain any water data that they have as well.

On Sun, Oct 11, 2015 at 5:57 PM, <gdn2@aol.com> wrote:

Hi Howard,

The thoughts that both Andy and Marc shared sound wise. I'm curious though as to whether the TAC could be privy to the actual results of the Flint City water testing prior to the switch and this years values? Also, it would seem prudent to obtain the present Detroit Water System testing if available as well?

Thank you,
 Gerald Natzke DO

-----Original Message-----

From: Andy Leavitt <aleavitt@senatedems.org>
To: Marc Edwards <edwardsm@vt.edu>; Howard Croft <hcroft@cityofflint.com>; Amy Hovey <Amy.Hovey@mail.house.gov>; Brent Wright <bwright@cityofflint.com>; Darren Lytle <lytle.darren@epa.gov>; Dayne Walling <dwalling@cityofflint.com>; donna.cole <donna.cole@genesys.org>; dykemal <dykemal@mich.gov>; George Krisztian (DEQ) <krisztian@michigan.gov>; Gerald (Jed) Natzke <gdn2@aol.com>; James Henry <jhenry@gchd.us>; Jamie Gaskin <jgaskin@unitedwaygenesee.org>; Jason Lorenz <jlorenz@cityofflint.com>; jmikewright <jmikewright@yahoo.com>; JoAnne Herman <jherman@genesys.org>; John O'Brien <jfobrien@gcdcwvws.com>; Kirk Smith <ksmith@flint.org>; larry.koehler <larry.koehler@mcc.edu>; Laura Sullivan <dr.laura2@gmail.com>; Lawrence Reynolds <LawrenceR@mottchc.org>; Lawrence Reynolds <reynolds@mottchc.org>; Michael Glasgow <mglasgow@cityofflint.com>; Michael Wright <Wright.Michael@epa.gov>; Mike Lane <mjlane@umflint.edu>; Mike Prysby (DEQ) <prysbym@michigan.gov>; Natasha Henderson <nhenderson@cityofflint.com>; Norb Birchmeier <nbirchm1@hurleymc.com>; Pete Levine <plevine@gcms.org>; Robert Bincsik <rbincsik@cityofflint.com>; rosejo <rosejo@msu.edu>; Russell Hudson <Russell.Hudson@mclaren.org>; Samir Matta <SFMatta@lan-inc.com>; schock.michael <schock.michael@epa.gov>; Sean Kammer <skammer@cityofflint.com>; Stephen Busch (DEQ) <BUSCHS@michigan.gov>; Warren Green <jwgreen@lan-inc.com>; Wurfel, Brad (DEQ) (DEQ) <WurfelB@michigan.gov>; Anthony Chubb <achubb@cityofflint.com>; Kevin Keane <KEVIN.KEANE@cmsenergy.com>
Sent: Sat, Oct 10, 2015 12:09 pm
Subject: Re: 3rd Quarter Water Report

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That is my input. I am available at 540 231-7236 or 540 320-8740, if anyone should have questions about this.

Best Regards,

Marc Edwards

From: Howard Croft [mailto:hcroft@cityofflint.com]

Sent: Saturday, October 10, 2015 8:33 AM

To: Amy Hovey; Andy Leavitt; Brent Wright; Darren Lytle; Dayne Walling; donna. cole; dykemal; edwardsm; George Krisztian (DEQ); Gerald (Jed) Natzke; Howard Croft; James Henry; Jamie Gaskin; Jason Lorenz; jmikewright; JoAnne Herman; John O'Brien; Kirk Smith; larry.koehler@mcc.edu; Laura Sullivan; Lawrence Reynolds; Lawrence Reynolds; Michael Glasgow; Michael Wright; Mike Lane; Mike Prysby (DEQ); Natasha Henderson; Norb Birchmeier; Pete Levine; Robert Bincsik; rosejo@msu.edu; Russell Hudson; Samir Matta; schock.michael@epa.gov; Sean Kammer; Stephen Busch (DEQ); Warren Green; Wurfel, Brad (DEQ); Anthony Chubb; Kevin Keane

Subject: 3rd Quarter Water Report

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Thank you,

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City of Flint

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2015 3rd Quarter Regulated Detected Contaminants

Inorganic & Organic Chemicals, Metals, and Pesticides – Monitored at treatment plant						
Regulated Contaminant	Unit of Measure	MCLG	MCL	Highest Level Detected	Range of Detection	Violation
Inorganic Chemicals						
Fluoride	mg/L	4	4	0.84	0.64 – 0.84	No
Nitrate	mg/L	10	10	N.D.	N/A	No
Metals						
Barium	mg/L	2	2	0.02	N/A	No

More than 100 other chemicals were monitored from July through September that were not detected.

The various classification groups of these chemicals include metals, carbamates, herbicides, pesticides, organics, and radiologicals.

Total Organic Carbon, TOC - Monitored at treatment plant			
Regulated Contaminant	Required Monthly % Removal	Minimum Monthly % Removal	Monthly % Removal Ranges
Total Organic Carbon	50	60	60 - 87

Turbidity - Monitored at treatment plant		
Highest Single Measurement (Cannot exceed 1NTU)	Lowest Monthly % of Samples Meeting Turbidity Limit (0.3 NTU in 95% of samples)	Violation
0.18	100 %	No

Disinfectant Residuals – Monitored in the distribution system						
Regulated Contaminant	Unit of Measure	MCLG	MCL	Highest Level Detected	Range of Detection	Violation
Total Chlorine Residual	mg/L	4.0	4.0	4.0	0.2 – 4.0	No

Microbiological Contaminants - Monitored in the distribution system				
Regulated Contaminant	MCLG	MCL	Highest Number detected (in 1 month)	Violation
Total Coliform bacteria	0	The presence of coliform bacteria in > 5% of monthly samples	1	No
<i>E. coli</i> Bacteria	0	0	0	No

Lead & Copper – Monitored from consumers tap					
Regulated Contaminant	Unit of Measure	MCLG	Action Level AL	Number of samples over AL	Total # of Samples Tested from January - September
Lead	ug/L	0	15	16	189
Copper	mg/L	1.3	1.3	0	189

Disinfection By-Products - Monitored in the distribution system and from treatment plant						
Regulated Contaminant	Unit of Measure	MCLG	MCL	Highest Level Detected	Range of Detection	Violation
Total Trihalomethanes (TTHM)	ug/L	n/a	80	90.3	42.6 – 90.3	N/A*
Haloacetic Acids (HAA)	ug/L	n/a	60	15.0	2.0 – 15.0	N/A*
Bromate	ug/L	10	10	N.D.	N/A	N/A*

*Violation based on locational running annual average for TTHM & HAA5, violation for bromate based on yearly average.

Key to the Detected Contaminant Tables		
Symbol	Abbreviation for	Definition/Explanation
>	Greater than	
AL	Action Level	The concentration of a contaminant, which, if exceeded, triggers treatment or other requirements which a water system must follow.
HAA5	Haloacetic Acids	HAA5 is the total of bromoacetic, chloroacetic, dibromoacetic, dichloroacetic, and trichloroacetic acids. Compliance is based on the total.
LRAA	Locational Running Annual Average	
MCL	Maximum Contaminant Level	The highest level of a contaminant that is allowed in water. MCLs are set as close to the MCLG's as feasible using the best available treatment technology.
MCLG	Maximum Contaminant Level Goal	The level of contaminant in drinking water below which there is no known or expected risk to health.
mg/L	Milligrams per Liter	A milligram = 1/1000 gram 1 milligram per liter is equal to 1ppm
MRDL	Maximum Residual Disinfectant Level	The highest level of disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.
MRDLG	Maximum Residual Disinfectant Level Goal	The level of a drinking water disinfectant below which there is no known or expected risk to health. MRLDG's do not reflect the benefits of the use of disinfectants to control microbial contaminants.
n/a	Not Applicable	
ND	Not Detected	
NTU	Nephelometric Turbidity Units	Measures the cloudiness of water.
pCi/L	Picocuries per Liter	A measure of radioactivity. Picocurie (pCi) means the quantity of radioactive material producing 2.22 nuclear transformations per minute.
ppb	Parts Per Billion (one in one billion)	The ppb is equivalent to micrograms per liter. A microgram = 1/1000 milligram.
ppm	Parts Per Million (one in one million)	The ppm is equivalent to milligrams per liter. A milligram = 1/1000 gram.
RAA	Running Annual Average	
TT	Treatment Technique	A required process intended to reduce the level of a contaminant in drinking water.
TTHM	Total Trihalomethanes	Total Trihalomethanes is the sum of chloroform, bromodichloromethane, dibromochloromethane and bromoform. Compliance is based on total.
ug/L	Micrograms per Liter	A microgram = 1/1,000,000 gram 1 microgram per liter is equal to 1ppb

Rennaker, Joanne (DEQ)

From: gdn2@aol.com
Sent: Sunday, October 11, 2015 5:57 PM
To: aleavitt@senatedems.org; edwardsm@vt.edu; hcroft@cityofflint.com; Amy.Hovey@mail.house.gov; bwright@cityofflint.com; lytle.darren@epa.gov; dwalling@cityofflint.com; donna.cole@genesys.org; Dykema, Linda D. (DHHS); Krisztian, George (DEQ); jhenry@gchd.us; jgaskin@unitedwaygenesee.org; jlorenz@cityofflint.com; jmikewright@yahoo.com; jherman@genesys.org; jfobrien@gcdcwvs.com; ksmith@flint.org; larry.koehler@mcc.edu; dr.laura2@gmail.com; LawrenceR@mottchc.org; reynolds@mottchc.org; mglasgow@cityofflint.com; Wright.Michael@epa.gov; mjlane@umflint.edu; Prysby, Mike (DEQ); nhenderson@cityofflint.com; nbirchm1@hurleymc.com; plevine@gcms.org; rbincsik@cityofflint.com; rosejo@msu.edu; Russell.Hudson@mclaren.org; SFMatta@lan-inc.com; schock.michael@epa.gov; skammer@cityofflint.com; Busch, Stephen (DEQ); jwgreen@lan-inc.com; Wurfel, Brad (DEQ); achubb@cityofflint.com; KEVIN.KEANE@cmsenergy.com
Subject: Re: 3rd Quarter Water Report

Hi Howard,

The thoughts that both Andy and Marc shared sound wise. I'm curious though as to whether the TAC could be privy to the actual results of the Flint City water testing prior to the switch and this years values? Also, it would seem prudent to obtain the present Detroit Water System testing if available as well?

Thank you,
 Gerald Natzke DO

-----Original Message-----

From: Andy Leavitt

To: Marc Edwards ; Howard Croft ; Amy Hovey ; Brent Wright ; Darren Lytle ; Dayne Walling ; donna. cole ; dykemal ; George Krisztian (DEQ) ; Gerald (Jed) Natzke ; James Henry ; Jamie Gaskin ; Jason Lorenz ; jmikewright ; JoAnne Herman ; John O'Brien ; Kirk Smith ; larry.koehler ; Laura Sullivan ; Lawrence Reynolds ; Lawrence Reynolds ; Michael Glasgow ; Michael Wright ; Mike Lane ; Mike Prysby (DEQ) ; Natasha Henderson ; Norb Birchmeier ; Pete Levine ; Robert Bincsik ; rosejo ; Russell Hudson ; Samir Matta ; schock.michael ; Sean Kammer ; Stephen Busch (DEQ) ; Warren Green ; Wurfel, Brad (DEQ) (DEQ) ; Anthony Chubb ; Kevin Keane

Sent: Sat, Oct 10, 2015 12:09 pm

Subject: Re: 3rd Quarter Water Report

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That is my input. I am available at 540 231-7236 or 540 320-8740, if anyone should have questions about this.

Best Regards,

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From: Howard Croft [<mailto:hcroft@cityofflint.com>]

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To: Amy Hovey; Andy Leavitt; Brent Wright; Darren Lytle; Dayne Walling; donna. cole; dykemal; edwardsm; George Krisztian (DEQ); Gerald (Jed) Natzke; Howard Croft; James Henry; Jamie Gaskin; Jason Lorenz; jmikewright; JoAnne Herman; John O'Brien; Kirk Smith; larry.koehler@mcc.edu; Laura Sullivan; Lawrence Reynolds; Lawrence Reynolds; Michael Glasgow; Michael Wright; Mike Lane; Mike Prysby (DEQ); Natasha Henderson; Norb Birchmeier; Pete Levine; Robert Bincsik; rosejo@msu.edu; Russell Hudson; Samir Matta; schock.michael@epa.gov; Sean Kammer; Stephen Busch (DEQ); Warren Green; Wurfel, Brad (DEQ); Anthony Chubb; Kevin Keane

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City of Flint

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Flint, MI 48502

PH# 810.766.7135 Ext.2043

hcroft@cityofflint.com

Rennaker, Joanne (DEQ)

From: Brent Wright <bwright@cityofflint.com>
Sent: Sunday, October 11, 2015 11:27 AM
To: Prysby, Mike (DEQ)
Subject: Re: 72" chlorination

Thanks Mike

On Oct 11, 2015 11:25 AM, "Prysby, Mike (DEQ)" <PRYSBYM@michigan.gov> wrote:
Hold time is 24 hrs...with 10 ppm after the hold time in acc. to C651

Sent from my iPhone

On Oct 11, 2015, at 9:46 AM, Brent Wright <bwright@cityofflint.com> wrote:

Mike

The best we could get was 10ppm. As of 4am this morning we closed valves at Genesee n Ritchfield and at Dort well. With only 10ppm what would the required hold time be.

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From: Prysby, Mike (DEQ)
Sent: Sunday, October 11, 2015 11:26 AM
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Cc: Mark Horgan
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Cc: Marc Edwards; Amy Hovey; Brent Wright; Darren Lytle; Dayne Walling; donna. cole; Dykema, Linda D. (DHHS); Krisztian, George (DEQ); Gerald (Jed) Natzke; James Henry; Jamie Gaskin; Jason Lorenz; jmikewright; JoAnne Herman; John O'Brien; Kirk Smith; larry.koehler@mcc.edu; Laura Sullivan; Lawrence Reynolds; Lawrence Reynolds; Michael Glasgow; Michael Wright; Mike Lane; Prysby, Mike (DEQ); Natasha Henderson; Norb Birchmeier; Pete Levine; Robert Bincsik; rosejo@msu.edu; Russell Hudson; Samir Matta; schock.michael@epa.gov; Sean Kammer; Busch, Stephen (DEQ); Warren Green; Wurfel, Brad (DEQ); Anthony Chubb; Kevin Keane
Subject: Re: 3rd Quarter Water Report
Attachments: 3rd Quarter Water Quality Report (2).docx

All,

The comments were very helpful and I have made several revisions to the report that was sent yesterday, please review the amendments and forward any additional recommendations. I would like to solicit comments from anyone in the medical community that is willing to be quoted.

On Sat, Oct 10, 2015 at 12:03 PM, Andy Leavitt <aleavitt@senatedems.org> wrote:

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Howard Croft

Public Works Director

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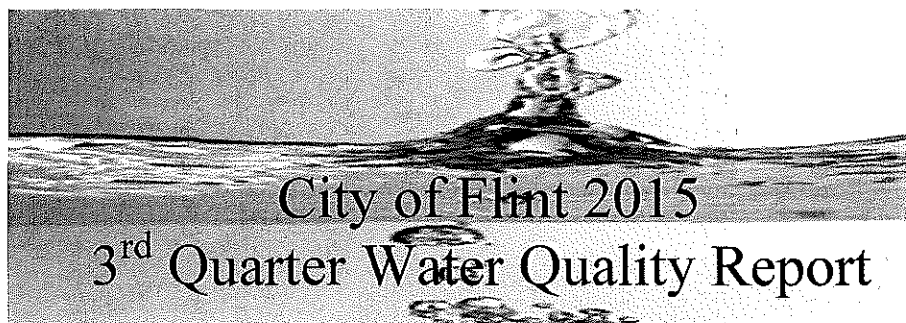
Flint, MI 48502

PH# 810.766.7135 Ext.2043

hcroft@cityofflint.com

Customer Service Center
City Hall
1101 S. Saginaw St.
Flint, MI 48501

Postage



The Quarterly Water Quality Report provides important information about your drinking water. This report includes information about the water source, current drinking water issues, lead information, water filters, 3rd quarter work accomplished, and a water timeline of events. The City of Flint Department of Utilities is dedicated to providing quality drinking water to the residents of the community. The Flint Water Plant operates and maintains a certified drinking water laboratory to assure compliance with all state and federal regulations, and is committed to prompt and thorough notification to the consumers if there is any reason for concern about the quality of the drinking water. Information about your drinking water is available on the City of Flint web page at www.cityofflint.com or by calling the City of Flint Water Plant at **(810) 787-6537**. The Safe Drinking Water Hotline at **(800) 426-4791** is a resource for health related questions and water quality issues. General drinking water information can also be found on the U.S. Environmental Protection Agency (EPA) web site at www.epa.gov/safewater/.

Water Source

The City of Flint began using the Flint River as a water source in May of 2014. After 16 months of treating water from the Flint River, the City became aware that the level of corrosiveness could result in more lead leaching from service lines and household plumbing. Reports of elevated blood lead levels resulted in the City's Technical Advisory Committee making a recommendation to return to the previous source of water while waiting for the KWA to provide water from Lake Huron.

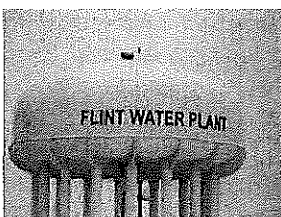
On Wednesday October 8, 2015, with the consent of Governor Snyder, the City stated they plan to return to its previous source of water. The decision followed two consecutive lead and copper test periods that exceeded 5ug/L which calls for additional action. In August of 2015 following the guidance of the DEQ, the City began also developing additional corrosion control measures that will be evaluated if it is needed as an additive to treated water but will be required when the city begins treating raw water from the Karegnondi Water Authority.

The City contributed \$2 Million dollars, the Mott Foundation contributed \$4 Million dollars, and the State of Michigan contributed \$ 6 Million dollars to make the transition possible. The City expects the transition to occur in October.

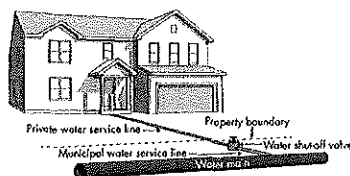
Current Drinking Water Issues & Lead Information

As noted, there has been a heightened awareness of lead leaching into drinking water through service lines and household plumbing. The City's Technical Advisory Committee has enlisted the support of EPA lead experts and is working with State of Michigan representatives to increase testing, rebuild public confidence, and implement long-term solutions to lead. It is recommended that everyone get their water tested and check with a plumber to evaluate the type and condition of your household plumbing. The City is currently mapping all of its lead service lines and working to develop a program to get lines changed over time.

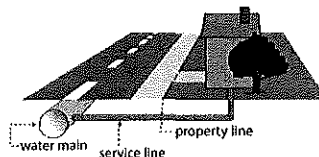
If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. The City of Flint is responsible for providing high quality drinking water, but cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 5 minutes before using water for drinking or cooking. If you are concerned about lead in your water, you may wish to have your water tested. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline or at <http://www.epa.gov/safewater/lead>.



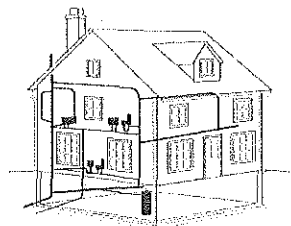
**No lead in water
leaving the
Treatment Plant.**



**Little or no lead in
water in the
transmission mains.**



**Lead can leach into
water through
service lines.**



**Lead can leach into
water through
household plumbing.**

Water Filters

Free water filters have been made available to current Flint residents at several locations. The MDHHS and the Genesee County Community Action Resource Department (GCCARD) are providing Free National Sanitation Foundation certified water filters at the following locations.

Residents receiving MDHHS assistance are encouraged to visit either the **125 E. Union St.** or **4809 Clio Rd.** MDHHS office location to obtain a free, certified home water filter. Residents who are not currently enrolled in MDHHS assistance programs should visit the (GCCARD) offices located at **2727 Lippincott** and **601 N. Saginaw** in Flint.

Staff will be onsite at all four locations from **9 a.m. to 4 p.m., Monday through Friday**, to distribute filters and assist residents who have questions about proper installation.

3rd Quarter Work Accomplished

- Successfully completed the installation of Granulated Activated Carbon at the water treatment plant which reduced the TTHM level in the water and helped bring the City back into compliance with the Safe Drinking Water Act.
- Over 3000 new water meters were installed creating better accuracy, accountability, and decreasing the number of estimated reads on water & sewer bills.
- Evaluated over 8000 valves in the system and identified over 2300 that are currently inoperable. The repair of these valves will be budgeted and worked into our multi-year Capital Improvement Plan.
- Leak Detection on all 600 miles of the distribution system has started and is over halfway complete. Several dozen leaks have been identified and repairs continue as more leaks are found. This has decreased the amount of water loss existing in the system.
- Construction of a load out facility at our wastewater plant is on target for completion by November and will allow the City to eliminate the use of the incinerator resulting in significant annual savings.
- Hundreds of main breaks are repaired annually by City workers on top of construction projects and routine maintenance.



City of Flint Water Service Center employees work to contain and repair one of many main breaks that continues to occur as a part of an antiquated infrastructure system.

Hundreds of water main breaks occur annually and the City's skilled workforce is constantly faced with long hours and changing weather conditions in which they work. Hydrant flushing and hydrant winterization are also part of the system maintenance and often cause water discoloration. It is advised that you run your water for several minutes to allow discoloration to

pass if work is being done in your area. The City is working to increase notification to residents when and where work is occurring.

Water Timeline

The following is a timeline of events, beginning with signing the KWA contract leading up to the current status of switching back to our previous source of water. This timeline only highlights certain notable events, for more information please visit the "water" page on the City of Flint website or email flintwater@cityofflint.com with your questions or to request a water test.

2013		
Date	Event	Comments
16-Apr	Flint signs contract with Karegnondi Water Authority (KWA).	Switch to KWA projected to provide water by mid-2016 and to result in over \$200 million dollars in savings over time.
17-Apr	DWSD terminates existing water contract.	Termination effective 12 months from date of the notice.
Oct	Determination is made to use Flint River for interim period if construction can be completed.	Determination follows attempt at signing new contract with DWSD and evaluation of River option.
2014		
9-Apr	Flint receives permit for use of the Flint River.	Permit is approved for interim use of Flint River which is expected to be just over two years.
30-Apr	Flint closes off the supply of water from DWSD	Valves were closed in the evening and monitored by Flint, GCDC, and DWSD.
Jul - Sept	Multiple boil water notices are issued in several areas of the City	Notices are due to test samples showing that bacteria growth is possible. Hydrant flushing is unable to clear the environment and additional chlorine is introduced.
Nov	Development of Operational Evaluation Report (OER)	Recognition of high TTHM levels prompts a preemptive development of an OER which was submitted to the DEQ
16-Dec	Flint receives TTHM violation notice from DEQ	Violation is calculated from a running average of four quarterly test results
2015		
2-Feb	Flint offers free water testing	Letters are sent to residents who have voiced water concerns and free testing is expanded to all residents
10-Feb	Veolia Consultants hired	Veolia responds to RFP for a water expert to make recommendations to reduce TTHM levels.
4-Mar	Flint holds first Technical Advisory Committee meeting	Formation of Advisory Committee comes out of Veolia recommendation and helped bring experts together to discuss options and solutions.
20-May	Flint holds second Technical Advisory Committee meeting	meeting is used to confirm that Flint plans to install the recommended Granulated Activated Carbon filters by August to combat TTHM
Aug	GAC filter installation complete	Filter installation completed on schedule and the TTHM drops significantly prior to quarterly testing
17-Aug	DEQ directs City to begin additional corrosion control	Corrosion control design moves forward with the City's engineering firm.
2-Sep	Flint receives notice they have returned to compliance	DEQ sends notification that Flint is no longer in violation of the Safe Drinking water act.
2-Sep	Online report that Flint River water is very corrosive	Report is by a VA Tech research group led by Professor Marc Edwards after hundreds of samples were tested.
24-Sep	Medical Professionals report a rise in elevated blood lead level of children.	A group of Medical Professionals led by Dr. Mona Hanna-Attisha, announce the difference in blood lead levels
25-Sep	Flint issues a "Lead Advisory"	Following the medical information, Flint and the Genesee County Health Department issue a "Lead Advisory"
1-Oct	Public Health State of Emergency	County Commissioners and the Health Department declare a Health Emergency.
7-Oct	Flint Technical Advisory Committee recommends returning to former source of water	The Tech team includes EPA lead experts, Marc Edwards, DEQ representatives, engineering team, Medical Professionals, and City Officials.
8-Oct	Governor announces effort to return Flint to former water source	The City of Flint, Mott Foundation, and State of Michigan combine to raise funding for switch.

Rennaker, Joanne (DEQ)

From: Andy Leavitt <aleavitt@senatedems.org>
Sent: Saturday, October 10, 2015 12:03 PM
To: Marc Edwards; Howard Croft; Amy Hovey; Brent Wright; Darren Lytle; Dayne Walling; donna. cole; Dykema, Linda D. (DHHS); Krisztian, George (DEQ); Gerald (Jed) Natzke; James Henry; Jamie Gaskin; Jason Lorenz; jmikewright; JoAnne Herman; John O'Brien; Kirk Smith; larry.koehler@mcc.edu; Laura Sullivan; Lawrence Reynolds; Lawrence Reynolds; Michael Glasgow; Michael Wright; Mike Lane; Prysby, Mike (DEQ); Natasha Henderson; Norb Birchmeier; Pete Levine; Robert Bincsik; rosejo@msu.edu; Russell Hudson; Samir Matta; schock.michael@epa.gov; Sean Kammer; Busch, Stephen (DEQ); Warren Green; Wurfel, Brad (DEQ); Anthony Chubb; Kevin Keane
Subject: Re: 3rd Quarter Water Report

I would echo Marc's sentiment on the bold language agreeing with his points but I would also add that trust needs to be rebuilt and the public simply will not believe anything in the document if you start by telling them it still meets standards. They do not differentiate between regs and rules but they know the water does not meet the standard of the physician community.

I would also recommend opening with timeline of going back to Detroit and what steps people can take to mitigate lead issues. Preferably with an excerpt from a physician.

The technical information matters for transparency but the trust gap is so wide that most people will be skeptical of all of it.

On Sat, Oct 10, 2015 at 11:48 AM Marc Edwards <edwardsm@vt.edu> wrote:

Hi Howard,

I think it is universally acknowledged now, that 30 seconds to 2 minutes flushing are not adequate, and **all public education should say 5 minutes flushing.**

I also think that given results of our team sampling 277 homes, the high levels of lead MDEQ detected in the Flint schools (a 90%ile over 15 ppb..which is horrible because they are not tier 1 plumbing sites), and the problems in the official LCR sampling conducted in late 2014-2015, that the following statement (in bold) is not really helpful in getting the message out about the current health risks. The bold statement seems more like wishful thinking or a legal position, and detracts from the goal of telling the public about the known problems.

*After 16 months of treating water from the Flint River, the City became aware that the while **still meeting all Safe Drinking Water Standards**, the level of corrosiveness could result in more lead leaching from service lines and household plumbing.*

That is my input. I am available at 540 231-7236 or 540 320-8740, if anyone should have questions about this.

Best Regards,

Marc Edwards

From: Howard Croft [mailto:hcroft@cityofflint.com]

Sent: Saturday, October 10, 2015 8:33 AM

To: Amy Hovey; Andy Leavitt; Brent Wright; Darren Lytle; Dayne Walling; donna. cole; dykemal; edwardsm; George Krisztian (DEQ); Gerald (Jed) Natzke; Howard Croft; James Henry; Jamie Gaskin; Jason Lorenz; jmikewright; JoAnne Herman; John O'Brien; Kirk Smith; larry.koehler@mcc.edu; Laura Sullivan; Lawrence Reynolds; Lawrence Reynolds; Michael Glasgow; Michael Wright; Mike Lane; Mike Prysby (DEQ); Natasha Henderson; Norb Birchmeier; Pete Levine; Robert Bincsik; rosejo@msu.edu; Russell Hudson; Samir Matta; schock.michael@epa.gov; Sean Kammer; Stephen Busch (DEQ); Warren Green; Wurfel, Brad (DEQ); Anthony Chubb; Kevin Keane

Subject: 3rd Quarter Water Report

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I will be putting together a separate weekly report for this Committee.

Thank you,

--

Howard Croft

Public Works Director

City of Flint

1101 S. Saginaw Street

Flint, MI 48502

PH# 810.766.7135 Ext.2043

hcroft@cityofflint.com

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Sent: Saturday, October 10, 2015 11:48 AM
To: 'Howard Croft'; 'Amy Hovey'; 'Andy Leavitt'; 'Brent Wright'; 'Darren Lytle'; 'Dayne Walling'; 'donna. cole'; Dykema, Linda D. (DHHS); Krisztian, George (DEQ); 'Gerald (Jed) Natzke'; 'James Henry'; 'Jamie Gaskin'; 'Jason Lorenz'; 'jmikewright'; 'JoAnne Herman'; 'John O'Brien'; 'Kirk Smith'; larry.koehler@mcc.edu; 'Laura Sullivan'; 'Lawrence Reynolds'; 'Lawrence Reynolds'; 'Michael Glasgow'; 'Michael Wright'; 'Mike Lane'; Prysby, Mike (DEQ); 'Natasha Henderson'; 'Norb Birchmeier'; 'Pete Levine'; 'Robert Bincsik'; rosejo@msu.edu; 'Russell Hudson'; 'Samir Matta'; schock.michael@epa.gov; 'Sean Kammer'; Busch, Stephen (DEQ); 'Warren Green'; Wurfel, Brad (DEQ); 'Anthony Chubb'; 'Kevin Keane'
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I will be putting together a separate weekly report for this Committee.

Thank you,

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Howard Croft

Public Works Director

City of Flint

1101 S. Saginaw Street

Flint, MI 48502

PH# 810.766.7135 Ext.2043

hcroft@cityofflint.com

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Subject: 3rd Quarter Water Report
Attachments: 3rd Quarter Water Quality Report.docx

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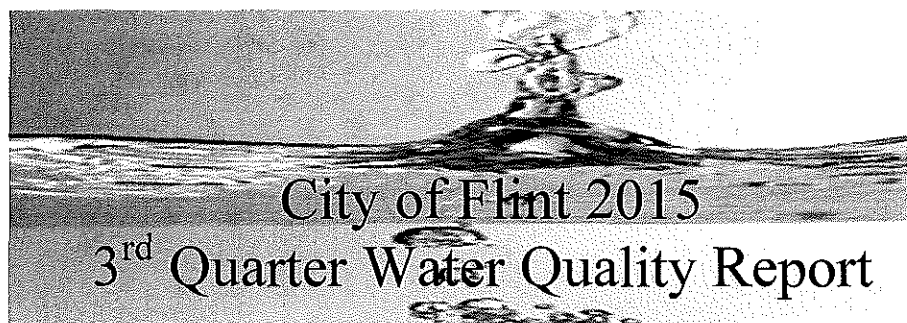
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Howard Croft
 Public Works Director
 City of Flint
 1101 S. Saginaw Street
 Flint, MI 48502
 PH# 810.766.7135 Ext.2043
hcroft@cityofflint.com

Customer Service Center
City Hall
1101 S. Saginaw St.
Flint, MI 48501

Postage



The Quarterly Water Quality Report provides important information about your drinking water. This report includes information about the source of the water, health information, charts that summarize regulatory required testing results, and a table giving explanations of important terms to understand when viewing the test results. The City of Flint Department of Utilities is dedicated to providing quality drinking water to the residents of the community. The Flint Water Plant operates and maintains a certified drinking water laboratory to assure compliance with all state and federal regulations, and is committed to prompt and thorough notification to the consumers if there is any reason for concern about the quality of the drinking water. Information about your drinking water is available on the City of Flint web page at www.cityofflint.com or by calling the City of Flint Water Plant at (810) 787-6537. The Safe Drinking Water Hotline at (800) 426-4791 is a resource for health related questions and water quality issues. General drinking water information can also be found on the U.S. Environmental Protection Agency (EPA) web site at www.epa.gov/safewater/.

Water Source

The City of Flint began using the Flint River as a water source in May of 2014. Flint is located roughly in the middle of the Flint River Watershed which includes Holloway Reservoir, C.S. Mott Lake, Kearsley Lake, and numerous streams and creeks that drain to these lakes or directly into the Flint River.

After 16 months of treating water from the Flint River, the City became aware that the while **still meeting all Safe Drinking Water Standards**, the level of corrosiveness could result in more lead leaching from service lines and household plumbing. Reports of elevated blood lead levels resulted in the City's Technical Advisory Committee making a recommendation to return to the previous source of water while waiting for the KWA to provide water from Lake Huron.

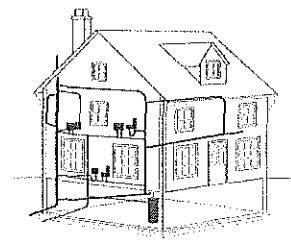
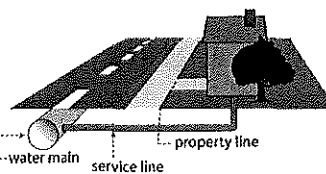
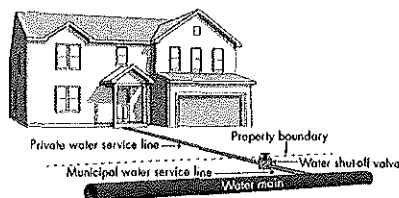
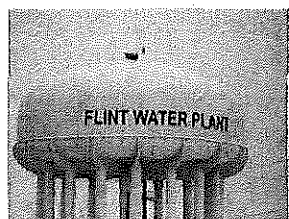
On Wednesday October 8, 2015, with the consent of Governor Snyder, the City stated they plan to return to its previous source of water. The decision followed two consecutive lead and copper test periods that exceeded 5ug/L which calls for additional action. In August of 2015 following the guidance of the DEQ, the City began also developing additional corrosion control measures that will be evaluated if it is needed as an additive to treated water but will be required when the city begins treating raw water from the Karegnondi Water Authority.

The City contributed \$2 Million dollars, the Mott Foundation contributed \$4 Million dollars, and the State of Michigan contributed \$ 6 Million dollars to make the transition possible. The City expects the transition to occur in October.

The City of Flint signed a contract with the Karegnondi Water Authority (KWA) in 2013. The KWA consists of a group of local communities that decided to support and fund construction of a raw water pipeline to Lake Huron. The KWA will provide the City of Flint Water Treatment Plant with source water from Lake Huron. The KWA pipeline is currently under construction, and is scheduled to be completed before the end of 2016. If you would like to know more information, contact the City of Flint Water Plant.

Current Drinking Water Issues

As noted, there has been a heightened awareness of lead leaching into drinking water through service lines and household plumbing. The City's Technical Advisory Committee has enlisted the support of EPA lead experts and is working with State of Michigan representatives to increase testing, rebuild public confidence, and implement long-term solutions to lead. It is recommended that everyone get their water tested and check with a plumber to evaluate the type and condition of your household plumbing. The City is currently mapping all of its lead service lines and working to develop a program to get lines changed over time.



NO LEAD IN THE
WATER LEAVING
THE TREATMENT
PLANT

LITTLE OR NO LEAD
IN THE WATER IN
TRANSMISSION
MAINS

LEAD CAN LEACH
INTO WATER
THROUGH WATER
SERVICE LINES

LEAD CAN LEACH
INTO WATER
THROUGH
HOUSEHOLD
PLUMBING

Water Filters

Free water filters have been made available to current Flint residents at several locations. The MDHHS and the Genesee County Community Action Resource Department (GCCARD) are providing Free National Sanitation Foundation certified water filters at the following locations.

Residents receiving MDHHS assistance are encouraged to visit either the **125 E. Union St.** or **4809 Clio Rd.** MDHHS office location to obtain a free, certified home water filter. Residents who are not currently enrolled in MDHHS assistance programs should visit the (GCCARD) offices located at **2727 Lippincott** and **601 N. Saginaw** in Flint.

Staff will be onsite at all four locations from **9 a.m. to 4 p.m., Monday through Friday**, to distribute filters and assist residents who have questions about proper installation.

3rd Quarter Work Accomplished

- Successfully completed the installation of Granulated Activated Carbon at the water treatment plant which reduced the TTHM level in the water and helped bring the City back into compliance with the Safe Drinking Water Act.
- Over 3000 new water meters were installed creating better accuracy, accountability, and decreasing the number of estimated reads on water & sewer bills.
- Evaluated over 8000 valves in the system and identified over 2300 that are currently inoperable. The repair of these valves will be budgeted and worked into our multi-year Capital Improvement Plan.
- Leak Detection on all 600 miles of the distribution system has started and is over halfway complete. Several dozen leaks have been identified and repairs continue as more leaks are found. This has decreased the amount of water loss existing in the system.
- Construction of a load out facility at our wastewater plant is on target for completion by November and will allow the City to eliminate the use of the incinerator resulting in significant annual savings.
- Hundreds of main breaks are repaired annually by City workers on top of construction projects and routine maintenance.



City of Flint Water Service Center employees work to contain and repair one of many main breaks that continues to occur as a part of an antiquated infrastructure system.



Hundreds of water main breaks occur annually and the City's skilled workforce is constantly faced with long hours and changing weather conditions in which they work. Hydrant flushing and hydrant winterization are also part of the system maintenance and often cause water discoloration. It is advised that you run your water for several minutes to allow discoloration to

pass if work is being done in your area. The City is working to increase notification to residents when and where work is occurring.

General Information

In order to ensure that tap water is safe to drink, the EPA prescribes regulations, which limit the amount of certain contaminants in water provided by the public water systems. The Food and Drug Administration (FDA) regulations establish limits for contaminants in bottled water, which must provide the same protection for public health. Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the EPA's **Safe Drinking Water Hotline (800) 426-4791**.

The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity. Contaminants that may be present in source water include:

- ◆ **Microbial contaminants**; such as viruses and bacteria, which may come from sewage treatment plants, septic systems, agricultural livestock operations, and wildlife.
- ◆ **Inorganic contaminants**; such as salts and metals, which can be naturally-occurring or result from urban storm water runoff, industrial or domestic wastewater discharges, oil and gas production, mining, or farming.
- ◆ **Pesticides and herbicides**; which may come from a variety of sources such as agriculture, urban storm water runoff, and residential uses.
- ◆ **Organic chemical contaminants**; including synthetic and volatile organic chemicals, which are by-products of industrial processes and petroleum production, and can also come from gas stations, urban storm water runoff, and septic systems.
- ◆ **Radioactive contaminants**; which can be naturally occurring or be the result of oil and gas production and mining activities.

Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. EPA/CDC guidelines on appropriate means to lessen the risk of infection by *Cryptosporidium* and other microbial contaminants are available from the hotline above.

If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Infants and young children are typically more vulnerable to lead in drinking water than the general population. It is possible that the lead levels at your home may be higher than at other homes in the community as a result of materials used in your home's plumbing. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. The City of Flint Department of Utilities is responsible for providing high quality drinking water, but cannot control the variety of materials used in plumbing components. If you are concerned about elevated lead levels in your home's water, you can minimize your potential exposure to lead in your water by flushing your tap for 30 seconds to 2 minutes before using water for drinking or cooking. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline or at <http://www.epa.gov/safewater/lead>.

Rennaker, Joanne (DEQ)

From: Michael <smarterwater@comcast.net>
Sent: Friday, October 09, 2015 5:21 PM
To: sfmatta@lan-inc.com
Cc: Prysby, Mike (DEQ); Cook, Pat (DEQ)
Subject: Our Phone Conversation About Flint, MI and Our Phosphate Product SeaQuest
Attachments: SEAQUEST - OPFLOW 2003 (COLOR).pdf; SEAQUEST FILES - CHLORINE, CAUSTIC, COMPLAINTS - PERU, IL.pdf; SEAQUEST FILES - CHLORINE, IRON, COMPLAINTS - MAGNOLIA, IL.pdf; SEAQUEST FILES - CORROSION AND SCALE - STELLARTON, NS.pdf; SEAQUEST FILES - SCALE - CARLINVILLE, IL.pdf; SEAQUEST FILES - CORROSION - BRUNSWICK, GA.pdf; SEAQUEST FILES - SCALE - MANHEIM, PA.pdf; SeaQuest - Greer THM and HAA Report.jpg; SeaQuest Document 6 - Virgin Islands In Line Lead Pipes With Graphs.pdf; SeaQuest Document 9 - Chlorine Reduction and Amonia Elimination, THMs.pdf

Samir Matta
 Lockwood, Andrews & Newnam (LAN)
 1311 S. Linden Road, Suite B
 Flint, MI 48532

517-819-2367 (cell)
 810-820-2682 (office)
 810-820-2703 (fax)

October 9, 2015

Hello Samir...

Thank you for your time on the phone. As promised, I'm sending you some information on our phosphate product, SeaQuest.

SeaQuest is a Phosphate blend made exclusively from 100% North American food grade poly and orthophosphates, with no fillers whatsoever. Our product is thoroughly documented and is the most stable, blended phosphate product available that effectively works in a wider pH range (5.5 through 12) and temperature range (only a 5% reversion in 250 degrees F) than any other phosphate on the market. SeaQuest provides a mono molecular coating which unlike any other phosphate, bonds with pipes and will lower lead and copper numbers even in extreme cases such as in desalinated water systems.

SeaQuest will completely sequester soluble hardness without precipitation in pipes or home water heaters, reduces calcium scale hardness and corrosion in the pipes through a gradual cleanout, increases chlorine residuals while decreasing chlorine usage (typically from 10% - 20%) and removes biofilms on both plastic and metal pipes, to name a few of our benefits.

SeaQuest is the only third generation phosphate technology and provides advantages not found with any other phosphate product. Our NSF Certified phosphate corrosion inhibitor is the only phosphate technology that has been independently written about and presented twice at the Water Quality Technology Conference of AWWA (1999 and

2007). SeaQuest is also the subject of numerous additional independent studies and professional Papers including a front page article in Op Flow Magazine (January, 2003).

I'm attaching some Case Histories which should give you a better sense of some of what SeaQuest can provide. I would be available to set up an appointment at your convenience either during the first or second week in November.

Thank you. I appreciate your time.

Respectfully,

Michael Edelstein
National Sales and Development Manager
Aqua Smart, Inc.
4445 Commerce Drive, SW
Atlanta, GA 30336
404-696-4406 (office)
404-696-3712 (fax)
404-307-8077 (cell)

Website: www.aquasmartinc.com

Aqua Smart, Inc .

"SeaQuest Makes Your Water Smarter"

Opflow

Vol. 29, No. 1 January 2003

Distribution Systems Corrosion Control Aids Residuals

by Y. Koby Cohen, Calvin G. Abernathy, and Christopher P. Hill

Unlined cast-iron and steel pipes, which are abundant in the Southern California Water Company-Southwest District distribution system, are known to have water quality problems because of higher disinfectant demands and higher biofilm density. Keeping ahead of the loss of disinfectant residual was labor intensive and costly, so the District conducted a pilot study to investigate alternatives.



Several bench-scale studies have documented that an effective corrosion control program may increase disinfectant residuals and improve water quality because fewer corrosion products are formed. So, over a three-year period, the District studied the long-term effect of corrosion inhibitors on disinfectant residuals, distribution system hydraulics, and water quality. The study proved that the use of polyphosphate-blend corrosion inhibitors is effective in maintaining residuals and will help limit water lost to and labor spent on flushing. The District is in the process of implementing the program systemwide.

District Disinfectant Demand

Unlined cast-iron and steel pipes, installed between 1930 and the late 1950s, comprise about 53 percent of the 410 miles of water distribution pipelines owned by the District. The remaining pipelines are ductile iron, polyvinyl chloride, and asbestos cement. The large number of unlined

continued on page 4

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Weighing Lead Pipe Replacement Options	12
Question of the Month	15
Tapping In	16
Product Place	18

Corrosion Control Aids Residuals

(from page 1)

cast-iron and steel pipes promotes significant disinfectant demand in some sections of the distribution system. The demand can be divided into two major categories:

- ▶ the demand of the bulk fluid, and
- ▶ the demand of the pipe wall surface.

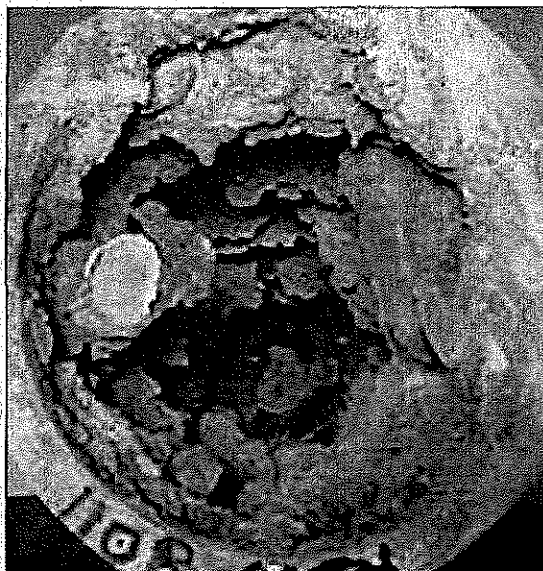
The disinfectant demand of the bulk fluid is exerted by reactions with organic, inorganic, and bacterial

constituents of the water. Reactions with corrosion products, oxidation of dissolved iron originating from the pipe walls, biofilms that reside on the pipe surface, and the organic and inorganic constituents that accumulate within the corrosion product-biofilm matrix cause disinfectant demand.

Loss of disinfectant residual, especially in low-flow areas, increases biofilm accumulation, nitrification, and customer complaints about objectionable taste and odor, color, and particulates in the water. To minimize these water quality problems and reduce consumer complaints, the District has a comprehensive flushing program that includes annual systemwide flushing, unidirectional flushing, dead-end flushing, and routine flushing of problem areas. These flushing programs use approximately 100 acre-ft (32.6 mil gal) of water per month and require three to four people to perform the flushing.

Polyphosphate-Blend Corrosion Inhibitors

Bench-scale studies done at the Montana State University-Biofilm Institute showed that polyphosphate-blend (approximately 77 percent polyphosphate and 23 percent orthophosphate) corrosion inhibitors produce corrosion products that are physically much softer and less cohesive than corrosion products formed with zinc orthophosphate-based corrosion inhibitors. Based on these studies, the District anticipated that use of this polyphosphate-blend would produce



Corroded pipes comprise about 40 percent of the District's distribution system.

corrosion products that would be easier to remove by flushing. Because of the reduction in corrosion products, we expected an additional benefit of less disinfectant demand and a smoother and hydraulically superior pipe surface.

A short-term disadvantage of polyphosphate-blend corrosion inhibitors is that existing corrosion products on pipe wall surfaces are softened and removed shortly after adding the blend.

The sloughing of these corrosion products may lead temporarily to increased disinfectant demand and increased microbial activity in the distribution system.

Study Description and Setup

The polyphosphate-blend-addition pilot study began in November 1998, in a less than 1 mi² isolated area of the distribution system. The District expanded the study in June 1999 to about a 3.6 mi² area. Pipes in the study area vary from 4 to 12 in. in diameter and are approximately 50 percent unlined cast iron, 25 percent cement-lined cast iron, and 25 percent asbestos-cement pipe. The study area, comprised of approximately 80 percent residential and 20 percent commercial and light industrial facilities, is representative of the rest of the distribution system.

Polyphosphate-blend solution

Y. Koby Cohen, PE, is vice president of quality assurance for Suburban Water Systems and chair of the AWWA Water Quality in Transmission and Distribution System Committee. Contact him at (626) 543-2551 or kcohen@suburbanwatersystems.com. Contact Calvin G. Abernathy, PhD, PE, associate professor at the University of Memphis, Department of Civil Engineering, at (901) 678-3283 or cgabernth@memphis.edu. Reach Christopher P. Hill, PE, an engineer with Malcolm Pirnie, at (614) 430-2683 or chill@pirnie.com.

was added at the effluent of five groundwater plants and at a treated surface water connection from Metropolitan Water District of Southern California. Each water source was disinfected using chloramines at a concentration of 2.5 to 4.0 mg/L total chlorine.

The polyphosphate-blend dose varied based on water quality parameters. It was dispensed at a rate of 1 mg/L per 1 mg/L of iron (Fe), manganese (Mn), and all divalent metals, plus 1 mg/L per 200 mg/L of hardness measured as calcium carbonate (CaCO_3) and 0.15–0.3 mg/L for polyphosphate-blend residual and corrosion control. In all cases, the polyphosphate-blend solution was injected after the chlorine and ammonia addition in the plant effluent line.

To evaluate changes in water quality, a number of parameters (Table 1) were measured regularly at five primary distribution system locations, each representing one of the plants. The same parameters were also monitored at each of the groundwater wells and 25 other locations within the distribution system. At each of the distribution system monitoring sites, orthophosphate was measured weekly,

District Operator Profile

Name: Mike Cory **Age:** 38
Title: Quality Assurance Supervisor
Operator Certification Level: Water Treatment Operator Grade 2/Water Distribution Operator Grade 3
Education & Experience: Some college, presently working on a bachelor's degree in business administration. 19 years in water supply operations; four months in current position



How were you involved in the process described in the article? I was a water quality technician responsible for taking water quality samples from the distribution system and coordinating the flushing activities. I handled customer complaints, evaluated water quality data, and made recommendations for operational changes to improve water quality.

How does this process help make your job easier or more efficient? Since the introduction of polyphosphate-blend to the distribution system we have reduced the time spent on customer complaints, water loss to distribution system flushing, and unnecessary manpower spent resolving water quality problems.

Are there any changes or improvements you would make to the process? I would like to have the necessary resources for flushing the system during the first two weeks after the initial introduction of the polyphosphate blend.

and heterotrophic plate counts (HPC) and total coliforms were monitored monthly to determine bacterial activity. Background data were collected three weeks prior to the startup of the pilot study at four of the five primary distribution system locations.

Results and Discussion

Water used in flushing activities. Prior to polyphosphate-blend addition, flushing typically required 20 to 30 acre-ft/month, and occasionally as much as 65 acre-ft/month. Following polyphosphate-blend addition that began June 1999, the required flushing volume dropped to 2 to 3 acre-ft; three years later, it has fallen as low as 0 to 1 acre-ft/month.

A crew of two to three people flushed the area as frequently as twice per week. In general, flushing was done until water quality goals were met.

Customer Complaints. One of the primary goals of the polyphosphate-blend addition was to reduce the number of customer complaints. During the summer of 1998, the number of complaints was as high as 35 per month. Because of its color-sequestering ability, the polyphosphate-blend addition had an immediate impact, reducing the number of complaints to fewer than five per month. The number of complaints has consistently remained fewer than five

continued on page 6

Constituent	Frequency	Importance
Total Chlorine	Daily/Weekly	Determine changes in disinfectant residual concentration
Total Ammonia	Weekly	Determine chlorine:ammonia ratio Nitrification Indicator
Nitrite	Weekly	Nitrification indicator
Turbidity/Odor/Color	Weekly	Determine water quality and aesthetic properties
Orthophosphate	Weekly	Determine residual polyphosphate concentration
Manganese	Weekly	Determine effect on manganese solubility
Iron	Weekly	Determine effect on iron solubility
Larson Indexes	Monthly	Corrosion rate measurements
Total Coliforms	Weekly	Determine bacterial activity
HPC	Weekly	Determine bacterial activity
HPC using R2A media	Weekly	Determine bacterial activity
Customer Complaints	Ongoing	Indication of water quality
Orthophosphate*	Weekly	Determine background orthophosphate level
Total Coliforms*	Monthly	Determine bacterial activity
HPC*	Monthly	Determine bacterial activity

Table 1. Water quality parameters measured in the distribution system or (*) at each source.

Corrosion Control Aids Residuals

(from page 5)

per month, including a number of summer months in which zero complaints were received (Figure 1).

Total chlorine residuals. Total chlorine residual was monitored in the field, using pocket colorimeters

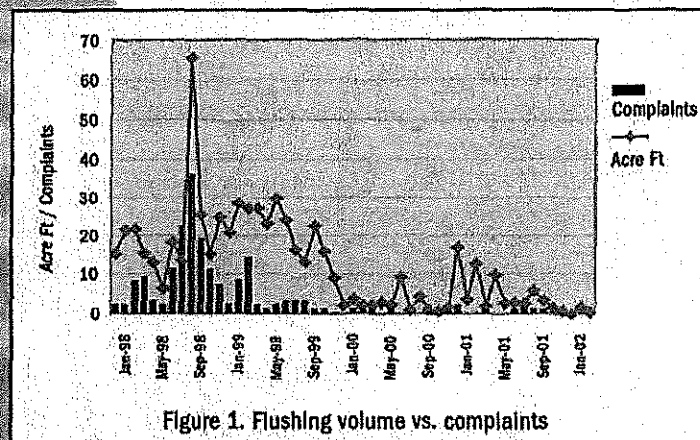


Figure 1. Flushing volume vs. complaints

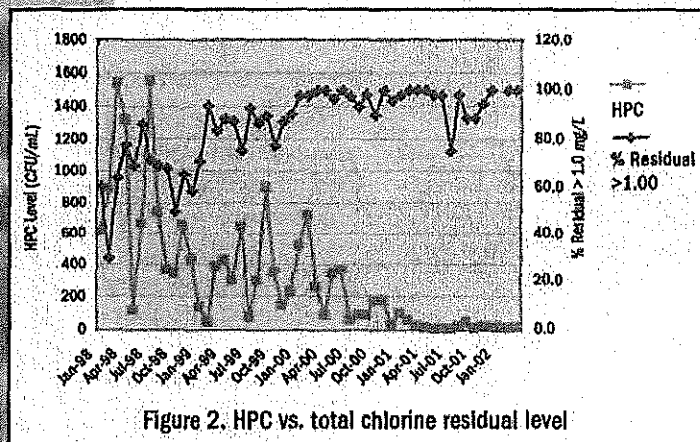


Figure 2. HPC vs. total chlorine residual level

with DPD-method procedures to determine if the District goal to maintain a total chlorine residual greater than 1.0 mg/L was being met. Prior to the addition of the polyphosphate blend, as few as 30 percent of monthly samples had a measured total chlorine residual greater than 1.0 mg/L. Approximately six months later, 90 to 100 percent of the residuals in the study area were greater than 1.0 mg/L. Also, less water was used in flushing to achieve the goal.

HPC bacteriological analyses. HPC levels, which are the main indicator of bacterial activity in the study area, also decreased significantly following the addition of polyphosphate blend. However, it took almost two years for the level to consistently remain below 100 colony forming units/mL, which is the District goal. We suspect that initially the polyphosphate-blend

agent dissolves the corrosion product-biofilm matrix on the pipe wall, resulting in higher HPC levels. Throughout the study period, all bacteriological samples were absent of coliform bacteria.

For this system, a minimum of two years of polyphosphate-blend addition is required to establish low HPC levels. The length of time following polyphosphate-blend addition required to reduce HPC levels depends on the type and age of the water mains and characteristics of the biofilms and corrosion products. Newer systems, which may contain thinner biofilms or fewer corrosion by-products, may be able to reduce HPC concentrations in less time. Older systems that have unlined cast-iron and steel water mains with firmly established biofilms may require longer than two years (Figure 2).

Recommendations

Over the three-year study period, the results showed continual improvement in water quality (evidenced by frequent months in which no customer complaints were received), an ability to continuously maintain the desired total chlorine residual, and a reduction in HPC levels to below the District's goal. The District achieved these improvements while conducting limited flushing in the study area.

Conclusions and recommendations to utilities considering polyphosphate-blend addition include

- Polyphosphate-blend addition can soften and remove existing biofilm layers and corrosion tubercles. Implementation of a well-coordinated flushing program may minimize short-term water quality degradation associated with corrosion product and biofilm detachment events and speed up removal of biofilm layers.
- Short-term episodes of low disinfectant residuals and high HPC levels should be expected shortly after the implementation of polyphosphate blend as a result of sloughing of pipe biofilms and dissolution of corrosion products in the system. Therefore, it may be necessary to temporarily increase the plant effluent disinfectant residual.
- Immediate reduction in customer complaints can be achieved.
- Improvement in overall water quality may take as long as three years to achieve based on type and age of pipes.

From The Aqua Smart Inc. Files

GRADUAL CAUSTIC ELIMINATION WITH SEAQUEST

Dealing With pH, Chlorine, Caustic and Ongoing Customer Complaints

Case # 121 – PERU, IL – STARTED JANUARY 4, 2006

(Total Hardness 120 PPM; Fe 0.04; Mn 0.002)

2.5 MGD Surface Plant

Peru, IL had long term Chlorine Residual problems and issues maintaining pH Levels



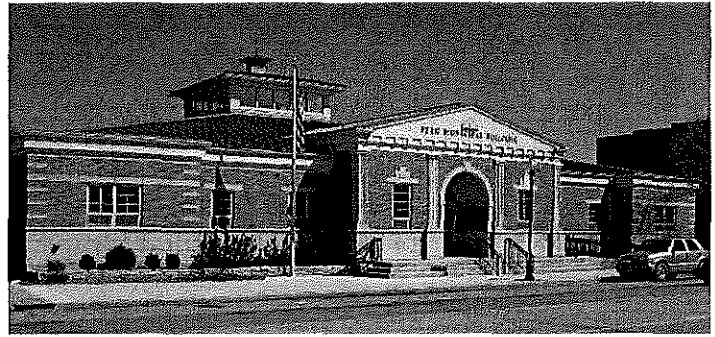
Before Using SeaQuest

Peru, IL had a long 25 year plus history of using Sodium Hydroxide (Caustic Soda) as a pH adjustment product. They were raising the Water Treatment Plant's finished water pH from a 7.5 to an 8.0 for corrosion control while also using a **phosphate product**. Even though they passed their lead and copper numbers, for decades the Treatment Plant was losing chlorine in various areas of the system and in some cases, Peru's chlorine residual numbers were well below IL-EPA minimum levels. And compounding this long term problem, the City, for years, was also receiving ongoing dirty water complaints.

Throughout this time, Peru, IL had been using various local phosphate blends from a national phosphate supplier which required a pH adjustment enhancer, like Caustic Soda, in order to work. **But it didn't work.** Financially, Peru was spending about \$2,300.00 per month (\$ 75.61 per day or \$ 27,600.00 per year) on just their Caustic costs!

In spite of their best efforts, Peru, IL also had problems maintaining consistent chlorine residuals throughout the city, especially on the West Side of Peru.

The City received an average of up to 5 dirty water calls every week (about 20 per month!) and flushing usually was the typical method of resolving these calls. Dingy laundry, calcium scale and dirty tap water were listed as common homeowner complaints, and giving customers the "Iron Out" product for their laundry was common and very costly.



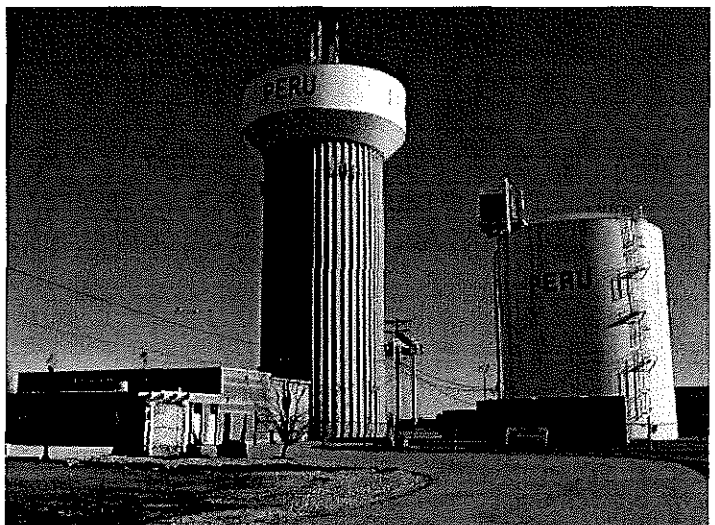
Peru, IL City Hall

Results Within 4 Months of Using SeaQuest

Within only 4 months of using SeaQuest, the City of Peru, IL saw chlorine residuals on the West side of Peru that they had not seen in over 25 years of using the various local blended phosphates from their previous national supplier. Peru noticed that their chlorine lasted longer and residuals were up everywhere and maintained throughout the entire system. **Dirty water calls ceased**, home softeners were working better and customers were very happy.

As pH adjustment is not necessary with SeaQuest, Peru gradually eliminated their Caustic usage because SeaQuest works and provides the exact same benefits in a broader pH range than any other Phosphate product on the market! This benefit alone has saved Peru, IL approximately \$ 27,600.00 per year from using Caustic.

Reference calls can be made to the General Manager at 815-224-1650 extension # 232.



The Peru, IL Water Treatment Plant

THE RESULTS FROM USING SEAQUEST:

1. Chlorine Residuals appeared in non-compliant areas and increased throughout the entire Peru, IL system
2. Cost Savings of \$ 27,600.00 with the elimination of Caustic
3. Customer Complaints down from 5 per week to Zero (100% Reduction)

From The Aqua Smart Inc. Files

DIRTY WATER ELIMINATION WITH SEAQUEST

Dealing With Low Chlorine Residuals and Boil Orders,
Dirty Water and Customer Complaints

Case # 120 – MAGNOLIA, IL – BEGAN SEPT 4, 2005
(Total Hardness ~ 300 PPM; Fe 0.05; Mn 0.015; Zn 0.1)
0.030 GPD Ground Water Plant

**Magnolia, IL had long term Chlorine
Residual problems and Dirty Water issues**

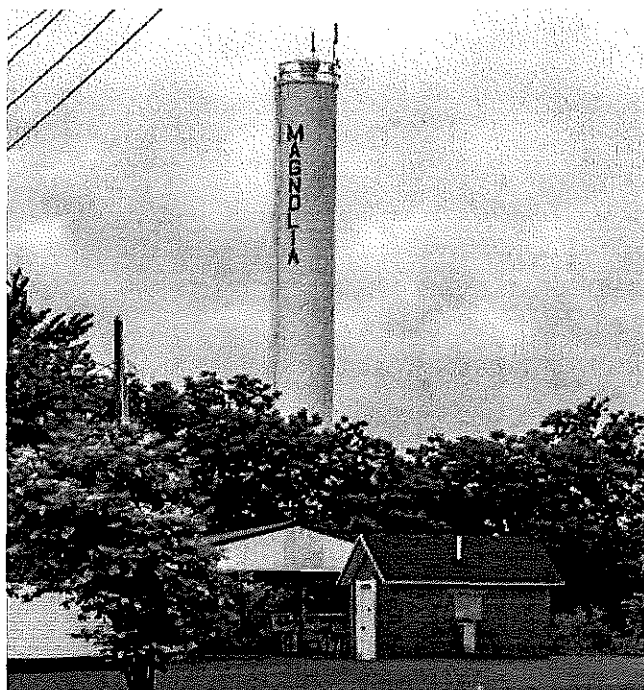


Before Using SeaQuest

The Village of Magnolia, IL, a small town located in Putnam County, IL, had a long 20 year plus history of dirty water with little to no chlorine residuals throughout their system. The Raw Water Iron level at 6 mg/L (PPM) was so high in their ground water that they used an Iron Removal Filter to bring down the Iron to 0.05 PPM, and then added a supplemental post filter Phosphate. Various blends and treatment rates from a local manufactured, national phosphate company were used to help Magnolia produce clean water, but of these many blends used over the years, none could hold the post filter Iron (or Zinc). It seemed like nothing was able to solve Magnolia's issues, and dirty red water throughout the Village was the norm. Because their storage tank was only 20,000 Gallons at the time, Magnolia would flush until the normal 55 PSI pressure reached down to 20 PSI, then they would wait for the storage tank to refill. All monthly, system wide Flushings took about a week and a half to complete and were accompanied by a Boil Order. **Nothing provided relief!** Furthermore, chlorine usage was high while residuals were low, and customers were resolved to getting dirty water from their taps and monthly Boil Orders as a way of life.



Magnolia, IL Township Building



The Village of Magnolia, IL and their new 53,000 Gallon Water Tower

Only 4 Months After Using SeaQuest

Within only 4 months of using SeaQuest, Magnolia's water began to completely clear up! Chlorine residuals went up dramatically throughout the Village of Magnolia and chlorine usage dropped by 40%! Monthly system wide Flushings went dramatically down from every month to only twice a year. Finally, Magnolia, IL was meeting the standard IL-EPA levels for chlorine residuals. Customer complaints went from 5 per month to Zero. SeaQuest resolved in 4 months what 20 plus years of using many other phosphate blends couldn't accomplish.

System wide Flushing at the hydrants in Magnolia today takes less than 30 seconds for clear water to appear.

Reference calls for Magnolia, IL can be made to the General Manager at 815-224-1650 extension # 232.

THE RESULTS FROM USING SEAQUEST:

1. 40% Less Chlorine Usage to maintain IL-EPA Residuals.
2. Customer Complaints went from 5 Per Month down to 0 (100% Reduction).
3. System Wide Flushing went from once a month down to the standard maintenance flushing of only once every six months (83% Less Yearly Flushing).
4. System wide Flushing time dropped from 1 ½ weeks down to 2 days (About 81 % less Flushing time and less water usage).
5. Flushing hydrants now produce clear water in less than 30 seconds.
6. NO MORE Boil Orders!

From The Aqua Smart Inc. Files

PIPE SCALE AND CORROSION REMOVAL WITH SEAQUEST

Case # 301 – Stellarton, Nova Scotia – May 2004 and Dec 2008
(Total Hardness <40 PPM; Fe 0.00; Mn 0.007; 0.630 MGD)

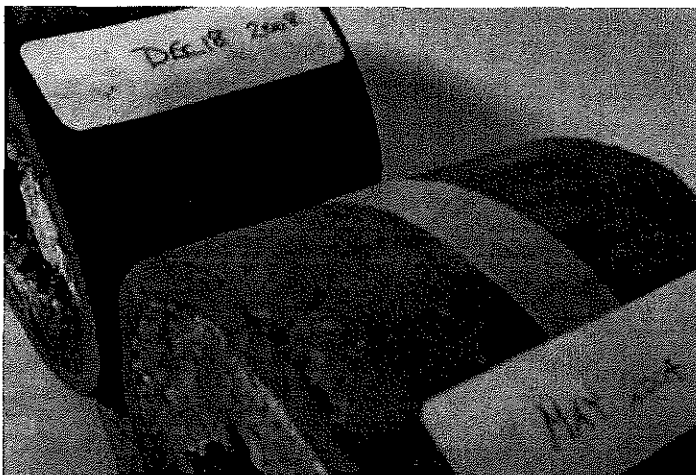
DECEMBER, 2008

MAY, 2004



1. In 1904, the Town of Stellarton, Nova Scotia, a Surface Water System, put new Cast Iron Pipe throughout their Distribution System. The 4" Pipe section above on the right was removed in May, 2004, about 100 years after it was put into the ground. The Stellarton Water Utility began using SeaQuest in 2004 and intended to cut out another piece of pipe 5 years later in May, 2009 for proof of cleanout.

Both Pipes Were Marked To Identify Removal Dates



DECEMBER, 2008

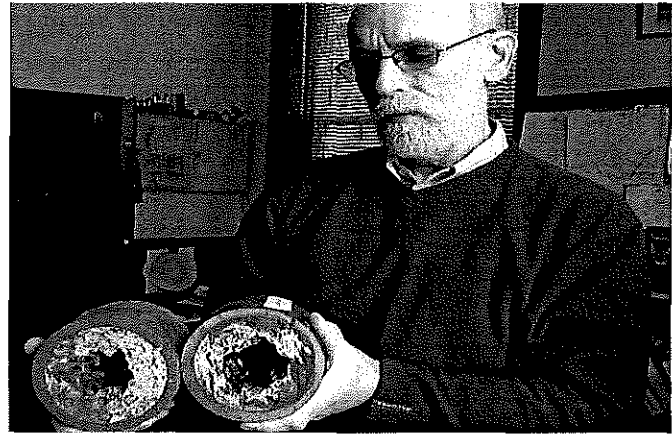
MAY, 2004

4.5 Years of Using SeaQuest 100 Years of Occasional Caustic

3. The hole in their Pipe increased from ½" to about 2" (two inches). Chlorine residuals remained stable using about 29% less Chlorine Gas and Flushing Time was greatly reduced from Twice a Year down to Once a Year and for about only 20 minutes per Hydrant. When you add it all together; Staff Time, Equipment, Paper Work, Water Usage, etc., SeaQuest saved Stellarton much more than the cost of using our product!

The 4" Distribution Pipe in the Town of Stellarton, Nova Scotia

Tony Addis, Town Engineer Inspecting Both Pipes



2. Unexpectedly, in December, 2008, 4.5 years later, a pipe break occurred about 100 feet from the original piece of cut out pipe. The Pipe in the above picture in Tony's left hand was a result of 4.5 years of cleanout from using SeaQuest. The Town of Stellarton was already saving money with less Chlorine Usage and dramatically decreased Flushing (cut by half), but now they were amazed at what they actually saw in their Pipe!

4.5 Years of Using SeaQuest compared to 100 Years



THE RESULTS FROM USING SEAQUEST:

1. 100 Year Old Pipe - Opening from ½" To 2" (300% Increase)
2. Chlorine Gas Usage was Reduced by 29% while Residuals remained stable throughout the Town of Stellarton.
3. System Wide Flushing went from Twice a Year to only Once a Year (50% Less Staff and Equipment Flushing Time).
4. Flushing Hydrants went from about 1 hour down to about 20 minutes before the water clears (Flushing approximately 66% less water!)

From The Aqua Smart Inc. Files

GRADUAL SCALE AND BIOFLM REMOVAL WITH SEAQUEST

Dealing With pH, Turbidity and Pseudomonas

Case # 123 – Carlinville, IL – Started SeaQuest in February, 2007

(Total Hardness 148 PPM, Fe 0.03, Mn 0.003)

Surface Water Plant ~ .900 GPD



Carlinville had about 1" of scale build up in their 125K Clearwell and 400K Storage Tank which was safely removed with SeaQuest.

1. Before using SeaQuest, Carlinville, IL had scale buildup in their Clearwell and Storage Tank, and had very little to no chlorine residuals on the North Side of town. About 4 weeks after using SeaQuest, Carlinville began seeing an increase in chlorine residuals throughout their system and a very gradual removal of scale. About 4 to 5 months after seeing these results, the Carlinville Water Plant noticed one day a rise with their turbidity from a 0.1 to a 0.5. After 4 days of showing an increase, the Water Plant Foreman and Engineering Firm concluded that the SeaQuest might be creating the problem and then decided to shut off the SeaQuest. The turbidity went down. Knowing that SeaQuest gradually removes scale, they wondered if they had been over feeding their SeaQuest with either a higher dosage than recommended or maybe their chemical feed pump was not feeding properly. They knew that several other systems in the area were using SeaQuest and seeing great results with no increase in their turbidities.

The Superintendent decided that the Water Plant should do a major flushing of their Clearwell and Storage Tank. With this aggressive flushing, the scale buildup was quickly removed without any negative affect with their water quality and their chlorine usage dramatically went down. After the scale was removed and the chemical feed pump and Dosage Rate of SeaQuest was corrected, they did not have this turbidity issue again.

2. Before using SeaQuest, Carlinville had an issue not originating from their Plant. The Central Macoupin County Rural Water District, which was buying water from Carlinville, had a sudden outbreak of the bacteria Pseudomonas in their system. Once in a water system, if left untreated, pseudomonas bacteria grow rapidly, quickly forming a bio-film on both metal and plastic pipework. The bio-films caused by pseudomonas adversely affected the County's drinking water; impairing the taste, appearance and safety of the water. Pseudomonas is usually lumped together as one part of the variety of bacteria that is included in the Heterotrophic Plate Count (HPC) measurements. The HPC is a relatively simple indicator of a wide range of bacteria including several Pseudomonas species. There were several possible explanations as to why the outbreak occurred, but Carlinville wanted to know if SeaQuest will kill the Pseudomonas bacteria. SeaQuest does not kill bacteria, however, it is the only blended phosphate product that is documented to remove biofilms which hide and protect some bacteria in both metal AND plastic PVC pipe (see OP FLOW, January, 2003, front page article on SeaQuest). When biofilms are removed and chlorine residuals are strong, bacteria is killed. Within 6 months of using SeaQuest, the Pseudomonas outbreak was finished and never returned!

THE RESULTS FROM USING SEAQUEST:

- A. Since using SeaQuest, Carlinville has seen pipe clean out throughout their system.
- B. 32% reduction of chlorine usage (from about 45 pounds per day down to 30 pounds per day or from 16,425 pounds – 8.212 Tons down to 10,950 pounds per year 5.475 Tons per year) while having an increase in chlorine residuals throughout the system
- C. No water quality complaints.
- D. pH ranges before the use of SeaQuest were up to 8.9 on the high side and after using SeaQuest, the pH went down to about 8.1 without any negative water quality affect in distribution.

From The Aqua Smart Inc. Files

PIPE CORROSION REMOVAL WITH SEAQUEST

Case # 302 – Brunswick, GA – 2009 Through 2011

(Total Hardness 195 PPM; Fe 0.12; Mn 0.09; 4.5 MGD)

MAY, 2009

The Dead End Pipe on the right in Brunswick, GA was about 50 – 60 years old in 2009. The City of Brunswick, GA had been using several phosphate blends over a 15 year period without any noticeable changes. The hole in this 4" Pipe was reduced down to approximately a $\frac{3}{4}$ " (three quarter inch) opening. The Gallon Per Minute (GPM) Flow Rate was down to about 40 – 50 GPM. Red Water Complaints at this Dead End Pipe area were at 24 that year. Chlorine was fed at the Plant at 1.2 PPM and the Chlorine Residual was at 0.35 PPM. Because of the poor results of other products, the City of Brunswick, GA decided to try different, SeaQuest.

The 4" Dead End Pipe in Brunswick, GA



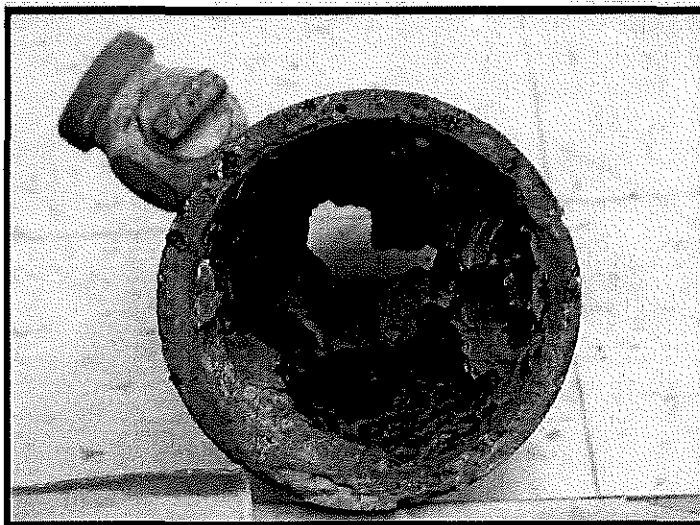
MAY, 2010

In May of 2010, 1 year after they put SeaQuest into their system, Brunswick pulled out the Dead End Pipe for inspection and noticed that corrosion was being removed inside of the Pipe. They were getting real cleanout with an increase of flow and chlorine residuals. The hole in this Pipe was now increased to approximately a $1\frac{1}{4}$ " (one and a quarter inch) opening. The Gallon Per Minute Flow Rate increased and Red Water Complaints went down to from 24 the year before to only 2 complaints.



MAY, 2011

In May of 2011, 2 years after they put SeaQuest into their system, Brunswick pulled out the Dead End Pipe for another inspection and noticed that corrosion was now dramatically removed in the Pipe. The hole in this Pipe increased to approximately 2" (two inches). The GPM Flow Rate increased to 150 – 200 Gallons Per Minute and Red Water Complaints went down to 0 (zero)! Chlorine is now being fed at the Plant at 0.80 PPM and the Chlorine Residual remains stable at an incredible 0.75 PPM.



THE RESULTS FROM USING SEAQUEST:

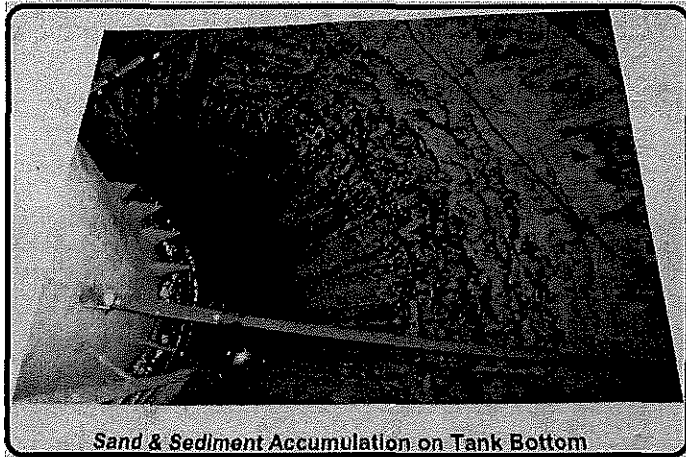
1. Pipe Opening from $\frac{3}{4}$ " To 2" (167% Increase)
2. Chlorine Usage From 1.2 PPM Down To 0.80 PPM (33% Less Chlorine Usage)

3. Chlorine PPM Residual Of 0.35 Up To 0.75 (114% Increase)
4. GPM From 40 – 50 Up To 150 – 200 GPM (400% Increase)
5. Customer Complaints From 24 To 0 (100% Reduction)

From The Aqua Smart Inc. Files

GRADUAL SCALE REMOVAL WITH SEAQUEST

Case # 100 – Manheim Borough Authority, PA – 2010
(Total Hardness 294 PPM, Fe 0.02, Mn 0.00, 0.936 GPD)



Sand & Sediment Accumulation on Tank Bottom

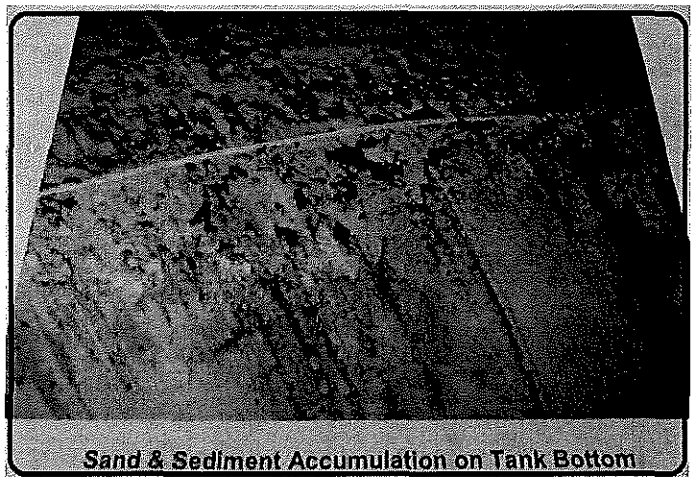
In February, 2010, after years of using only Chlorine and Fluoride, the Borough of Manheim began using SeaQuest at a Treatment Rate of 1.64 PPM. After using SeaQuest for about 6 months, the Borough Authority noticed many improvements including a system wide reduction of scale in their pipes and a 22% decrease of chlorine usage while maintaining a consistent chlorine residual of 0.7 throughout their system. They drained their Tank in October, 2010 and in November brought in the Water Tank Cleaning Company to begin the difficult task of removing the scale and sedimentation buildup as originally planned. The technician looked inside their Water Tank and wanted to know what did the Manheim Borough Authority do to the Water Tank?



After Wash Out

The Manheim, PA Main Water Tower holds 500,000 Gallons of Treated Water

The Manheim Borough Authority Water Tower (Picture on the Left) was inspected in October, 2009. The issue was to remove the calcium scale and iron precipitation and other sedimentation that was present on the walls and at the bottom of the Borough's Main Water Tower. A Tank Cleaning Company technician told the Borough Authority that the removal of their serious scale and sedimentation buildup over the many years would be a very intense, complex and costly procedure which would involve a considerable amount of labor and expense.



Sand & Sediment Accumulation on Tank Bottom

After using SeaQuest for only 6 months, there was no new scale precipitation and a gradual softening of the scale build up. The water quality notably improved in a way that no other phosphate product would be able to achieve. The years of scale and sedimentation build up in the Water Tower eventually created an expensive and complex problem for the Manheim Borough Authority. However, using SeaQuest for only 6 months now allowed a much less expensive method of scale removal in the Water Tower. The Tank Cleaning Company could now remove the scale and sedimentation build up in a very different as planned manner, using a quick and less costly method.

The Water Tower was cleaned out with a simple wash down using only a High Pressure Power Hose!

This quick and easy scale removal saved the Manheim Borough Authority thousands of dollars.

Delivered-To: mike@theramp.net
 X-Modus-ReverseDNS: OK
 X-Modus-BlackList: 66.64.194.130=OK; Tony.Greene@greerpcpw.com=OK
 X-Modus-RBL: 66.64.194.130=OK
 X-Modus-Trusted: 66.64.194.130=NO
 Subject: FW: Question
 Date: Wed, 3 May 2006 16:51:22 -0400
 From: "Tony Greene" <Tony.Greene@greerpcpw.com>
 To: <mike@theramp.net>

From: Greg McGlohorn [mailto:gmcglohorn@BPBarber.com]
Sent: Saturday, April 01, 2006 2:38 PM
To: Tony Greene
Subject: RE: Question

Thanks Tony. I really appreciate the info.

Greg

From: Tony Greene [mailto:Tony.Greene@greerpcpw.com]
Sent: Friday, March 31, 2006 2:07 PM
To: Greg McGlohorn
Subject: RE: Question

Greg we started Sea Quest January 1st. Chlorine residuals have averaged 2.35 throughout entire distribution. This took about three to four weeks. Caustic feed has been reduced 10%. Chlorine feed has been reduced considerable yet residuals have increased and stabilized. We had three automatic flushing devices where residuals were .5 to .8. These areas are now in the 2.35 range with no flushing. We tried Sea Quest for six months in 2003 and experienced the same results but because of cost we went to an inferior phosphate. Greer Commission of Public Works has under gone an 8.5 million dollar distribution upgrade. Some 40 coupons taken from mains showed no evidence of phosphate application. In 2003 we also reduced ammonia feed by 15% and residuals remained stable. The short time we used Sea Quest in 2003 we saved about \$12,000.00 in chemicals. I requested that Sea Quest bid 2006 with savings included in bid document. So far I have been very pleased and our residuals have never been better. As a side note, Sea Quest does not make this claim but our TTHM's first quarter were 0.012 and HAA's were 0.015 and you know from past experience how our first quarter results have been.

From: Greg McGlohorn [mailto:gmcglohorn@BPBarber.com]
Sent: Friday, March 31, 2006 11:35 AM
To: Tony Greene
Subject: Question

Tony,

Do you guys feed Seaquest? One of our clients was thinking about switching to that chemical for corrosion control. The sales rep. makes a lot of claims about how well it works, but we wanted to check with some operators that have actually been working with it for a while.

If you are using Seaquest, are you happy with it? Have you observed any major advantages or disadvantages? Has it affected your chlorine residuals or any other water quality data (changes that can be directly attributed to the chemical)?

If you don't use this product, then please disregard this email.

Thanks, Greg

Greg B. McGlohorn, P.E.
 Project Engineer
 B.P. Barber & Associates, Inc.

Printed for Michael <mike@theramp.net>

5/4/2006

Corrosion Control Project

INTRODUCTION

In an effort to limit the lead and copper contaminants found in the distributed water supply the [REDACTED] Water and Power Authority undertook the Corrosion Control Project. Assigned initially to the Environmental Affairs department this endeavor grew to encompass personnel from the Maintenance, Water Distribution and Engineering departments in both districts united in a joint effort to bring four automated chemical injection systems on-line.

The chemical in question is an orthophosphate based solution Sequest which has been certified by the National Sanitation Foundation and approved by the Department of Planning and Natural Resources as a corrosion treatment. Sequest produces a mono molecular coating on the interior of piping in order to diminish pitting and reduce bio-film formations while sequestering lead and copper contaminants for later flushing. Manufactured and distributed by Aqua Smart, Inc. of Atlanta Georgia the Sequest injection process has proven successful at several distribution systems throughout the world. England, Brazil, South Africa and New Mexico are all reported to have Sequest treatments in operation within their boundaries.

Design Methodology

The chemical injection system design was formulated solely by the Engineering and Environmental Affair departments. Two systems were specified for [REDACTED] distribution system to meet the need of the two separate 16" and 24" systems (an upcoming project). Likewise two systems on [REDACTED] treated the desalinated and well water systems.

03-21-99 19:02 [REDACTED]

P. 86

Project Schedule

The Authority was mandated by the Department of Planning and Natural Resources to complete installation and begin application of the corrosion control treatment within ninety (90) working days following the receipt of written approval. This approval was received by the Executive Director's office on January 24, 1998 determining a start up date of no later than June 8, 1998. Despite several construction delays the first system was energized and treatment initiated on May 4, 1998 at [REDACTED] Pump Station on [REDACTED]. The second system on [REDACTED] was installed and placed in a stand by status, while both [REDACTED] systems have been brought online. Refer to Figure 1.1 the 'As Built' schedule for further detail.

Operations

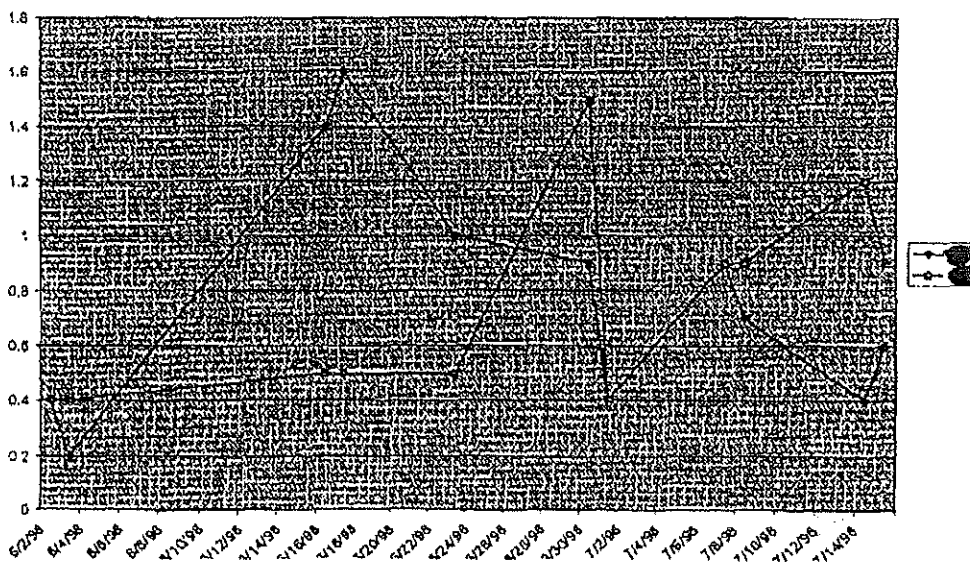
Ideally, it is intended that the corrosion control system operates with a minimum of manual support. In fact, once the chemical in its powder form, is mixed and transferred to the injection tank it is expected that the system will operate in automatic for approximately 2 - 3 days at a time, even to the point of notifying the operator when a new mixture is necessary. Several alarms and fail-safes and have been configured into the system to avoid equipment damage or operator injury. Additionally, all operators of both Water Distribution departments partook in a two and a half-day training seminar held by the system's designers. During these sessions a review was made of the Material and Safety Data Sheets of all pertinent chemicals and the proper safety procedures were demonstrated for all required services of the operator(s).

Once chemical mixture is accomplished the injection pumps electronically controlled by the process control station increases or decrease the injection stroke percentage to supply 0.5 ppm of phosphate in the system. The phosphate analyzer monitors a sample taken from the distributed water, and supplies a signal to the process control station. Simultaneously, the water flowmeter provides a like function for the water flow parameters of the system. Auxiliary transmission furnishes output readings a system recorder and alarm announcer.

Treatment

Through the operational procedure described Seaquest treatment has been in progress in the [REDACTED] for nine months. The manufacturer has recommended that systematic flushing procedures be implemented after approximately six to twelve months of treatment at the present rate of injection. Additionally, system monitors were installed to detect concentrations at remote locations. This was to verify treatment throughout the systems entirety. Chart 1.3 below displays the residual phosphate concentration at remote (sample points farthest from injection) locations.

Chart 1.3 Remote location phosphate residuals



Though the majority of these concentrations varied from 0.2 to 1.6 mg/l. Readings clearly indicate that the treatment is reaching the furthest points in the system at the recommended dosages.

Conclusions

After successful implementation, the [REDACTED] Water and Power Authority is now in compliance with the Environmental Protection Agency and the Department of Planning and Natural Resources consent decree. With all departments working collectively the project was completed within the allotted time. The Authority subsequently realized tremendous savings between the estimated cost and the actual cost. The final evaluation however relies on the results of the corrosive, lead and copper contaminant testing to be performed March 1999.



VIRGIN ISLANDS
**WATER
 AND POWER
 AUTHORITY**



file
 P.O. BOX 1450, ST. THOMAS
 U.S. VIRGIN ISLANDS 00804-1450
 TELEPHONE: (340) 774-3562
 FAX: (340) 776 2723

July 12th. 1999

Christine Lottes, PWWS
 Department of Planning and Natural Resources
 Division of Environmental Protection
 Government of the Virgin Islands
 1118 Watergut Homes
 Christiansted
 St. Croix, V.I. 00820

Dear Ms. Lottes,

Enclosed please find the calculated 90th percentile values of Lead and Copper content in distributed water from the St. Thomas system, located in the category Tier 3.

Of the 60 sample sites only 13.3% were collected from the same location as the initial survey in 1993.

Statistical account for the 60 sample sites are as follows:

26 (43.3%) Single Family Resident (SFR) before 1983
 14 with cisterns attached.

5 (8.3%) Single Family resident (SFR) after 1982
 1 with cistern attached.

29 (48.3%) Multi Family Resident/Bussiness/Office Bldg.
 27 with cisterns attached.

A total of 70% of the 60 sample sites were connected to a cistern.

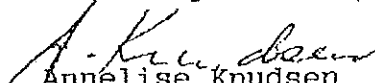
C. Lottes, PWWS
July 12th 1999

page 2

Also attached is a map of the St. Thomas distribution system with sample site locations.

Please call me if you have any questions at 774-3552 ext. 2313.

sincerely


Annelise Knudsen
Laboratory Supervisor

cc: Martin Ramirez, Superintendent of Water Distribution
Greg Rhymer, Manager Environmental Department
Carol Aubin, DPNR/DEP. St. Thomas

St. Thomas Water Distribution System

Lead and Copper Monitoring Test Results (*)
Collected between March 22nd and April 6th. 1999

Lead values(**):

Copper values(**):

Sample ID Lead (ppb)

Sample ID Copper (ppb)

816 27.1
813 26.3
835 23.3
106 17.0
807 12.8
856 12.2
820 11.0 -(90 percentile)
826 7.8
809 7.8
602 7.4
831 6.6
601 6.6
846 5.7
605 5.6
815 5.5
840 5.5
858 5.4
842 5.2
847 4.9
827 4.5
819 4.0
837 4.0
825 3.7
812 3.5
823 3.4
103 3.2
841 3.1
852 3.1
811 2.8
844 2.6
104 2.3
107 2.2

825 293.2
812 166.5
809 149.6
601 134.3
805 120.1
107 112.6
807 100.0
820 91.0
835 88.9
816 69.4
831 59.8
847 53.6
821 50.4
836 47.7
810 42.0
808 36.6
844 36.3
605 36.1
814 36.0
104 32.0
106 32.0
826 31.5
852 29.1
101 29.0
815 27.3
843 24.8
813 24.0
838 22.7
841 20.6

28 ea.# at <2.0

31 ea.# at <20.0

(*) recorded values enclosed

(**) values are listed from the highest to the lowest.



**VIRGIN ISLANDS
WATER
AND POWER
AUTHORITY**

P. O. BOX 1450, ST. THOMAS
VIRGIN ISLANDS, U. S. A. 00804-1450
TELEPHONE: (340) 774-3552
FAX: (340) 776-2723

February 25th. 2000

Harold Mark
Department of Planning and Natural Resources
Division of Environmental Protection
Government of the Virgin Islands
1118 Water Gut Homes
Christiansted
St. Croix, V.I. 00820

Dear Mr. Mark,

Enclosed please find the calculated 90th percentile values of Lead and Copper content in the St. Thomas Distribution system, located in category Tier 3.

Of the 60 sample sites 23 (38.3%) were collected from the same locations as in Spring/99 sample collection.

Statistical account for the 60 sample sites are as follows:

18 (30.0%) Single Family Resident (SFR) before 1983
14 with cisterns attached.

5 (8.3%) Single Family Resident (SFR) after 1982
3 with cisterns attached.

37 (61.7%) Multi Family Resident/Business/Office Bldg.
33 with cisterns attached.

A total of 83.3% of the 60 sample sites were connected to a cistern.

H. Mark
February 25th. 2000

page 2

Also attached is a map of the St. Thomas distribution system with sample site location.

Please call me if you have any questions at 774-3552 ext. 2313.

Sincerely,


Annelise Knudsen
Laboratory Supervisor

cc: Martin Ramirez, Superintendent, Water Distribution
Greg. Rhymer, Manager, Dept. of Environmental Affairs
Carol Aubin, DPNR/DEP. St. Thomas

St. Thomas Water Distribution System

Lead and Copper Monitoring Test Results (*)
Collected between January 11th. and February 3rd. 2000

Lead values(**):

Copper values(**):

Sample ID Lead (ppb)

Sample ID Copper (ppb)

938 65.4
950 11.3
922 14.7
957 11.8
952 10.8
939 10.0
958 9.9
606 6.4
959 5.7
910 4.9
944 4.5
937 3.9
947 3.6
936 3.4
949 2.7
903 2.6
926 2.0

-(90 percentile)-

938 257.4
939 185.6
928 110.8
910 98.9
606 79.2
948 76.8
949 74.4
917 73.1
920 63.9
947 58.7
952 57.5
946 56.7
919 53.2
922 50.4
937 47.8
916 46.4
936 41.8
944 39.5
951 34.3
903 30.2
718 29.5
950 28.2
909 25.0
932 21.4

43 ea.# at <2.0

36 ea.# at <20.0

(*) recorded values enclosed.

(**) values are listed from the highest to the lowest.



VIRGIN ISLANDS
WATER
AND POWER
AUTHORITY



P.O. BOX 1450, ST. THOMAS
U.S. VIRGIN ISLANDS 00804-1450
TELEPHONE (340) 774-3552
FAX (340) 776 2723

March 7th, 2001

Harold Mark
Department of Planning and Natural Resources
Division of Environmental Protection
Government of the Virgin Islands
1118 Water Gut Homes
Christiansted
St. Croix, V.I. 00820

Dear Mr. Mark,

Enclosed please find the calculated 90th percentile values of Lead and Copper content in the St. Thomas Distribution system, located in category Tier 3.

Reduced monitoring of 35 samples collected resulted in the following values (90 percentile) for Lead 6.2 ppb and for Copper 49.1 ppb. representing a deduction of 27% and 29% respectively from the values obtained in the February 2000 Lead and Copper monitoring.

Statistical account for the 35 sample sites are as follows:

12	(34%)	Single Family Resident (SFR) before 1983
1	(3%)	Single Family Resident (SFR) after 1982
22	(63%)	Multi Family Resident/Business/Office Bldg.

The majority of the sites were connected to a cistern.

Attached is a map of the St. Thomas Distribution system with sample site locations.

Please call me if you have any questions at 774-3552 ext. 2313.

Sincerely,
Annelise Knudsen
Annelise Knudsen
Laboratory Supervisor

cc: Martin Ramirez, Superintendent, Water Distribution
Greg. Rhymer, Manager, Dept. of Environmental Affairs
Anibal Bermudez, DPNR/DEP, St. Thomas

St. Thomas Water Distribution System

Lead and Copper Monitoring Test Results (*)
Collected between January 23rd and February 16th 2001

Lead values (**)

Sample ID Lead (ppb)

613	25.6
020	12.4
618	11.1
021	6.2 <u>(90th percentile)</u>
620	6.1
024	3.5
010	3.1
934598	2.8
008	2.5
004	2.3
027	2.3
002	2.2
018	2.1

22 samples at < 2.0

Copper values (**)

Sample ID Copper (ppb)

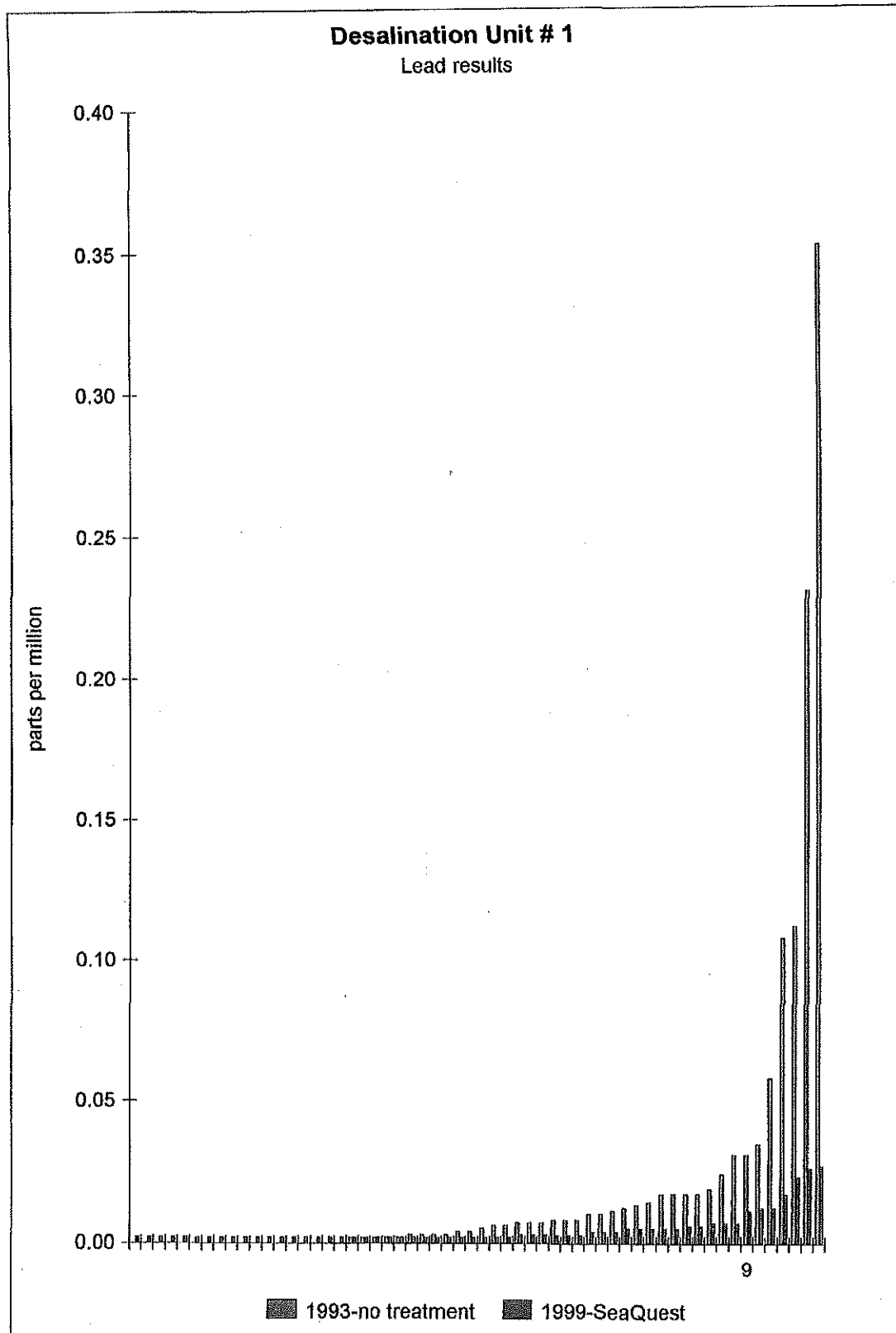
613	154.2
002	95.5
024	86.4
017	49.1
021	47.3
018	40.2
612	35.3
618	24.1
010	23.0

26 samples at < 20.2

(*) recorded values enclosed

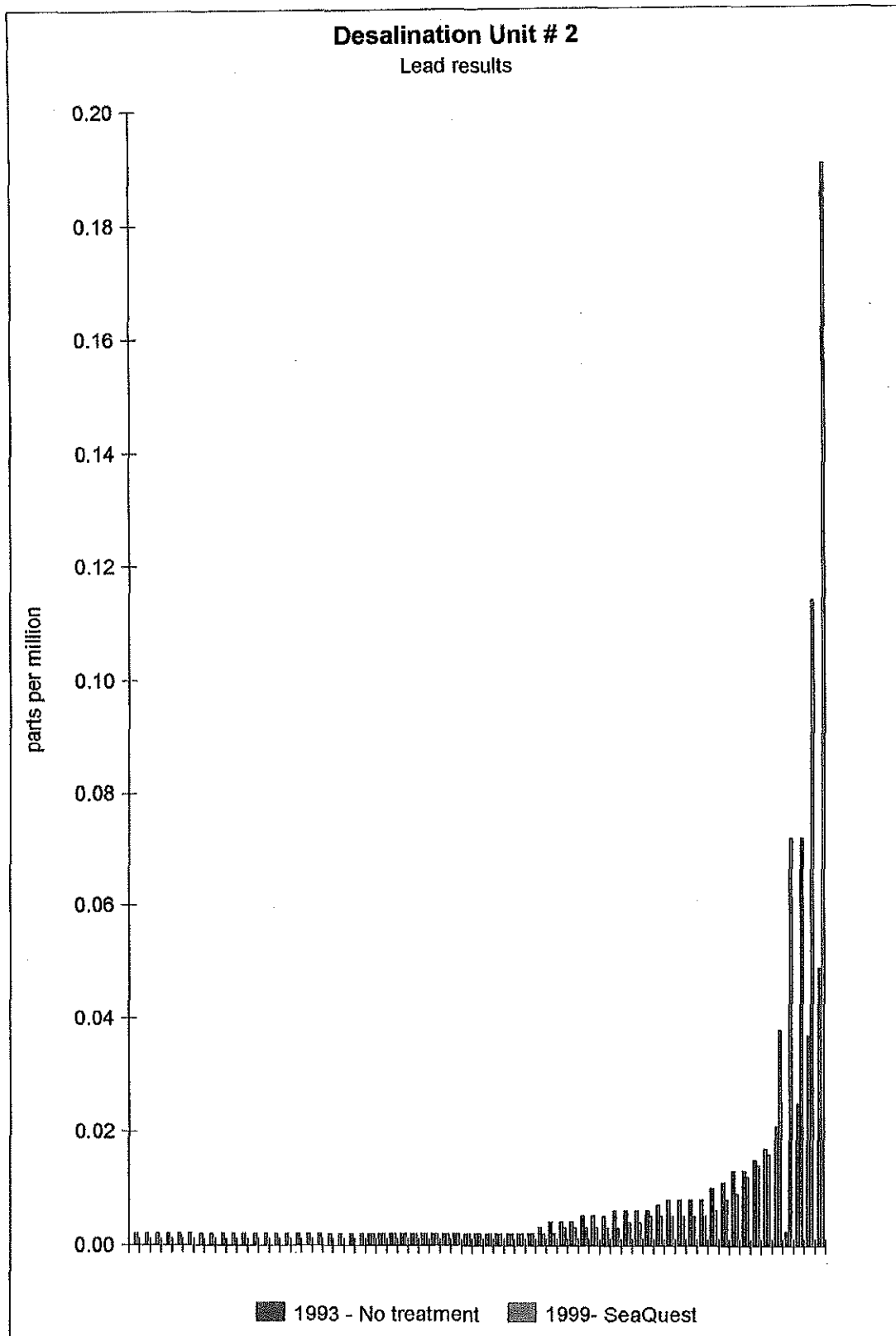
(**) values are listed from highest to lowest.

90 % Before - 0.108 ppm After - 0.011 ppm

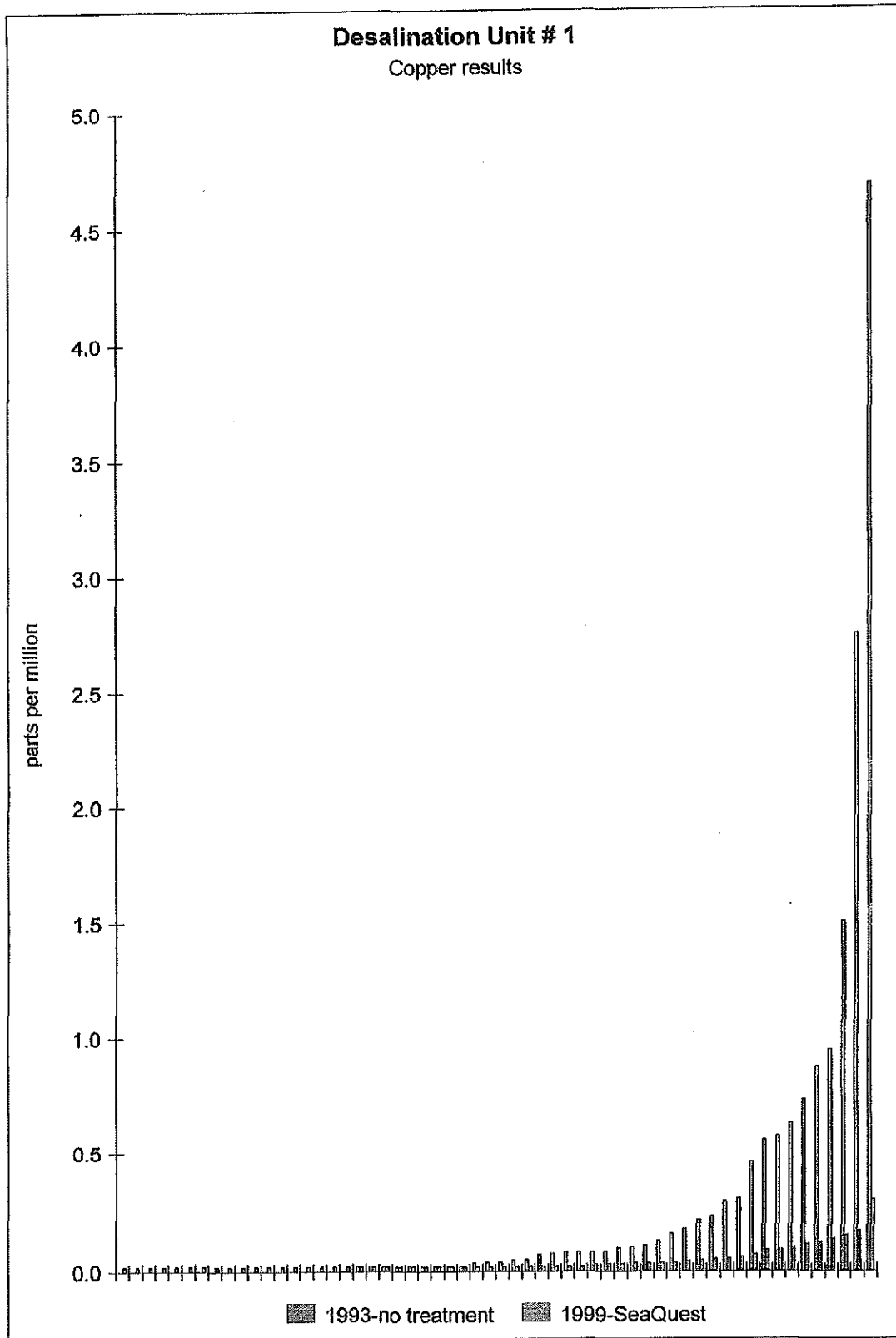


TH - 1 ALK - 3 pH - 6.7

90 % Before 0.021 - ppm After - 0.014

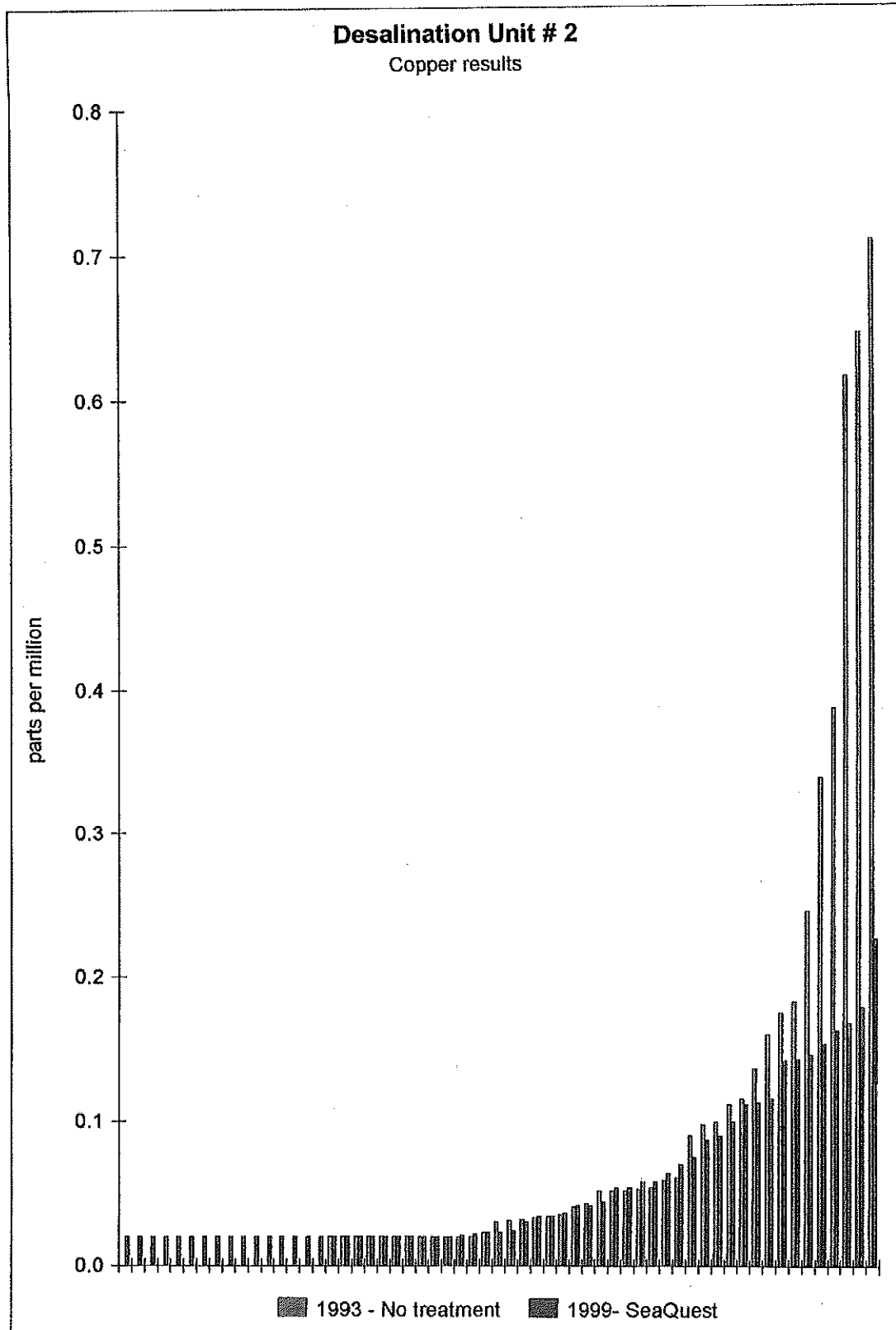


90% Before 0.948 ppm After - 0.1 ppm



TH - 1 ALK - 3 pH - 6.7

90 % Before - 0.3 88 ppm After - 0.227 ppm



TH - 1 ALK - 3 pH - 6.7

5-26-203 8:38AM

FROM

P. 1

CITY OF NEWBERRY

S O U T H C A R O L I N A

GEORGE HUGH CONNELLY WATER TREATMENT PLANT
621 Highway 121 • Silverstreet, South Carolina 29145

Michael Edelstein, National Sales and Development Manager
Aqua Smart, Inc
4445 Commerce Drive
Atlanta, GA 30336

May 24, 2003

Dear Mr. Edelstein,

After using Seaquest for over one year, we have noticed the following changes in our system.

1. We've lowered our pH from 7.8-8.0 to 6.5 without any negative results. Our water quality is excellent.
2. We've reduced our caustic usage by 75%.
3. We've reduced our chlorine usage by 22%.
4. We've gotten off of chloramines and stopped using ammonia for better water quality.
5. In the year that we've been using SeaQuest, we've only had one limited outbreak of red water, which was caused by a sudden spike of metal and organics in our system, which cleared up very quickly. Otherwise, we've had no red water complaints, when previously; we would have them occur every so often.
6. We've reduced our flushing considerable (in some areas every few months) to just once a year.
7. We've visibly seen reduction of corrosion and scale.
8. We've had an increase in chlorine residuals in our system.
9. Our TTHMs average is 26% lower.
10. Our HAA average is stable.
11. Our lead and copper results passed for ultra reduced monitoring.

Since we've been on SeaQuest, we have improved our overall water quality as stated using far less chemical in our water with better results and have saved the City of Newberry, SC a considerable amount of money. Thank you for a great product.

Sincerely,



David Hendrix
Superintendent

City of Greer, SC

**Tony Green, Water Plant Manager
864-848-5527**

(MARCH 3, 2002 – APRIL 6, 2002)

Monitoring of 13 weekly samples taken in distribution for residual chlorine. This is the result from the dead end line of the 13 weekly samples.

SeaQuest in use for the first 4 weeks!

1. Monitoring Results - First Week (MARCH 3 - 9, 2002) 0.05

This is a dead end line and has averaged this residual for 5 years!

2. Monitoring Results - Second Week (March 10 - 16, 2002) 0.05

Same dead end line

SEA QUEST PUT INTO SYSTEM THIS WEEK

3. Monitoring Results - Third Week (March 17 - 23, 2002) 0.13

Same dead end line

**Nothing different treatment wise other than adding SEA QUEST
(NO flushing was done to this line!)**

**Cut Chlorine from 3 mg/L to 2.6 mg/L and Ammonia ratio from 4 to 1
to 5 to 1 (dropped from 90 lbs to 70 lbs per week)**

4. Monitoring Results - Fourth Week (March 24 - 30, 2002) 0.60

**Same dead end with the exception of feeding SEA QUEST
(Still no flushing)**

5. Monitoring Results – Fifth Week (APRIL 1 - 6, 2002) 0.94

**Same dead end but now SEA QUEST has been in use approximately 4 weeks
(With no flushing at this line!)**

City of Greer, SC

Tony Green, Water Plant Manager
864-848-5527

MEMORANDUM

To: Michael Edelstein, National Sales & Development Manager
Aqua Smart, Inc.

Date: April 15, 2002

Two weeks after starting SEA QUEST in the Greer, SC drinking water system, we cut our chlorine usage down from 3 mg/L to 2.6 mg/L and our chlorine residuals still remain consistent throughout our system. Attached is our chlorine residual results for one typical deadend. This particular site is about 10 miles from our Water Treatment Plant.

Last years' chlorine residuals for March (2001) were lower with a higher feed of chlorine. Using SEA QUEST, we saw better chlorine residuals and all in a short period of time.

Last year, we were running ammonia at 4 to 1 and 3 to 1 ratios. After two weeks of using SEA QUEST, we have cut our ammonia to a 5 to 1 ratio and are retaining residuals further in the distribution system than we thought was possible before using SEA QUEST.

We plan to eventually go off ammonia. SEA QUEST has already helped to improve our operation and saved our system money in a very short period of time.

Rennaker, Joanne (DEQ)

From: Wurfel, Brad (DEQ)
Sent: Friday, October 09, 2015 12:08 PM
To: Busch, Stephen (DEQ); Shekter Smith, Liane (DEQ); Prysby, Mike (DEQ)
Cc: Krisztian, George (DEQ)
Subject: FW: Got dates?

I need a comprehensive picture of lead and copper tests, please. At the plant tap, in the lines, figures we got from the city during the L&C rule tests. Everything. Thank you.

b

From: Erb, Robin [<mailto:rerb@freepress.com>]
Sent: Friday, October 09, 2015 11:13 AM
To: Wurfel, Brad (DEQ)
Subject: RE: Got dates?

Hey Brad,

'Just making sure you saw this. Can you help me out? I know it's probably been a hellish couple of weeks, but for what it's worth – weekend's almost here....

Robin

From: Erb, Robin
Sent: Thursday, October 08, 2015 3:28 PM
To: 'WurfelB@michigan.gov' <WurfelB@michigan.gov>
Subject: Got dates?

Hey Brad,

I know we've talked about all the testing that was done on the Flint water. I'd like to drive home how much testing was done.

Can you give me a time line of the tests? I believe there were the 7 tests done from the source, and then the two supplemental tests that confirmed ppb lower than 15 (6 and 11).

I know, I know. You've probably explained this 422 time to 422 different reporters (I'm guessing). Can we go over one more time so we have it nailed down on a time line? If it's easier, a phone call works too – 313-222-2708.

Robin

Robin Erb

Medical Writer
 Desk: 313-222-2708
 Metro Desk: 313-222-6601
rerb@freepress.com

Follow me on Twitter: @FreepHealth



www.freep.com

Rennaker, Joanne (DEQ)

From: Tim Davidek <T_DAVIDEK@gcdcwws.com>
Sent: Friday, October 09, 2015 11:58 AM
To: Prysby, Mike (DEQ)
Cc: 'bwright@cityofflint.com'
Attachments: cityofflint10815.doc

Mike,

Attached is the revision with the Dort Res. Added.

Thanks,

Tim Davidek

Michael Prysby, P.E.
District Engineer
Office of Drinking Water and Municipal Assistance

Dear Mr. Prysby,

Find enclosed the City of Flint and GCDC-WWS proposed disinfection procedure of the 72" water main to supply potable water produced by DWSD to the City of Flint.

Thursday, October 8, 2015:

Fill and pressurize the 72" water main from Genesee and Richfield roads to a closed valve at station 2, near the City of Flint Water Plant. Approximately 3.5 miles of water main will be filled and pressurized. This represents approximately 3.5 million gallons of water.

Friday, October 9, 2015:

Flush water from the 72" water main into the Dort Reservoir while introducing chlorine, utilizing the continuous feed method, into the 72" water main, near the intersection of Genesee and Richfield roads, in an effort to achieve a residual of 25 ppm. Hold for 24 hours.

Saturday, October 10, 2015:

Flush water from the 72" water main into the Dort Reservoir to remove highly chlorinated water from the 72" water main. Collect first round of Bacti samples. GCDC-WWS staff will collect a sample from a fire hydrant located at the intersection of Center and Pierson roads. The City of Flint will collect 1st round of Bacti samples at their Control Station 3 and their Dort Reservoir.

Sunday, October 11, 2015:

City of Flint and GCDC-WWS will collect a second round of Bacti samples from the same locations.

The disinfection procedure and Bacti sampling will be done in accordance with the AWWA C651 standards. The 1st and 2nd rounds will be collected 16 hours apart.

Once the 2 consecutive negative bacti samples are completed and the water delivery agreement is finalized between all parties, water will then be supplied to the City of Flint.

Attached is a drawing identifying the location of the valves to be operated, location of the fire hydrant and the location chlorine will be introduced. *Drawing for illustrative purposes only.*

The City of Flint is responsible for the water once it passes the valve on the 72" at Station 2. This valve is identified on the drawing as: "City of Flint Valve".

Respectfully,

City of Flint
Genesee County Water and Waste Services

Rennaker, Joanne (DEQ)

From: Brent Wright <bwright@cityofflint.com>
Sent: Friday, October 09, 2015 11:23 AM
To: Prysby, Mike (DEQ)
Cc: Tim Davidek
Subject: Re:

Tim

Could you add what Mike is requesting about the Dort Reservoir and we will be sampling from Control station 3. We are bypassing Control Station 2.

On Fri, Oct 9, 2015 at 11:09 AM, Prysby, Mike (DEQ) <PRYSBYM@michigan.gov> wrote:

Tim, Brent

Need to add collection of 2 consecutive set of samples for bacteriological analysis from the Dort reservoir since the city intends to distribute this water to Flint residents.

Michael Prysby, P.E.

District Engineer

Office of Drinking Water and Municipal Assistance

517 290-8817

From: Tim Davidek [mailto:T_DAVIDEK@gcdewws.com]
Sent: Friday, October 09, 2015 11:04 AM
To: Prysby, Mike (DEQ)
Cc: 'bwright@cityofflint.com'
Subject:

Mike,

Attached is the revised procedure.

Thanks and have a great weekend,

Tim Davidek

--

Brent Wright

Water Plant Supervisor
City of Flint
4500 N. Dort Hwy.
Flint, MI. 48505
Ph: 810.787.6537 ext. 3510
Fx: 810.787.3710

Rennaker, Joanne (DEQ)

From: Tim Davidek <T_DAVIDEK@gcdcwws.com>
Sent: Friday, October 09, 2015 11:04 AM
To: Prysby, Mike (DEQ)
Cc: 'bwright@cityofflint.com'
Attachments: cityofflint10815.doc

Mike,

Attached is the revised procedure.

Thanks and have a great weekend,

Tim Davidek

Michael Prysby, P.E.
District Engineer
Office of Drinking Water and Municipal Assistance

Dear Mr. Prysby,

Find enclosed the City of Flint and GCDC-WWS proposed disinfection procedure of the 72" water main to supply potable water produced by DWSD to the City of Flint.

Thursday, October 8, 2015:

Fill and pressurize the 72" water main from Genesee and Richfield roads to a closed valve at station 2, near the City of Flint Water Plant. Approximately 3.5 miles of water main will be filled and pressurized. This represents approximately 3.5 million gallons of water.

Friday, October 9, 2015:

Flush water from the 72" water main into the Dort Reservoir while introducing chlorine, utilizing the continuous feed method, into the 72" water main, near the intersection of Genesee and Richfield roads, in an effort to achieve a residual of 25 ppm. Hold for 24 hours.

Saturday, October 10, 2015:

Flush water from the 72" water main into the Dort Reservoir to remove highly chlorinated water from the 72" water main. Collect first round of Bacti samples. GCDC-WWS staff will collect a sample from a fire hydrant located at the intersection of Center and Pierson roads. The City of Flint will collect 1st round of Bacti samples at their Control Station 3.

Sunday, October 11, 2015:

City of Flint and GCDC-WWS will collect a second round of Bacti samples from the same locations.

The disinfection procedure and Bacti sampling will be done in accordance with the AWWA C651 standards. The 1st and 2nd rounds will be collected 16 hours apart.

Once the 2 consecutive negative bacti samples are completed and the water delivery agreement is finalized between all parties, water will then be supplied to the City of Flint.

Attached is a drawing identifying the location of the valves to be operated, location of the fire hydrant and the location chlorine will be introduced. *Drawing for illustrative purposes only.*

The City of Flint is responsible for the water once it passes the valve on the 72" at Station 2. This valve is identified on the drawing as: "City of Flint Valve".

Respectfully,

City of Flint
Genesee County Water and Waste Services

Rennaker, Joanne (DEQ)

From: Prysby, Mike (DEQ)
Sent: Friday, October 09, 2015 10:37 AM
To: Shekter Smith, Liane (DEQ)
Cc: Busch, Stephen (DEQ)
Subject: RE: Daily updates

Lianne,

Flint and Genesee County are coordinating their efforts to have the unused portion of the 72-inch transmission main (pipeline) available for service. The city e-mailed me a draft procedure late afternoon yesterday. I commented back to the city and the county emphasizing the need to include the disinfection standard AWWA C651-14. I provided the city and the county with a copy of the standard. The draft procedure mentions that the pipeline would be re-filled overnight and chlorination was to begin at 8:30 am today.

My follow-up calls this morning with the city and the county confirmed that the main was being re-filled at this time. Once filled, the ability of the pipeline to hold pressure will be confirmed. Chlorination has not started yet.

I discussed, in more detail the need to send us an updated description of the procedure which needs to include adherence to the AWWA disinfection standard. Discussion of the sampling locations and the number of bacteriological samples to be collected also needs to be included. The city and the county are meeting this morning to review the procedures and to be certain that there is no confusion. I expect to receive an updated procedure later today in which the city and the county will ask for our concurrence. An Act 399 permit does not apply here; however, I plan to offer the DEQ's concurrence with their proposed procedure – provided that it references adherence to AWWA's disinfection standard and the sampling protocol that was discussed.

I leave at 11am today; however, I plan to respond to the city and the county anytime today to give them the go-ahead after I receive an acceptable procedure.

Michael Prysby, P.E.
District Engineer
Office of Drinking Water and Municipal Assistance
517 290-8817

From: Shekter Smith, Liane (DEQ)
Sent: Friday, October 09, 2015 8:09 AM
To: Prysby, Mike (DEQ); Rennaker, Joanne (DEQ); Rosenthal, Adam (DEQ); Butler, Sonya (DEQ); Benzie, Richard (DEQ);

Busch, Stephen (DEQ); Cook, Pat (DEQ)

Cc: Devereaux, Tracy Jo (DEQ)

Subject: FW: Daily updates

Importance: High

FYI – I'll need a daily summary by 4:00pm (4:15pm at the latest) of all work efforts as described below.

Be sure to cc Tracy Jo so that one of us will be able to forward it to George by the 4:30pm deadline.

Thanks!

From: Krisztian, George (DEQ)

Sent: Friday, October 09, 2015 7:07 AM

To: Shekter Smith, Liane (DEQ)

Cc: Thelen, Mary Beth (DEQ); Shaler, Karen (DEQ); Wyant, Dan (DEQ); Sygo, Jim (DEQ)

Subject: Daily updates

Importance: High

Hi Liane,

The Governor wants daily updates regarding the progress we are making on the Flint issue. Can you please provide me with a summary of the action steps that we have taken on a daily basis? The summary should not contain excessive detail, it should be something like:

- Steve Busch contacted Natasha Henderson at the City of Flint to get details on supplemental Phosphate Dosing
- Pat Cook/Mike P Analyzed Plans for flushing and pressure testing lines to make the switch back to GLWA
- Met with city of Flint officials to review actions to date and to create a list of next steps

The above examples are for illustrative purposes only

I need to have this summary each day no later than 4:30 PM. This is a hard deadline as we need to get the summary to the Governor by 5:00 PM. Please make sure that you copy Mary Beth and Karen.

Thank you!

George

Rennaker, Joanne (DEQ)

From: Tim Davidek <T_DAVIDEK@gcdcwws.com>
Sent: Friday, October 09, 2015 10:34 AM
To: Prysby, Mike (DEQ)
Subject: FW: Message from KM_C554e
Attachments: SKM_C554e15100910320.pdf

Mike,

Attached is the proposed disinfection bacti sampling procedure for the 72" water main along with a map.

Thanks,

Tim Davidek

Michael Prysby, P.E.
District Engineer
Office of Drinking Water and Municipal Assistance

Dear Mr. Prysby,

Find enclosed the City of Flint and GCDC-WWS proposed disinfection procedure of the 72" water main to supply potable water produced by DWSD to the City of Flint.

Thursday, October 8, 2015:

Fill and pressurize the 72" water main from Genesee and Richfield roads to a closed valve at station 2, near the City of Flint Water Plant. Approximately 3.5 miles of water main will be filled and pressurized. This represents approximately 3.5 million gallons of water.

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Sunday, October 11, 2015:

Collect a second round of Bacti samples from the same location.

The disinfection procedure and Bacti sampling will be done in accordance with the AWWA C651 standards.

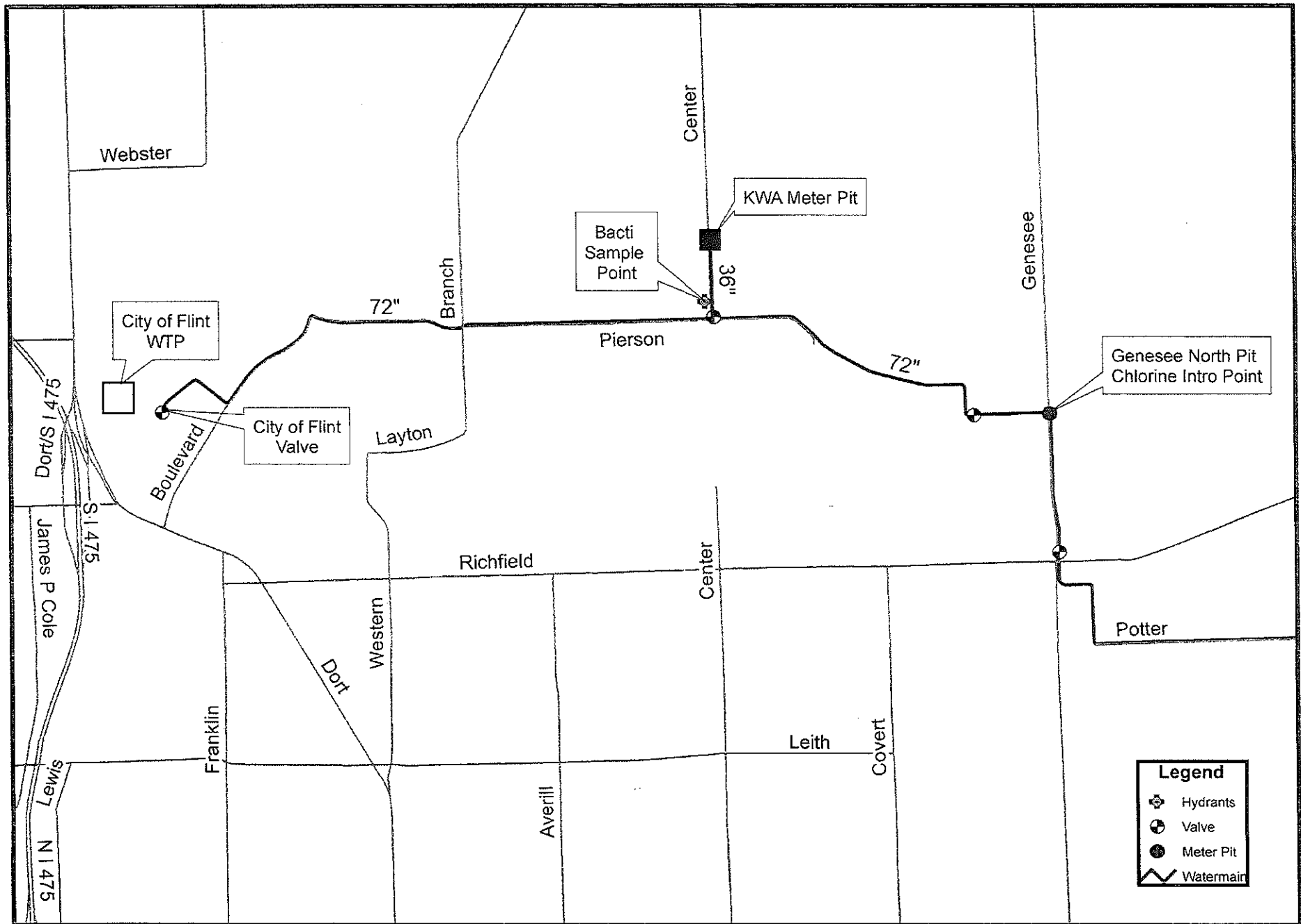
Once the 2 consecutive negative bacti samples are completed and the water delivery agreement is finalized between all parties, water will then be supplied to the City of Flint.

Attached is a drawing identifying the location of the valves to be operated, location of the fire hydrant and the location chlorine will be introduced. *Drawing for illustrative purposes only.*

The City of Flint is responsible for the water once it passes the valve on the 72" at Station 2. This valve is identified on the drawing as: "City of Flint Valve".

Respectfully,

City of Flint
Genesee County Water and Waste Services



1 inch = 2,000 feet

10/9/2015

Rennaker, Joanne (DEQ)

From: Shekter Smith, Liane (DEQ)
Sent: Friday, October 09, 2015 8:09 AM
To: Prysby, Mike (DEQ); Rennaker, Joanne (DEQ); Rosenthal, Adam (DEQ); Butler, Sonya (DEQ); Benzie, Richard (DEQ); Busch, Stephen (DEQ); Cook, Pat (DEQ)
Cc: Devereaux, Tracy Jo (DEQ)
Subject: FW: Daily updates

Importance: High

FYI – I'll need a daily summary by 4:00pm (4:15pm at the latest) of all work efforts as described below.

Be sure to cc Tracy Jo so that one of us will be able to forward it to George by the 4:30pm deadline.

Thanks!

From: Krisztian, George (DEQ)
Sent: Friday, October 09, 2015 7:07 AM
To: Shekter Smith, Liane (DEQ)
Cc: Thelen, Mary Beth (DEQ); Shaler, Karen (DEQ); Wyant, Dan (DEQ); Sygo, Jim (DEQ)
Subject: Daily updates
Importance: High

Hi Liane,

The Governor wants daily updates regarding the progress we are making on the Flint issue. Can you please provide me with a summary of the action steps that we have taken on a daily basis? The summary should not contain excessive detail, it should be something like:

- Steve Busch contacted Natasha Henderson at the City of Flint to get details on supplemental Phosphate Dosing
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- Met with city of Flint officials to review actions to date and to create a list of next steps

The above examples are for illustrative purposes only

I need to have this summary each day no later than 4:30 PM. This is a hard deadline as we need to get the summary to the Governor by 5:00 PM. Please make sure that you copy Mary Beth and Karen.

Thank you!
 George

Rennaker, Joanne (DEQ)

From: Prysby, Mike (DEQ)
Sent: Thursday, October 08, 2015 5:16 PM
To: 'bwright@cityofflint.com'; Michael Glasgow
Cc: Howard Croft (hcroft@cityofflint.com); Natasha Henderson (nhenderson@cityofflint.com); Tim Davidek (T_DAVIDEK@gcdcwws.com); Dave Jansen
Subject: FW: 72" Transmission Main
Attachments: C651-14 Disinfecting Water Mains.pdf

Attached is the AWWA C651-14 for disinfection of watermain. I will contact all parties asap tomorrow morning

Michael Prysby, P.E.
 District Engineer
 Office of Drinking Water and Municipal Assistance
 517 290-8817

From: Prysby, Mike (DEQ)
Sent: Thursday, October 08, 2015 4:49 PM
To: Brent Wright
Cc: Howard Croft; Michael Glasgow; Anthony Chubb; Natasha Henderson
Subject: Re: 72" Transmission Main

Brent,
 We will advise that the procedure include the most recent AWWA C651 disinfection procedure and reference the method that will be followed. We will send you the latest standard

Sent from my iPhone

On Oct 8, 2015, at 4:12 PM, Brent Wright <bwright@cityofflint.com> wrote:

Mike,

Per our phone conversation earlier today below is the list of events to re-energize the 72" main to Flint.

10-8-2015

4:00 pm : Genesee Co. crews will open valve about 10% @ Genesee Rd. and Richfield Rd. This will slowly energize the pipe. The valve just upstream from Station #2 on Water Plant grounds will remain closed. All valves in between are open.

10-9-2015

8:00 am : Isolate Station #2 and open valve upstream.

8:30 am : Genesee Co. to start chlorination and Flint will open valve @ Station #3 to Dort Reservoir and start filling with water from the 72" main. Flint staff will be @ Station #3 taking Cl2 residuals. When we start receiving super chlorinated water we will have Genesee Co. close the valve on Genesee Rd. and Flint will close valve to Dort Reservoir and hold for 24hrs. Flint staff will open sanitary drains to Dort Reservoir and drain water received from first flushing of the 72".

I will be contacting you tomorrow with further discussion on sampling protocol.

Thank you

--

Brent Wright
Water Plant Supervisor
City of Flint
4500 N. Dort Hwy.
Flint, MI. 48505
Ph: 810.787.6537 ext. 3510
Fx: 810.787.3710



**American Water Works
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ANSI/AWWA C651-14
(Revision of ANSI/AWWA C651-05)

AWWA Standard

Disinfecting Water Mains

Effective date: Feb. 1, 2015.

First edition approved by AWWA Board of Directors Sept. 30, 1947.

This edition approved June 8, 2014.

Approved by American National Standards Institute Nov. 18, 2014.



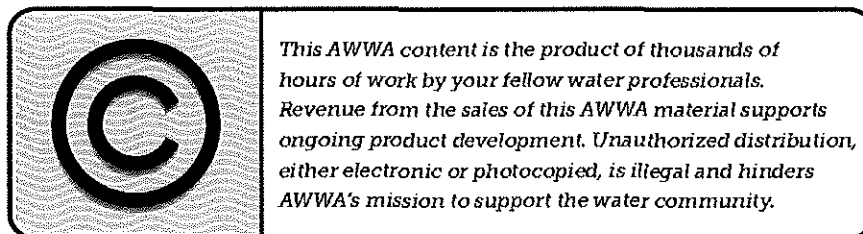
AWWA Standard

This document is an American Water Works Association (AWWA) standard. It is not a specification. AWWA standards describe minimum requirements and do not contain all of the engineering and administrative information normally contained in specifications. The AWWA standards usually contain options that must be evaluated by the user of the standard. Until each optional feature is specified by the user, the product or service is not fully defined. AWWA publication of a standard does not constitute endorsement of any product or product type, nor does AWWA test, certify, or approve any product. The use of AWWA standards is entirely voluntary. This standard does not supersede or take precedence over or displace any applicable law, regulation, or codes of any governmental authority. AWWA standards are intended to represent a consensus of the water supply industry that the product described will provide satisfactory service. When AWWA revises or withdraws this standard, an official notice of action will be placed in the Official Notice section of *Journal - American Water Works Association*. The action becomes effective on the first day of the month following the month of *Journal - American Water Works Association* publication of the official notice.

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Foreword

This foreword is for information only and is not a part of ANSI/AWWA C651.

I. Introduction.

I.A. *Background.* This standard describes methods of disinfecting newly constructed potable water mains; mains that have been removed from service for planned repairs or for maintenance that exposes them to contamination; mains that have undergone emergency repairs because of physical failure; and mains that, under normal operation, continue to show the presence of coliform organisms. The disinfecting agents discussed in this standard are chlorine solutions that may be derived from liquid chlorine (Cl_2), calcium hypochlorite ($\text{Ca}(\text{OCl})_2$), or sodium hypochlorite (NaOCl). Combinations of free chlorine residual and contact time are provided. Chlorine dosage reference tables are provided as appendix B of this standard.

I.B. *History.* This standard was first approved on Sept. 30, 1947, by the AWWA Board of Directors and published as 7D.2-1948, A Procedure for Disinfecting Water Mains. Revisions were approved on Sept. 14, 1948; Mar. 6, 1953; May 27, 1954; June 2, 1968; and June 7, 1981. All were done under the designation ANSI/AWWA C601, Standard for Disinfecting Water Mains. In 1986, the designation of the standard was changed to ANSI/AWWA C651, and the subsequent editions were approved on Jan. 26, 1986; June 18, 1992; June 20, 1999; and Jan. 16, 2005. This edition was approved on June 8, 2014.

I.C. *Acceptance.* In May 1985, the US Environmental Protection Agency (USEPA) entered into a cooperative agreement with a consortium led by NSF International (NSI) to develop voluntary third-party consensus standards and a certification program for direct and indirect drinking water additives. Other members of the original consortium included the Water Research Foundation (formerly AwwaRI) and the Conference of State Health and Environmental Managers (COSHEM). The American Water Works Association (AWWA) and the Association of State Drinking Water Administrators (ASDWA) joined later.

In the United States, authority to regulate products for use in, or in contact with, drinking water rests with individual states.[†] Local agencies may choose to impose requirements more stringent than those required by the state. To evaluate the health

* American National Standards Institute, 25 West 43rd Street, Fourth Floor, New York, NY 10036.

† Persons outside the United States should contact the appropriate authority having jurisdiction.

effects of products and drinking water additives from such products, state and local agencies may use various references, including

1. An advisory program formerly administered by USEPA, Office of Drinking Water, discontinued on Apr. 7, 1990.
2. Specific policies of the state or local agency.
3. Two standards developed under the direction of NSF*: NSF/ANSI 60, Drinking Water Treatment Chemicals—Health Effects, and NSF/ANSI 61, Drinking Water System Components—Health Effects.
4. Other references, including AWWA standards, *Food Chemicals Codex*, *Water Chemicals Codex*,[†] and other standards considered appropriate by the state or local agency.

Various certification organizations may be involved in certifying products in accordance with NSF/ANSI 60. Individual states or local agencies have authority to accept or accredit certification organizations within their jurisdictions. Accreditation of certification organizations may vary from jurisdiction to jurisdiction.

Annex A, "Toxicology Review and Evaluation Procedures," to NSF/ANSI 60 does not stipulate a maximum allowable level (MAL) of a contaminant for substances not regulated by a USEPA final maximum contaminant level (MCL). The MALs of an unspecified list of "unregulated contaminants" are based on toxicity testing guidelines (noncarcinogens) and risk characterization methodology (carcinogens). Use of Annex A procedures may not always be identical, depending on the certifier.

ANSI/AWWA C651 does not address additives requirements. Thus, users of this standard should consult the appropriate state or local agency having jurisdiction in order to

1. Determine additives requirements including applicable standards.
2. Determine the status of certifications by parties offering to certify products for contact with, or treatment of, drinking water.
3. Determine current information on product certification.

II. Special Issues.

II.A. *Information on Application of This Standard.* Generally, it is easier to disinfect a new main than one that has had emergency repairs in terms of access, sanitary control, and the time available for disinfection, sampling, and testing.

* NSF International, 789 North Dixboro Road, Ann Arbor, MI 48105.

† Both publications available from National Academy of Sciences, 500 Fifth Street, NW, Washington, DC 20001.

For a new main, there is typically more time available for disinfection and testing since there is no immediate demand from customers. Given the often significant amount of time and materials involved in a new water main project, careful disinfection and testing of the main are reasonable and necessary to ensure public health protection.

Conditions for pipe repair projects vary tremendously in terms of the size of the repair, the sanitary conditions, and the time constraints resulting from immediate customer demands. It should be noted if the line is depressurized or opened to the environment prior to or during repair, the sanitary integrity of the pipe is compromised and it is critical to follow sanitary procedures throughout the repair—not just as it is being returned to service. Crews responsible for the repair of mains should be aware of the potential health hazards and be trained to carefully observe prescribed construction practices and disinfection procedures.

Because of the differences between initial installation and repair, the disinfection requirements for each situation are also different. The installation of new mains requires that two sets of samples for coliform analysis are collected at least 16 hr apart, or two sets collected 15 min apart after at least a 16-hr rest period. For repaired mains that are depressurized and/or wholly or partially dewatered, one set of samples may be required, and depending on the sanitary conditions, the line may be returned to service prior to the completion of bacteriological testing. For repaired mains that are maintained under pressurized conditions at all times, bacteriological testing is not required.

When required, samples are now specified to be collected at least 16 hr apart, or 15 min apart after a 16-hr rest period. The purpose of this change is to consider the balance between public health, improved test methods, and timely work completion. This timing is sufficient to allow bacterial regrowth within the line if there was a contamination problem and provides more flexibility in the scheduling of various work activities.

Bacteriological testing in accordance with Sec. 5.1 is used to verify the absence of coliform organisms and is generally accepted as verification that disinfection of the pipeline has been accomplished; and following sanitary practices for handling and installation of pipe, valves, fittings, and accessories, coupled with adequate flushing of the line before disinfection, is necessary to ensure the disinfected pipeline will be ready for connection to the water system. Failure to pass the bacteriological test requires that the flushing or disinfection process be repeated. It must be remembered that the final water quality test is not the primary means for certifying the sanitary condition of a main. The sanitary

handling of materials, the practices during construction, and the continual inspection of the work are the primary means for ensuring the sanitary condition of the water main.

Four methods of disinfecting newly constructed water mains are described in this standard: the tablet method, the continuous-feed method, the slug method, and the spray method. The utility should decide which of these methods is most suitable for a given situation. Factors to consider when choosing a method should include the length and diameter of the main, type of joints present, availability of materials, equipment required for disinfection, training of the personnel who will perform the disinfection, and safety concerns. For example, if gas chlorination is the chosen chemical when either continuous-feed or slug methods are being used, use only properly designed and constructed equipment; makeshift equipment is not acceptable when liquid chlorine (gas) cylinders are used.

Thorough consideration should be given to the impact of highly chlorinated water flushed into the environment. If there is any question that damage may be caused by chlorinated-waste discharge (to fish life, plant life, physical installations, or other downstream water uses of any type), then an adequate amount of reducing agent should be applied to water being disposed of in order to thoroughly neutralize the chlorine residual remaining in the water.

The tablet method cannot be used unless the main can be kept clean and dry. It cannot be used in large-diameter mains if it is necessary for a worker to enter the main to grout joints or perform inspection because the tablets may release toxic fumes after exposure to moist air. When using the tablet method, the chlorine concentration is not uniform throughout the main because the hypochlorite solution is dense and tends to concentrate at the bottom of the pipe. The use of the tablet method precludes preliminary flushing. The tablet method is convenient to use in mains having diameters up to 24 in. (600 mm), and it requires no special equipment.

The continuous-feed method is suitable for general application. Preliminary flushing removes light particulates from the main but not from the pipe-joint spaces. The chlorine concentration is uniform throughout the main.

The slug method is suitable for use in large-diameter mains where the volume of water makes the continuous-feed method impractical and difficult to achieve for short attachments. The slug method results in appreciable savings of chemicals used to disinfect long large-diameter mains. Also, this method reduces the volume of heavily chlorinated water to be flushed to waste.

The spray method is suitable for use in large-diameter transmission lines where spray equipment can be used to disinfect all surfaces of the pipe. This method reduces the volume of heavily chlorinated water to be flushed to waste.

The purpose of all four chlorination methods is to disinfect water lines, resulting in an absence of coliforms as confirmed by laboratory analysis. As noted above, the four methods attempt to provide flexibility in responding to specific situations. The tablet and continuous-feed methods both have initial chlorine concentrations of 25 mg/L and a minimum contact time of 24 hr. Because the tablet method cannot be flushed and cleaned prior to disinfection, the required free chlorine residual must be detectable (≥ 0.2 mg/L) after 24 hr. Because the continuous-feed method can be used to flush particles, a higher free chlorine residual of 10 mg/L is required after 24 hr. To meet the needs of situations requiring reduced contact times, the slug method allows only a 3-hr contact time but requires a 100-mg/L initial chlorine dosage. For larger transmission lines, spray disinfection using 200 mg/L free chlorine may be a suitable option, minimizing discharges of highly chlorinated water. While the contact times of the methods may not be identical, the end result, absence of coliforms, is the same for all four methods.

Disinfectants other than chlorine may be appropriate to use. Although this standard describes only the use of liquid chlorine (gas), sodium hypochlorite solutions, and calcium hypochlorite, the applicability of other disinfectants should be evaluated. Ozone and chemical cleaners have been used, and these warrant further investigation. Whichever disinfectant or method is selected, approval from the local regulatory agency may be required.

III. Use of This Standard. It is the responsibility of the user of an AWWA standard to determine that the products described in that standard are suitable for use in the particular application being considered.

III.A. Purchaser Options and Alternatives. This standard is written as though the disinfection work will be performed by the purchaser's personnel. Where the work is to be performed using a separate contract or as part of a contract for installing mains,* appropriate provisions should be included in the purchase documents to ensure that the constructor is specifically instructed as to its responsibilities. The following information should be provided by the purchaser.

* Refer to other AWWA standards and manuals for design criteria and installation procedures for various pipe materials.

1. Standard used—that is, ANSI/AWWA C651, Standard for Disinfection of Water Mains, of latest revision.
2. Approval requirements before use.
3. Those procedures included in the standard that are designated as optional, that are to be included in the purchase documents.
4. Whether compliance with NSF/ANSI 60, Drinking Water Chemicals—Health Effects, is required.
5. Whether compliance with NSF/ANSI 61, Drinking Water System Components—Health Effects, is required.
6. Details of other federal, state or provincial, and local requirements (Section 4).
7. Form of chlorine to be used (Sec. 4.1.1, 4.1.2, and 4.1.3).
8. Method of chlorination (Sec. 4.3, 4.4, 4.5, and 4.6).
9. Flushing locations, rates of flushing, and locations of drainage facilities (Sec. 4.4.2, 4.9.1, and 4.9.2).
10. Responsibility for tapping existing mains and connections to new mains (Sec. 4.4.3[1], 4.4.3[2], and 4.10).
11. The number and frequency of samples for bacteriological tests (Sec. 5.1.1, 5.1.2, and 5.2).
12. Method of taking samples (Sec. 5.1.3).

III.B. *Modification to Standard.* Any modification of the provisions, definitions, or terminology in this standard must be provided by the purchaser.

IV. Major Revisions. Major revisions made to the standard in this edition include the following:

1. Clarified differences in the requirements between new and repaired mains (foreword II.A, Sec. 1.1, and 4.11).
2. Changed the requirement for bacteriological sampling in new mains from two sets of samples 24 hr apart to add two options for two sets of samples: Option A samples are 16 hr apart, and Option B samples are 15 min apart after a 16-hr rest period (foreword II.A and Sec. 5.1).
3. The flushing rate of 2.5 ft/sec has been increased to 3.0 ft/sec for a scour flush based on testing performed under Water Research Foundation Project No. 4307, which indicates the threshold velocity of 2.5 to 3.0 ft/sec for successful flushing (2.5- to 3.0-log removal) of sand particles. Since this is a threshold velocity, 3.0 ft/sec was chosen for the standard (Sec. 4.4.2 and Table 3).
4. Added spray disinfection method for large transmission mains (Sec. 4.6).

5. Appendix C has been deleted, and instead, a reference to ANSI/AWWA C655 is made for dechlorination (Sec. 4.7 and 4.9.2).

6. Developed a rationale for evaluating risk during pipe repairs and the level of disinfection and sampling needed under those conditions (Sec. 4.11).

V. Comments. If you have any comments or questions about this standard, please call the AWWA Engineering and Technical Services at 303.794.7711, FAX at 303.795.7603; write to the group at 6666 West Quincy Avenue, Denver, CO 80235-3098; or email the group at standards@awwa.org.

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**American Water Works
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ANSI/AWWA C651-14
(Revision of ANSI/AWWA C651-05)

AWWA Standard

Disinfecting Water Mains

SECTION 1: GENERAL

Sec. 1.1 Scope

This standard describes essential procedures for the disinfection of new and repaired potable water mains. New water mains shall be disinfected before they are placed in service. Water mains taken out of service for inspection, repair, or other activities may or may not require disinfection and sampling, depending on the risk of contamination. This standard describes the process for evaluating the risk under different conditions.

Sec. 1.2 Purpose

The purpose of this standard is to define the minimum requirements for the disinfection of water mains, including the preparation of water mains, application of chlorine, and sampling and testing for the presence of coliform bacteria.

Sec. 1.3 Application

This standard can be referenced in the purchase documents for the disinfection of water mains and can be used as a guide for the preparation of water mains, application of chlorine, and sampling and testing for the presence of coliform bacteria. The stipulations of this standard apply when this document has been referenced and only to the disinfection of water mains.

SECTION 2: REFERENCES

This standard references the following documents. In their latest editions, they form a part of this standard to the extent specified within the standard. In any case of conflict, the requirements of this standard shall prevail.

ANSI*/AWWA B300—Hypochlorites.

ANSI/AWWA B301—Liquid Chlorine.

ANSI/AWWA C652—Disinfection of Water Storage Facilities.

ANSI/AWWA C655—Field Dechlorination.

APHA,[†] AWWA, and WEF:[‡] *Standard Methods for the Examination of Water and Wastewater*.

AWWA Manual M12, *Simplified Procedures for Water Examination*.

NSF/ANSI 61—Drinking Water System Components—Health Effects.

SECTION 3: DEFINITIONS

The following definitions shall apply in this standard:

1. *Available chlorine:* A measure of the amount of chlorine in chlorinated lime, hypochlorite compounds, chloramines, and other materials that are used for disinfection compared with the amount in elemental (liquid or gaseous) chlorine.
2. *Chlorine, combined:* The amount of chlorine combined with ammonia (NH_3) or other compounds in water.
3. *Chlorine, free:* Also called *free available chlorine*, the amount of chlorine available as dissolved gas (Cl_2), hypochlorous acid (HOCl), and hypochlorite (OCl^-) that is not combined with ammonia (NH_3) or other compounds in water that is available for disinfection.
4. *Chlorine residual:* Concentration of chlorine species present in water after the oxidant demand has been satisfied.
5. *Chlorine, total:* A combination of free chlorine, combined chlorine, and organochlorine species.
6. *Constructor:* The party that provides the work and materials for placement or installation.

*American National Standards Institute, 25 West 43rd Street, Fourth Floor, New York, NY 10036.

†American Public Health Association, 800 I Street NW, Washington, DC 20001.

‡Water Environment Federation, 601 Wythe Street, Alexandria, VA 22314.

7. *Liquid chlorine (gas)*: the commercially available form of liquefied elemental chlorine gas. (The term *liquid chlorine* is sometimes used to describe a hypochlorite solution. This use of the term is discouraged. See ANSI/AWWA B300, Hypochlorites.)

8. *Manufacturer*: The party that manufactures, fabricates, or produces materials or products.

9. *Purchaser*: The person, company, or organization that purchases any materials or work to be performed.

10. *Supplier*: The party that supplies material or services. A supplier may or may not be the manufacturer.

11. *Organochlorine*: Any organic compound containing chlorine as a constituent. Organochlorine compounds can form when chlorine reacts with organic substances.

SECTION 4: REQUIREMENTS

Materials shall comply with the requirements of the Safe Drinking Water Act and other federal regulations for potable water, wastewater, and reclaimed water systems as applicable.

Sec. 4.1 Forms of Chlorine for Disinfection

The forms of chlorine that may be used in the water main disinfection operations are liquid chlorine (gas), sodium hypochlorite solution, and calcium hypochlorite granules or tablets.

4.1.1 *Liquid chlorine (gas)*. Liquid chlorine (gas) conforming to ANSI/AWWA B301 contains 100 percent available chlorine and is packaged in steel containers usually of 100-lb, 150-lb, or 1-ton (45.4-kg, 68.0-kg, or 907.2-kg) net chlorine weight. Liquid chlorine (gas) shall be used only (1) in combination with appropriate gas-flow chlorinators and ejectors to provide a controlled high-concentration solution feed to the water to be chlorinated; (2) under the direct supervision of someone familiar with the biological, chemical, and physical properties of liquid chlorine (gas) and who is trained and equipped to handle any emergency that may arise; and (3) when appropriate safety practices are observed to protect working personnel and the public. Makeshift equipment is not acceptable when liquid chlorine (gas) cylinders are used.

4 AWWA C651-14

4.1.2 *Sodium hypochlorite.* Sodium hypochlorite conforming to ANSI/AWWA B300 is available in liquid form in glass, rubber-lined, or plastic containers typically ranging in size from 1 qt (0.95 L) to 5 gal (18.92 L). Containers of 30 gal (113.6 L) or larger may be available in some areas. Sodium hypochlorite contains approximately 5 percent to 15 percent available chlorine, and the storage conditions and time must be controlled to minimize its deterioration. (Available chlorine is expressed as a percent of weight when the concentration is 5 percent or less, and usually as a percent of volume for higher concentrations. $\text{Percent} \times 10 =$ grams of available chlorine per liter of hypochlorite.)

4.1.3 *Calcium hypochlorite.* Calcium hypochlorite conforming to ANSI/AWWA B300 is available in granular form or in 5-g tablets and must contain approximately 65 percent available chlorine by weight. The material should be stored in a cool, dry, and dark environment to minimize its deterioration.

CAUTION: Tablets dissolve in approximately 7 hr and must be given adequate contact time. Do not use calcium hypochlorite intended for swimming pool disinfection, as this material has been sequestered and is extremely difficult to eliminate from the pipe after the desired contact time has been achieved.

Sec. 4.2 General Considerations for All Methods of Chlorination

4.2.1 *General.* Four methods of chlorination are explained in this section: tablet, continuous feed, slug, and spray. The tablet method gives an initial chlorine dose of 25 mg/L; the continuous-feed method gives a 24-hr chlorine residual of not less than 10 mg/L; the slug method gives a 3-hr exposure of not less than 50 mg/L free chlorine; and the spray method gives a 30-min exposure of not less than 200 mg/L free chlorine. Caution should be used with highly chlorinated water when conducting hydrostatic pressure testing and with high-volume flushing of water.

4.2.2 *Flushing.* Potable water shall be used for disinfection, hydrostatic pressure testing, and flushing. Drainage should take place away from the construction or work area. Adequate drainage must be provided during flushing. If applicable, the valve(s) isolating the main from existing system should be locked out and tagged out to prevent unintentional release of the elevated chlorine residual water used for disinfection.

4.2.3 *Dechlorination.* When dechlorination is required, it is recommended that any high-velocity flushing be completed prior to disinfection. Dechlorination equipment may not be capable of handling high flows with high levels of chlorine.

Table 1 Weight of calcium hypochlorite granules to be placed at beginning of main and at each 500-ft (150-m) interval

Pipe Diameter (<i>d</i>)		Calcium Hypochlorite Granules	
<i>in.</i>	(<i>mm</i>)	<i>oz</i>	(<i>g</i>)
4	(100)	1.7	(48)
6	(150)	3.8	(108)
8	(200)	6.7	(190)
10	(250)	10.5	(298)
12	(300)	15.1	(428)
14 and larger	(350 and larger)	$D^2 \times 15.1$	$D^2 \times 428$

Where D is the inside pipe diameter, in feet $D = d/12$

Sec. 4.3 Tablet/Granule Method of Chlorination

4.3.1 Tablet method. The tablet method consists of placing calcium hypochlorite granules or tablets in the water main during installation and then filling the main with potable water to create a chlorine solution. This method may be used only if the pipes and appurtenances are kept clean and dry during construction.

WARNING: This procedure must not be used on solvent-welded plastic or on screwed-joint steel pipe because of the danger of fire or explosion from the reaction of the joint compounds with the calcium hypochlorite.

4.3.2 Placement of calcium hypochlorite granules during construction. Calcium hypochlorite granules shall be placed at the upstream end of the first section of pipe, at the upstream end of each branch main, and at 500-ft (150-m) intervals. The quantity of granules at each location shall be as shown in Table 1.

4.3.3 Placement of calcium hypochlorite tablets during construction. Calcium hypochlorite tablets (5-grams) shall be placed in the upstream end of each section of pipe to be disinfected, including branch lines. Also, at least one tablet shall be placed in each hydrant branch and in other appurtenances. The number of 5-g tablets required for each pipe section shall be $0.0012 d^2 L$ rounded to the next higher integer, where d is the inside pipe diameter, in inches, and L is the length of the pipe section, in feet. Table 2 shows the number of tablets required for commonly used sizes of pipe. Calcium hypochlorite tablets shall be attached by an adhesive meeting the requirements of NSF/ANSI 61. There shall be adhesive only on the broadside of the tablet attached to the surface of the pipe. Attach tablets inside and at the top of the main. If the tablets are attached before the pipe section is placed in

Table 2 Number of 5-g calcium hypochlorite tablets required for dose of 25 mg/L*

Pipe Diameter		Length of Pipe Section, <i>ft (m)</i>				
		13 (4.0) or less	18 (5.5)	20 (6.1)	30 (9.1)	40 (12.2)
<i>in.</i>	<i>(mm)</i>	Number of 5-g Calcium Hypochlorite Tablets				
4	(100)	1	1	1	1	1
6	(150)	1	1	1	2	2
8	(200)	1	2	2	3	4
10	(250)	2	3	3	4	5
12	(300)	3	4	4	6	7
16	(400)	4	6	7	10	13

*Based on 3.25-g available chlorine per tablet

the trench, their positions shall be marked on the pipe exterior to indicate that the pipe has been installed with the tablets at the top.

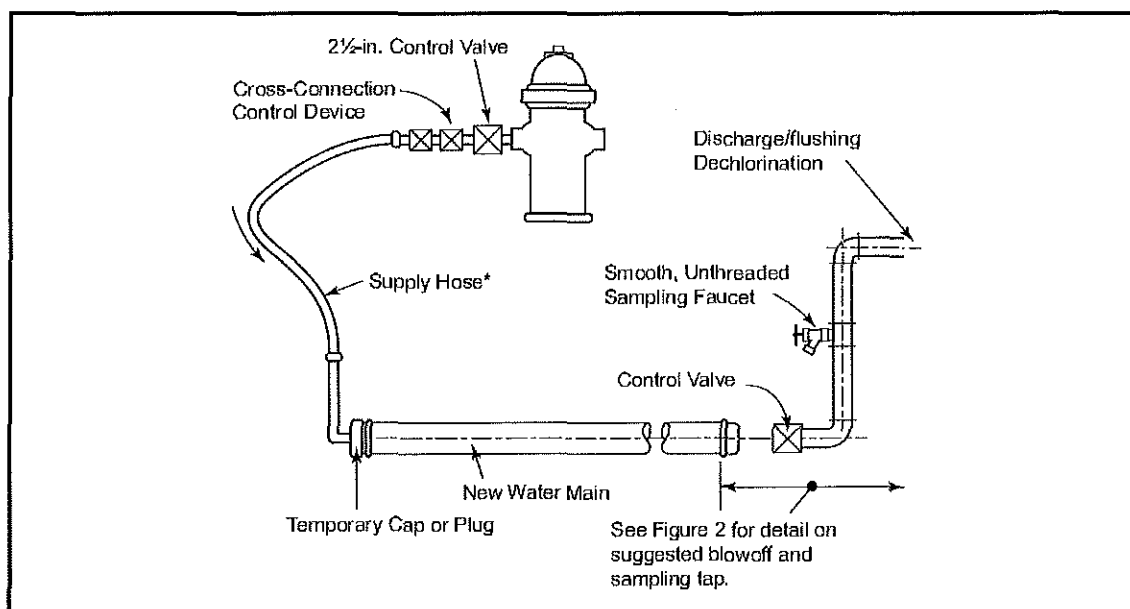
4.3.4 Filling and contact time. When installation has been completed, the main shall be filled with water such that the full pipe velocity is no greater than 1 ft/sec (0.3 m/sec). Fill rate must be carefully controlled to ensure tablets do not come loose from pipe. Precautions shall be taken to ensure that air pockets are eliminated. As an optional procedure, if required by the purchaser, water used to fill the new main shall be supplied through a temporary connection that shall include an appropriate cross-connection control device, consistent with the degree of hazard, for backflow protection of the active distribution system (see Figure 1).

The chlorinated water shall remain in the pipe for at least 24 hr. If the water temperature is less than 41°F (5°C), the water shall remain in the pipe for at least 48 hr. A detectable free chlorine residual (≥ 0.2 mg/L) shall be found at each sampling point after the 24- or 48-hr period.

Sec. 4.4 Continuous-Feed Method of Chlorination

4.4.1 Continuous-feed method. The continuous-feed method consists of completely filling the main with potable water, removing air pockets, then flushing the completed main to remove particulates, and refilling the main with potable water that has been chlorinated to 25 mg/L. After a 24-hr holding period in the main there shall be a free chlorine residual of not less than 10 mg/L.

4.4.2 Preliminary flushing. Before the main is chlorinated, it shall be filled with potable water to eliminate air pockets and flushed to remove particulates. The flushing velocity in the main shall not be less than 3.0 ft/sec (0.91 m/sec) unless



NOTE: Figure 1 applies to pipes with diameters 4 in. (100 mm) through 12 in. (300 mm). Larger sizes must be handled on a case-by-case basis.

*Clean potable-water hose only. Size and number of taps per Table 3. This hose must be removed during the hydrostatic pressure test.

Figure 1 Suggested temporary flushing/testing connection

Table 3 Required flow and openings (either taps or hydrants) to flush pipelines at 3.0 ft/sec (0.91 m/sec) (40 psi [276 kPa] residual pressure in water main)*

Pipe Diameter		Flow Required to Produce 3.0 ft/sec (approx.) Velocity in Main		Size of Tap Used, in. (mm)			Number of Hydrant Outlets	
				1 (25)	1½ (38)	2 (51)		
in.	(mm)	gpm	(L/sec)	Number of Taps Required on Pipe†			2½-in. (64-mm)	4½-in. (114 mm)
4	(100)	120	(7.4)	1	—	—	1	1
6	(150)	260	(16.7)	—	1	—	1	1
8	(200)	470	(29.7)	—	2	—	1	1
10	(250)	730	(46.3)	—	3	2	1	1
12	(300)	1,060	(66.7)	—	—	3	2	1
16	(400)	1,880	(118.6)	—	—	5	2	1

*With a 40-psi (276-kPa) pressure in the main with the hydrant flowing to atmosphere, a 2½-in. (64-mm) hydrant outlet will discharge approximately 1,000 gpm (63.1 L/sec); and a 4½-in. (114-mm) hydrant outlet will discharge approximately 2,500 gpm (160 L/sec).

†Number of taps on pipe based on 3.0-ft/sec discharge through 5 ft (1.5 m) of galvanized iron (GI) pipe with one 90° elbow.

the purchaser determines that conditions do not permit the required flow to be discharged to waste. Table 3 shows the rates of flow required to produce a velocity of 3.0 ft/sec (0.91 m/sec) in commonly used sizes of pipe. (NOTE: flushing is no substitute for preventive measures during construction. Certain contaminants, such as caked deposits, resist flushing at any feasible velocity, and pigging of the main, or other suitable method acceptable to the purchaser, may be required.) Where such flow rates are not possible, flushing at the maximum expected flow rate for the line for 2–3 volumes may be acceptable. For larger mains, pigging (or other suitable method acceptable to the purchaser) is an option in place of high velocity flushing.

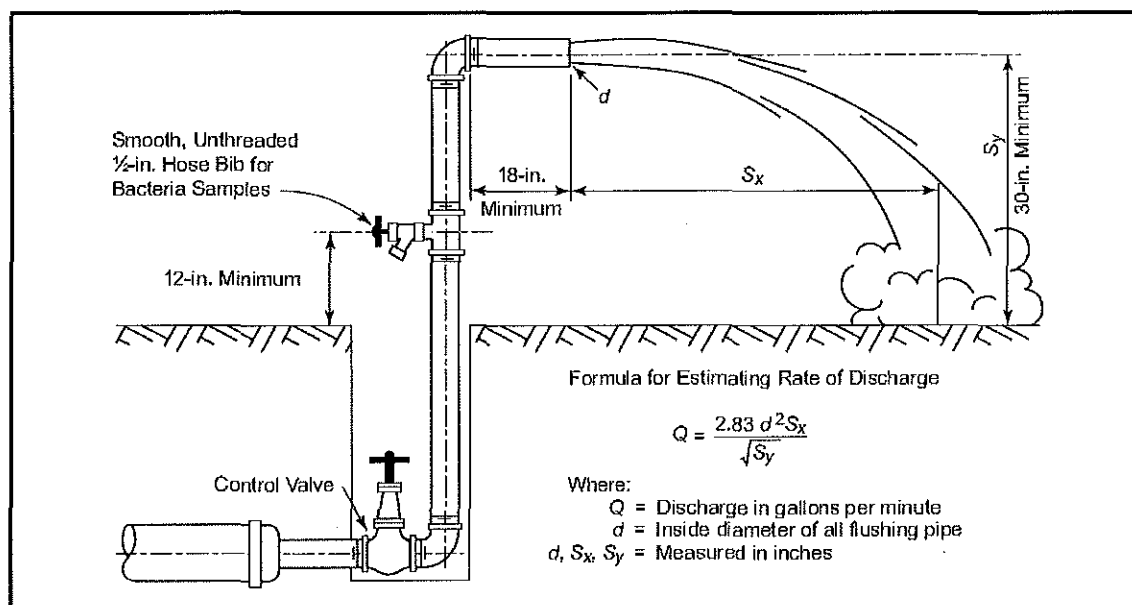
For 24-in. (600-mm) or larger diameter mains, an acceptable alternative to flushing is to broom-sweep the main, carefully removing sweepings prior to filling and chlorinating the main. WARNING: OSHA requirements for confined space need to be addressed before entering a pipeline.

4.4.3 Procedure for chlorinating the main.

1. Potable water may be supplied from a temporary backflow-protected connection to the existing distribution system or other supply source approved by the purchaser. The cross-connection control device shall be consistent with the degree of hazard for backflow protection of the active distribution system (see Figure 1). The flow shall be at a constant, measured rate into the newly installed water main. In the absence of a meter, the rate may be approximated using a Pitot gauge in the discharge, measuring the time to fill a container of known volume, or measuring the trajectory of the discharge and using the formula shown in Figure 2. The main should undergo hydrostatic testing prior to disinfection.

2. At a point not more than 10 ft (3 m) downstream from the beginning of the new main, water entering the new main shall receive a dose of chlorine fed at a constant rate such that the water will have not less than 25 mg/L free chlorine. To ensure that an appropriate concentration is achieved, the free chlorine concentration shall be measured at regular time intervals in accordance with the procedures described in *Standard Methods for the Examination of Water and Wastewater* or AWWA Manual M12, or using appropriate chlorine test kit (see appendix A).

Table 4 gives the amount of chlorine required for each 100 ft (30.5 m) of pipe for various pipe diameters. Solutions with a minimum 1 percent chlorine concentration may be prepared with sodium hypochlorite or calcium hypochlorite. The latter solution requires 1 lb (454 g) of calcium hypochlorite in 8 gal (30.3 L) of water.



NOTE: This figure applies to pipes up to and including 8-in. (200-mm) diameter.

Figure 2 Suggested combination blowoff and sampling tap

Table 4 Chlorine required to produce an initial 25-mg/L concentration in 100 ft (30.5 m) of pipe by diameter

Pipe Diameter		100% Chlorine		1% Chlorine Solution	
<i>in.</i>	<i>(mm)</i>	<i>lb</i>	<i>(g)</i>	<i>gal</i>	<i>(L)</i>
4	(100)	0.013	(5.9)	0.16	(0.6)
6	(150)	0.030	(13.6)	0.36	(1.4)
8	(200)	0.054	(24.5)	0.65	(2.5)
10	(250)	0.085	(38.6)	1.02	(3.9)
12	(300)	0.120	(54.4)	1.44	(5.4)
16	(400)	0.217	(98.4)	2.60	(9.8)

3. Chlorine application shall not cease until the entire main is filled with chlorinated water. The chlorinated water shall be retained in the main for at least 24 hr, during which time valves and hydrants in the treated section shall be operated to ensure disinfection of the appurtenances. At the end of this 24-hr period, the treated water in all portions of the main shall have a residual of not less than 10 mg/L of free chlorine.

4. Direct-feed chlorinators, which operate solely from gas pressure in a chlorine cylinder, shall not be used for the application of liquid chlorine (gas). (The

danger of using direct-feed chlorinators is that water pressure in the main can exceed gas pressure in the chlorine cylinder. This allows backflow of water into the cylinder, resulting in severe cylinder corrosion and the escape of chlorine gas.)

The preferred equipment for applying liquid chlorine (gas) is a solution-feed, vacuum-operated chlorinator and a booster pump. The vacuum-operated chlorinator mixes the chlorine gas in solution water; the booster pump then injects the chlorine solution into the main to be disinfected. Hypochlorite solutions may be applied to the water main with a chemical-feed pump designed for feeding chlorine solutions. Feed lines shall be made of material capable of withstanding the corrosion caused by the concentrated chlorine solutions and the maximum pressures that may be created by the pumps. All connections shall be checked for tightness before the solution is applied to the main.

Sec. 4.5 Slug Method of Chlorination

4.5.1 *Slug method.* The slug method consists of completely filling the main to eliminate air pockets; flushing the main to remove particulates; then slowly flowing through the main a slug of water dosed with chlorine to a concentration of 100 mg/L. The slow rate of flow ensures that all parts of the main and its appurtenances will be exposed to the highly chlorinated water for a period of not less than 3 hr.

4.5.2 *Preliminary flushing.* Same as Sec. 4.4.2.

4.5.3 *Procedure for chlorinating the main.*

1. Potable water may be supplied from a temporary backflow-protected connection to the existing distribution system or other supply source approved by the purchaser. The cross-connection control device shall be consistent with the degree of hazard for backflow protection of the active distribution system (see Figure 1). The flow shall be at a constant, measured rate into the newly installed water main. In the absence of a meter, the rate may be approximated using a Pitot gauge in the discharge, measuring the time to fill a container of known volume, or measuring the trajectory of the discharge and using the formula shown in Figure 2. The main should undergo hydrostatic testing prior to disinfection.

2. At a point not more than 10 ft (3 m) downstream from the beginning of the new main, water entering the new main shall receive a dose of chlorine fed at a constant rate such that the water will have not less than 100 mg/L free chlorine. To ensure that this concentration is achieved, the free chlorine concentration shall be measured at regular time intervals sufficient to guide the completion of the successful loading of the target chlorine concentration. The chlorine shall be applied

continuously and for a sufficient period to develop a solid column, or slug, of chlorinated water that will, as it moves through the main, expose all interior surfaces to a concentration of approximately 100 mg/L for at least 3 hr.

3. The free chlorine residual shall be measured in the slug as it moves through the main. If at any time it drops below 50 mg/L, the flow shall be stopped; chlorination equipment shall be relocated at the head of the slug; and, as flow resumes, chlorine shall be applied to restore the free chlorine in the slug to not less than 100 mg/L.

4. As chlorinated water flows past fittings and valves, related valves and hydrants shall be operated so as to disinfect appurtenances and pipe branches.

Sec. 4.6 Spray Disinfection for Large Transmission Lines

For very large transmission mains (where personnel or equipment may safely enter the pipe), spray disinfection may be an appropriate and efficient means of achieving disinfection. For this method, refer to ANSI/AWWA C652, Sec. 4.3.2 (Disinfection of Water Storage Facilities; Chlorination Method 2). In general, once pipe is cleaned, spray a 200-mg/L free chlorine solution on all surfaces. After 30 min, fill line and sample as described in Sec. 5.1.

Sec. 4.7 Basic Disinfection Procedure for New Mains

The basic disinfection procedure consists of

1. Inspecting materials to be used to ensure their integrity.
2. Preventing contaminating materials from entering the water main during storage, construction, or repair and noting potential contamination at the construction site.
3. Removing, by flushing or other means, those materials that may have entered the water main or appurtenances.
4. Preventing contamination of existing mains from cross-connection during flushing, pressure testing, and disinfection.
5. Pressure testing the water main to ensure the main meets the purchaser's allowable leakage rate. Hydrostatic pressure tests should be conducted with potable water.
6. Chlorinating and adequately documenting the process used for disinfection.
7. Flushing the chlorinated water from the main. Refer to ANSI/AWWA C655 Field Dechlorination for dechlorination procedures, if dechlorination is required.

8. Determining the bacteriological quality of water samples collected from the pipe by laboratory test after disinfection.

9. Final connecting of the newly disinfected water main to the active distribution system without sacrificing sanitary practices and conditions.

Sec. 4.8 Preventive and Corrective Measures During New Construction

4.8.1 *General.* Heavy particulates generally contain bacteria and prevent even very high chlorine concentrations from contacting and killing these organisms. Therefore, the procedures of this section must be observed to ensure that a water main and its appurtenances have been thoroughly cleaned for the final disinfection by chlorination. Also, any connection of a new water main to the active distribution system before the receipt of satisfactory bacteriological samples may constitute a cross-connection. Therefore, the new main must be isolated until bacteriological tests described in Section 5 of this standard are satisfactorily completed.

4.8.2 *Keeping pipe clean and dry.* The interiors of pipes, fittings, and valves shall be protected from contamination.

4.8.2.1 *Openings.* Openings in the pipeline shall be closed with watertight plugs when pipe laying is stopped at the close of the day's work or for other reasons, such as rest breaks or meal periods. Rodent-proof plugs may be used when watertight plugs are not practicable and when thorough cleaning will be performed by flushing or other means.

4.8.2.2 *Stringing pipe.* Pipe delivered for construction shall be strung to minimize the entrance of foreign material.

4.8.2.3 *Delays.* Delay in placement of delivered pipe invites contamination. The more closely the rate of delivery is correlated to the rate of pipe laying, the lower the risk of contamination.

4.8.3 *Joints.* Joints of pipe in the trench shall be completed before work is stopped. If water accumulates in the trench, the plugs shall remain in place until the trench is free of standing water and mud that may enter the pipe.

4.8.4 *Packing materials.* Yarning or packing material shall consist of molded or tubular rubber rings, rope of treated paper, or other approved materials. Materials such as jute or hemp shall not be used. Packing material shall be handled in a manner that avoids contamination.

4.8.5 *Sealing materials.* No contaminated material or any material capable of supporting growth of microorganisms shall be used for sealing joints. Sealing material or gaskets shall be handled in a manner that avoids contamination. The lubricant used in the installation of sealing gaskets shall be suitable for use in

potable water meeting the requirements of NSF/ANSI 61 and shall not contribute odors. It shall be delivered to the job in closed containers and shall be kept clean and applied with dedicated clean applicators.

4.8.6 *Cleaning and swabbing.* If dirt enters the pipe, it shall be removed and the interior pipe surface swabbed with a minimum 1 percent free chlorine disinfecting solution. If, in the opinion of the purchaser, the dirt remaining in the pipe will not be removed using the flushing operation, the interior of the pipe shall be cleaned using mechanical means, such as a hydraulically propelled foam pig (or other suitable device acceptable to the purchaser) in conjunction with the application of a minimum 1 percent free chlorine disinfecting solution. The cleaning method used shall not force mud or debris into the interior pipe-joint spaces and shall be acceptable to the purchaser.

4.8.7 *Wet-trench construction.* If it is not possible to keep the pipe and fittings dry during installation, a scour flush at 3.0 ft/sec (0.91 m/sec) or greater for a minimum of three pipe volumes (see Table 3) followed by slug or continuous-feed chlorination and bacteria testing before release is required. For larger mains, pigging or other suitable method acceptable to the purchaser is an option in place of high-velocity flushing.

4.8.8 *Flooding by storm or accident during construction.* If the main is flooded during construction, it shall be cleared of the floodwater by draining and flushing with potable water until the main is clean. The section exposed to the floodwater shall then be filled with a chlorinated potable water that, at the end of a 24-hr holding period, will have a free chlorine residual of not less than 25 mg/L. The chlorinated water may then be drained or flushed from the main. If chemical contamination occurs, such as a hydraulic oil leak or petroleum product spill, the pipe sections exposed to the contamination should be replaced and not reused for potable water applications. After construction is completed, the main shall be disinfected using the continuous-feed, slug, or spray methods.

4.8.9 *Backflow protection (optional).** As an optional procedure (if required by the purchaser), the new water main shall be kept isolated from the active distribution system using a physical separation (see Figure 1) until satisfactory bacteriological testing has been completed and the disinfection water flushed out.

Water required to fill the new main for hydrostatic pressure testing, disinfection, and flushing shall be supplied through a temporary connection between the

* Optional Sec. 4.8.9 is not included as part of the standard unless required by the purchaser.

distribution system and the new main or other supply source approved by the purchaser. The temporary connection shall include an appropriate cross-connection control device consistent with the degree of hazard (a double check valve assembly or a reduced pressure zone assembly) and shall be disconnected (physically separated) from the new main during the hydrostatic pressure test. It will be necessary to reestablish the temporary connection after completion of the hydrostatic pressure test to flush out the disinfectant water prior to final connection of the new main to the distribution system. NOTE: Exposure to high levels of chlorine or high pH can cause severe irritation to customers. Also, the chlorinated water can be high in disinfection by-products.

Sec. 4.9 Final Flushing for New Mains

4.9.1 *Clearing the main of heavily chlorinated water.* After the applicable retention period, heavily chlorinated water should not remain in prolonged contact with pipe. In order to prevent damage to the pipe lining or to prevent corrosion damage to the pipe itself, the heavily chlorinated water shall be flushed from the main fittings, valves, and branches until chlorine measurements show that the concentration in the water leaving the main is no higher than that generally prevailing in the distribution system or that is acceptable for domestic use.

4.9.2 *Disposing of heavily chlorinated water.* The environment to which the chlorinated water is to be discharged shall be inspected. If there is any possibility that the chlorinated discharge will cause damage to the environment, a neutralizing chemical shall be applied to the water to be wasted to thoroughly neutralize the residual chlorine (see ANSI/AWWA C655 for neutralizing chemicals). Where necessary, federal, state, local, or provincial regulatory agencies should be contacted to determine special provisions for the disposal of heavily chlorinated water.

Sec. 4.10 Final Connections to Existing Mains

Water mains and appurtenances must be completely installed, flushed, disinfected, and satisfactory bacteriological sample results received prior to permanent connections being made to the active distribution system. Sanitary construction practices must be followed during installation of the final connection so that there is no contamination of the new or existing water main with foreign material or groundwater.

4.10.1 *Connections equal to or less than one pipe length (generally ≤ 20 ft [6 m]).* The new pipe, fittings, and valve(s) required for the connection may be spray disinfected or swabbed with a minimum 1 percent solution of chlorine just

before being installed, if the total length of the connection from the end of a new main to the existing main is equal to or less than 20 ft (6 m).

4.10.2 *Connections greater than one pipe length (generally >20 ft [6 m]).* The pipe required for the connection must be set up aboveground, disinfected, and bacteriological samples taken, as described in Section 5, if the total length of the connection from the end of a new main to the existing main is greater than 20 ft (6 m). After satisfactory bacteriological sample results have been received for the predisinfected pipe, the pipe can be used in connecting the new main to the active distribution system. Between the time the satisfactory bacteriological sample results are received and the time that the connection piping is installed, the ends of the piping must be sealed with plastic wraps, watertight plugs, or caps.

Sec. 4.11 Disinfection Procedures When Cutting Into or Repairing Existing Pipe

4.11.1 *General.* The planned, unplanned, or emergency repair of a water main or appurtenance (e.g., valve) is time sensitive—an important goal is to minimize the disruption of water service to customers. Nonetheless, the repair work needs to be accomplished using sanitary and safe procedures by well-trained crews with proper supervision and guidance. Refer to preventive and corrective measures described previously in Sec. 4.8.2, 4.8.3, 4.8.4, and 4.8.5. Follow all personal protection precautions when working with chlorine solutions.

4.11.2 *Basic disinfection.* Work should follow basic disinfection and contamination prevention procedures:

1. Preventing contaminants from entering the existing pipe during the repair such as by maintaining positive pressure in the leaking pipe until the repair site on the pipe is fully exposed, by maintaining a dewatered trench, and by keeping all pipe materials being used in the repair in a clean and sanitary condition.

2. Inspecting and cleaning, followed by disinfection of spraying or swabbing with a minimum 1 percent chlorine solution:

- Exposed portions of existing pipe interior surfaces
- Pipe materials used in the repair
- Handheld materials and tools used to make the repair

3. As appropriate, advising affected customers to adequately flush their service lines upon return to service.

4.11.3 *Selection of disinfection procedure.* The disinfection procedure selected should be determined by the conditions and severity of the main break. Many leaks or breaks can be repaired under controlled conditions without depressurizing the water main, such as when applying a clamp to a small crack or hole,

thus preventing contaminants from entering the water system. In most other situations, the water main can be maintained pressurized until the break site is secured and the pipe is fully exposed. Some circumstances (e.g., severe erosion of the local environment or icing of the roadway) that impact public safety may require that water pressure be substantially reduced prior to exposing the pipe in the area of the leak. In some cases, situations become catastrophic where there is a pipe blow-out and a loss of water pressure prior to shutdown, requiring disinfection procedures equivalent to those of a new main installation. The procedures described in Sec. 4.11.3.1 through 4.11.3.3 describe the contamination risks and the associated disinfection and sampling requirements for different scenarios of pipeline repair. Specific situations not captured below need to be evaluated and the appropriate disinfection and sampling methods followed.

Note that the procedures explained in Sec. 4.11.3.1, 4.11.3.2, and 4.11.3.3 for distribution mains may need to be modified for large transmission mains. Large mains may need additional work (such as having a valve replaced or requiring a special order on a connection), may be out of service for more than a day, or may not be able to accommodate a scour flush. These modifications need to be made on a case-by-case basis but should still take into account the procedures outlined in ANSI/AWWA C651.

4.11.3.1 Controlled pipe repair without depressurization. In this situation, activities are well controlled and a full shutdown is not needed, thus maintaining positive pressure to the area of shutdown and around the break site at all times. The repair site is exposed and the trench is adequately dewatered so that the repair site can be cleaned and disinfected by spraying or swabbing with a minimum 1 percent chlorine solution. The water main is then returned to service with flushing to obtain three volumes of water turnover, making sure that the flushed water is visually clear. No bacteriological testing is necessary. It is advisable to check for a typical system chlorine residual, and if not found, to continue flushing until residuals are restored to levels maintained in the distribution system by the water utility—if the system operates with a disinfectant residual.

4.11.3.2 Controlled pipe repair with depressurization after shutdown. In this situation, after the repair site has been exposed and secured from trench soil/water contamination, the water main is depressurized by a shutdown to complete the repair. The repair site should be cleaned and disinfected by spraying or swabbing with a minimum 1 percent chlorine solution. The water main is then returned to service with flushing to scour the pipe and obtain three volumes of water turn-

over, making sure that the flushed water is visually clear. It is advisable to check for a typical system chlorine residual, and if not found, to continue flushing until residuals are restored to levels maintained in the distribution system by the water utility—if the system operates with a disinfectant residual.

When the existing pipe has to be opened and the interior surfaces of the water system exposed to the environment, additional procedures need to be followed. The existing pipe should be inspected and cleaned with the help of flushing water into the trench, where possible, until the flush water runs visually clear. The repair site should be accessible and the trench adequately dewatered so that the repair site can be cleaned and disinfected by spraying or swabbing with a minimum 1 percent chlorine solution. Additionally, any accessible upstream and downstream interior of the existing pipe should be disinfected by swabbing or spraying with a minimum 1 percent chlorine solution. If the repair requires a full pipe section replacement, the new pipe should be inspected, cleaned, and disinfected from both ends by swabbing with a minimum 1 percent chlorine solution. The water main may then be returned to service after flushing to scour the pipe and obtain three volumes of water turnover. The flushed water should run visually clear, have a measurable chlorine residual if the system operates with a residual, and be checked with bacteriological testing. The pipeline may be returned to service prior to obtaining bacteriological results.

4.11.3.3 Uncontrolled pipe break with a likelihood of water contamination or loss of sanitary conditions during repair. In situations in which the existing main to be repaired could not be protected and kept free of contamination and there are obvious signs of contamination (e.g., muddy trench water flowing into the broken pipe and a leaking sewer pipe in the trench, or catastrophic pipe failure where pipe is open and there is a likelihood that contamination was drawn into the active system) or when a controlled repair situation turns into a situation in which the internal pipe and water have become contaminated, the procedures outlined in Sec. 4.3, 4.4, 4.5, or 4.6 should be followed where practical. These methods specify chlorine doses of 25–300 mg/L; however, such levels may present greater harm if the line or services cannot be reliably isolated or shut down and exposure of customers to high concentrations of chlorine cannot be controlled. Free chlorine residuals up to 4 mg/L (based on annual averages) are allowed by federal drinking water regulations; therefore this level is suggested as a minimum to be maintained for at least 16 hr in conjunction with flushing, coliform sampling, and associated customer education. Such situations require careful review and need to balance the public health risks of the pipeline failure as well as the repair process.

Where practical and appropriate considering the risks of public exposure to high concentrations of chlorine, in addition to the procedures previously described in this standard, the section of pipe in which the break is located shall be isolated, all service connections shut off, and the section flushed and disinfected. If the slug chlorination method is employed, the dose may be increased to as much as 300 mg/L and the contact time reduced to as little as 15 min. After chlorination and repair, perform scour flushing at 3.0 ft/sec (0.91 m/sec) or greater for a minimum of three pipe volumes and continue until discolored water is not observed and the chlorine residual is restored to the levels maintained in the distribution system by the water utility.

For larger-diameter pipe (12 in. and greater), if a water velocity of 3.0 ft/sec (0.91 m/sec) cannot be achieved, it is desirable to flush at the maximum flow for the main until three pipe volumes have been displaced before returning the main to service. The flushed water should run visually clear, and have typical system chlorine residual (if the system operates with a disinfectant residual).

For very-large-diameter pipe (where personnel may safely enter the pipe), in lieu of flushing following disinfection, the interior of the pipe at the repair site may be cleaned by sweeping or high pressure wash using potable water before disinfection. Standing water and debris from the cleaning must be removed from the pipe prior to disinfection. The affected pipe shall be disinfected by swabbing or spraying with a minimum 1 percent chlorine solution.

After following the appropriate methods above, prior to returning the pipe to service, the efficacy of the disinfection procedure shall be verified by testing for the absence of coliform bacteria. If allowed by local regulations, the pipeline may be returned to limited service prior to obtaining bacteriological results with proper notification of the affected customers.

4.11.4 Temporary service lines. Temporary water service lines to customers during main repair activities shall be disinfected prior to use. Materials shall meet the NSF/ANSI 61 certification for potable water use. Disinfection should be accomplished by the procedures in Sec. 4.4 or 4.5 followed by scour flushing at 3.0 ft/sec (0.91 m/sec) or greater for a minimum of three pipe volumes (see Table 3), or until the water runs visually clear and preferably a measurable chlorine residual is restored.

SECTION 5: VERIFICATION

Sec. 5.1 Bacteriological Tests

5.1.1 *Standard conditions for new mains.* It should be recognized that the primary means of ensuring the sanitary integrity of a main are the sanitary handling of materials, the practices during construction, and continual inspection of work. After disinfection and final flushing such that typical system chlorine residuals are present, if the system operates with a residual, samples shall be collected as follows:

5.1.1.1 For new mains, the purchaser has two options for the bacteriological testing for total coliform analysis.

Option A: Before approving a main for release, take an initial set of samples and then resample again after a minimum of 16 hr using the sampling site procedures outlined. Both sets of samples must pass for the main to be approved for release.

Option B: Before approving a main for release, let it sit for a minimum of 16 hr without any water use. Then collect, using the sampling site procedures outlined and without flushing the main, two sets of samples a minimum of 15 min apart while the sampling taps are left running. Both sets of samples must pass for the main to be approved for release.

A set of samples includes all samples collected along the length of the pipeline, as described in Sec. 5.1.1.2.

5.1.1.2 For new mains, sets of samples shall be collected every 1,200 ft (370 m) of the new water main, plus one set from the end of the line and at least one from each branch greater than one pipe length.

5.1.1.3 If trench water has entered the new main during construction or if, in the opinion of the purchaser, excessive quantities of dirt or debris have entered the new main, bacteriological samples shall be taken at intervals of approximately 200 ft (61 m), and the sampling location shall be identified (see Sec. 5.1.3 for sampling location details). Samples shall be taken of water that has stood in the new main for at least 16 hr after final flushing has been completed.

5.1.1.4 A standard heterotrophic plate count (HPC) test may be required at the option of the purchaser because new mains do not typically contain coliform bacteria but often contain HPC bacteria. If sample results show HPC greater than 500 CFU/mL, flushing should resume and another set of HPC and coliform samples collected until no coliform are present and the HPC is less than 500 CFU/mL.

5.1.2 *Standard conditions for repaired mains.* It should be recognized that the primary means of ensuring the sanitary integrity of a main are the sanitary handling of materials, the practices during repair work, and continual inspection of work. After disinfection and final flushing, samples shall be collected as follows:

5.1.2.1 For repaired mains that were depressurized and/or wholly or partially dewatered, one set of samples may be required, and depending upon the sanitary conditions, the line may be reactivated prior to the completion of bacteriological testing. Samples shall be collected downstream of the repair site and at intervals of approximately 200 ft (61 m) within the length of pipe that was shut down. If direction of flow is not known, samples shall be collected on either side of the repair site. Refer to Sec. 4.11.

5.1.2.2 For repaired mains that were maintained under pressurized conditions at all times, disinfection and/or testing may not be required. Refer to Sec. 4.11.3.

5.1.2.3 However, under either main repair scenario, it is advisable where possible to provide a scour flush to clear before the release of the repaired section.

5.1.3 *Sampling procedure.* Samples for bacteriological analysis shall be collected in sterile bottles treated with sodium thiosulfate, in accordance with Section 9060—*Samples of Standard Methods for the Examination of Water and Wastewater*. Hoses and fire hydrants are not recommended for the collection of samples that will be used to make decisions on the bacteriological quality of drinking water. However, if no sampling port is available, cleaned fire hydrants that have been cleared of standing water and/or other sanitized sampling apparatus (i.e., sanitized tubing, hose, gooseneck, spigot) may be used with the understanding that they do not represent optimum access to the water main for bacteriological sampling. A suggested combination blowoff and sampling tap used for mains up to and including 8-in. (200-mm) diameter is shown in Figure 2. There should be no water in the trench up to the connection for sampling. The sampling pipe must be dedicated and clean and disinfected and flushed prior to sampling. A corporation cock may be installed in the main with a copper-tube gooseneck assembly. After samples have been collected, the gooseneck assembly may be removed and retained for future use and the corporation cock should be capped or taped for future reuse. If corporation cocks are placed at the 12 o'clock position, they may be struck more easily during future excavations.

5.1.4 *Sample results.* Samples shall be tested for bacteriological quality in accordance with *Standard Methods for the Examination of Water and Wastewater* and shall show the absence of coliform bacteria.

In addition, it is recommended that samples be tested for acceptable aesthetic quality (e.g., chlorine residual, pH, alkalinity, specific conductance, turbidity). Levels should be as expected or typical for the water system. For new mains, a standard heterotrophic plate count test may be required at the option of the purchaser because new mains do not typically contain coliform bacteria but often contain HPC bacteria. If sample results show HPC greater than 500 CFU/mL, flushing should resume and another set of HPC and coliform samples collected until no coliform are present and the HPC is less than 500 CFU/mL.

5.1.5 *Record of compliance.* The record of compliance shall be the bacteriological test results certifying that the water sampled is free of coliform bacteria contamination.

5.1.6 *Redisinfection.* If the initial disinfection fails to produce satisfactory bacteriological results, or if other results indicate unacceptable water quality, the main may be reflashed and shall be resampled. If check samples fail to produce acceptable results, the main shall be rechlorinated by the continuous-feed or slug method until satisfactory results are obtained—that being acceptable samples taken as described in Sec. 5.1.1.1.

NOTE: In the case of new mains, high velocities in the adjacent existing system, resulting from flushing the new main, may disturb sediment that has accumulated in the existing mains. When check samples are taken, it is advisable to sample water entering the new main to determine if excessive turbidity is present that could be interfering with results.

Sec. 5.2 Optional Sampling and Testing

If a pipeline is not promptly returned to service, the situation should be evaluated to determine if the water quality may have been impacted and if additional testing is warranted. Test results should confirm that the water quality is appropriate for distribution. Although this assessment is unique for each system, parameters considered for testing include disinfectant residual, total coliform bacteria, HPC, turbidity, pH, alkalinity, total chlorine, odor, and specific conductance.

SECTION 6: DELIVERY

This standard has no applicable information for this section.

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APPENDIX A

Chlorine Residual Testing

This appendix is for information only and is not a part of ANSI/AWWA C651.

SECTION A.1: DPD DROP DILUTION METHOD (FOR FIELD TEST)

The N, N-diethyl-p-phenylenediamine (DPD) drop dilution method of approximating total residual chlorine is suitable for concentrations above 10 mg/L, such as those applied in the disinfection of water mains or tanks.

Sec. A.1.1 Apparatus

1. A graduated cylinder for measuring distilled water.
2. An automatic or safety pipette.
3. Two dropping pipettes that deliver a 1-mL sample in 20 drops. One pipette is for dispensing the water sample, and the other is for dispensing the DPD and buffer solutions. The pipettes should not be interchanged.
4. A comparator kit containing a suitable range of standards.

Sec. A.1.2 Reagents

1. DPD indicator solution. Prepare as prescribed in *Standard Methods for the Examination of Water and Wastewater*.

Sec. A.1.3 Procedure

1. Add 10 drops of DPD solution and 10 drops of buffer solution (or 20 drops of combined DPD-buffer solution) to a comparator cell.
2. Fill the comparator cell to the 10-mL mark with distilled water.
3. With a dropping pipette, add the water sample one drop at a time; mix until a red color is formed that matches one of the color standards.
4. Record the total number of drops used and the final chlorine reading obtained (that is, the chlorine reading of the matched standard).
5. Calculate the milligrams per liter of free residual chlorine as follows:

$$\text{mg/L chlorine} = \frac{\text{reading} \times 200}{\text{drops of sample}}$$

SECTION A.2: HIGH-RANGE CHLORINE TEST KITS

Several manufacturers produce high-range chlorine test kits that are inexpensive, easy to use, and satisfactory for the precision required.

APPENDIX B

Chlorine Dosages

This appendix is for information only and is not a part of ANSI/AWWA C651.

Table B.1 Amounts of chemicals required to produce various chlorine concentrations in 100,000 gal (378.5 m³) of water*

Desired Chlorine Concentration in Water <i>mg/L</i>	Liquid Chlorine Required <i>lb (kg)</i>		Sodium Hypochlorite Required						Calcium Hypochlorite Required	
			5% Available Chlorine		10% Available Chlorine		15% Available Chlorine		65% Available Chlorine	
			<i>gal (L)</i>	<i>gal (L)</i>	<i>gal (L)</i>	<i>gal (L)</i>	<i>gal (L)</i>	<i>gal (L)</i>	<i>lb (kg)</i>	<i>lb (kg)</i>
2	1.7	(0.77)	3.9	(14.7)	2.0	(7.6)	1.3	(4.9)	2.6	(1.18)
10	8.3	(3.76)	19.4	(73.4)	9.9	(37.5)	6.7	(25.4)	12.8	(5.81)
50	42.0	(19.05)	97.0	(367.2)	49.6	(187.8)	33.4	(126.4)	64.0	(29.03)

*Amounts of sodium hypochlorite are based on concentrations of available chlorine by volume. For either sodium hypochlorite or calcium hypochlorite, extended or improper storage of chemicals may have caused a loss of available chlorine.

Table B.2 Amounts of chemicals required to produce chlorine concentration of 200 mg/L in various volumes of water*

Volume of Water <i>gal L</i>		Liquid Chlorine Required <i>lb (g)</i>		Sodium Hypochlorite Required						Calcium Hypochlorite Required	
				5% Available Chlorine		10% Available Chlorine		15% Available Chlorine		65% Available Chlorine	
				<i>gal (L)</i>	<i>gal (L)</i>	<i>gal (L)</i>	<i>gal (L)</i>	<i>gal (L)</i>	<i>gal (L)</i>	<i>lb (g)</i>	<i>lb (g)</i>
10	(37.9)	0.02	(9.1)	0.04	(0.15)	0.02	(0.08)	0.02	(0.08)	0.03	(13.6)
50	(189.3)	0.10	(45.4)	0.20	(0.76)	0.10	(0.38)	0.07	(0.26)	0.15	(68.0)
100	(378.5)	0.20	(90.7)	0.40	(1.51)	0.20	(0.76)	0.15	(0.57)	0.30	(136.1)
200	(757.1)	0.40	(181.4)	0.80	(3.03)	0.40	(1.51)	0.30	(1.14)	0.60	(272.2)

*Amounts of sodium hypochlorite are based on concentrations of available chlorine by volume. For either sodium hypochlorite or calcium hypochlorite, extended or improper storage of chemicals may have caused a loss of available chlorine.



American Water Works Association

6666 West Quincy Avenue
Denver, CO 80235-3098
T 800.926.7337
www.awwa.org

Dedicated to the world's most important resource, AWWA sets the standard for water knowledge, management, and informed public policy. AWWA members provide solutions to improve public health, protect the environment, strengthen the economy, and enhance our quality of life.



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9 781625 760463

Rennaker, Joanne (DEQ)

From: Prysby, Mike (DEQ)
Sent: Thursday, October 08, 2015 4:54 PM
To: Brent Wright
Cc: Howard Croft; Michael Glasgow; Anthony Chubb; Natasha Henderson
Subject: Re: 72" Transmission Main

Will also comment on remainder of proposal first thing tomorrow morning... I am in at 7am

Sent from my iPhone

On Oct 8, 2015, at 4:12 PM, Brent Wright <bwright@cityofflint.com> wrote:

Mike,

Per our phone conversation earlier today below is the list of events to re-energize the 72" main to Flint.

10-8-2015

4:00 pm : Genesee Co. crews will open valve about 10% @ Genesee Rd. and Richfield Rd. This will slowly energize the pipe. The valve just upstream from Station #2 on Water Plant grounds will remain closed. All valves in between are open.

10-9-2015

8:00 am : Isolate Station #2 and open valve upstream.

8:30 am : Genesee Co. to start chlorination and Flint will open valve @ Station #3 to Dort Reservoir and start filling with water from the 72" main. Flint staff will be @ Station #3 taking Cl2 residuals. When we start receiving super chlorinated water we will have Genesee Co. close the valve on Genesee Rd. and Flint will close valve to Dort Reservoir and hold for 24hrs. Flint staff will open sanitary drains to Dort Reservoir and drain water received from first flushing of the 72".

I will be contacting you tomorrow with further discussion on sampling protocol.

Thank you

--

Brent Wright
Water Plant Supervisor
City of Flint
4500 N. Dort Hwy.
Flint, MI. 48505
Ph: 810.787.6537 ext. 3510
Fx: 810.787.3710

Rennaker, Joanne (DEQ)

From: Prysby, Mike (DEQ)
Sent: Thursday, October 08, 2015 4:49 PM
To: Brent Wright
Cc: Howard Croft; Michael Glasgow; Anthony Chubb; Natasha Henderson
Subject: Re: 72" Transmission Main

Brent,

We will advise that the procedure include the most recent AWWA C651 disinfection procedure and reference the method that will be followed. We will send you the latest standard

Sent from my iPhone

On Oct 8, 2015, at 4:12 PM, Brent Wright <bwright@cityofflint.com> wrote:

Mike,

Per our phone conversation earlier today below is the list of events to re-energize the 72" main to Flint.

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4500 N. Dort Hwy.
Flint, MI. 48505

Ph: 810.787.6537 ext. 3510

Fx: 810.787.3710

Rennaker, Joanne (DEQ)

From: Brent Wright <bwright@cityofflint.com>
Sent: Thursday, October 08, 2015 4:13 PM
To: Prysby, Mike (DEQ)
Cc: Howard Croft; Michael Glasgow; Anthony Chubb; Natasha Henderson
Subject: 72" Transmission Main

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Water Plant Supervisor
City of Flint
4500 N. Dort Hwy.
Flint, MI. 48505
Ph: 810.787.6537 ext. 3510
Fx: 810.787.3710

Rennaker, Joanne (DEQ)

From: Prysby, Mike (DEQ)
Sent: Thursday, October 08, 2015 7:28 AM
To: Sygo, Jim (DEQ)
Cc: Busch, Stephen (DEQ)
Subject: FW: TAC Team Summary 10_7_15
Attachments: TAC Meeting Summary 10_7_15.pdf

Jim,

Below is a summary of the TAC meeting prepared by Howard Kroft for the Director's information.

Michael Prysby, P.E.
 District Engineer
 Office of Drinking Water and Municipal Assistance
 517 290-8817

From: Howard Croft [<mailto:hcroft@cityofflint.com>]
Sent: Thursday, October 08, 2015 5:41 AM
To: Amy Hovey; Andy Leavitt; Brent Wright; Darren Lytle; Dayne Walling; donna. cole; edwardsm; Gerald (Jed) Natzke; Howard Croft; James Henry; Jamie Gaskin; Jason Lorenz; jmkewright; JoAnne Herman; John O'Brien; Kirk Smith; larry.koehler@mcc.edu; Laura Sullivan; Lawrence Reynolds; Lawrence Reynolds; Michael Glasgow; Michael Wright; Mike Lane; Prysby, Mike (DEQ); Natasha Henderson; Norb Birchmeier; Pete Levine; Robert Bincsik; rosejo@msu.edu; Russell Hudson; Samir Matta; schock.michael@epa.gov; Sean Kammer; Busch, Stephen (DEQ); Warren Green; John Monsees; Kevin Keane
Subject: Re: TAC Team Summary 10_7_15

All,

Please find attached, the summary of Wednesday's meeting.

Thank you,

On Wed, Oct 7, 2015 at 9:42 PM, Howard Croft <hcroft@cityofflint.com> wrote:
 All,

I want to personally thank everyone for participating in today's meeting, it is encouraging to see the commitment that exists to address the concerns around health. I apologize for the poor phone reception we experienced today, I will have that corrected at the next meeting.

I am sending a summary of today's meeting and have attempted to chronicle the highlights or major points that we discussed. I have also included an electronic version of Marc Edwards presentation and will forward any other documents that are requested.

Please look for continued communication from me as we work to move forward as fast as possible. I expect to have November and December dates selected very soon and will maintain the stream of information to this team as it becomes available.

Please do not hesitate to email or call me with any questions or requests.

Thank you,

--
Howard Croft

Public Works Director

City of Flint

1101 S. Saginaw Street

Flint, MI 48502

PH# 810.766.7135 Ext.2043

hcroft@cityofflint.com

--
Howard Croft

Public Works Director

City of Flint

1101 S. Saginaw Street

Flint, MI 48502

PH# 810.766.7135 Ext.2043

hcroft@cityofflint.com

**City of Flint
Technical Advisory Committee Meeting
Summary**

Location: Flint City Hall

Date: Wednesday October 7, 2015

Time: 2:00 pm

Introductions

Everyone gave individual introductions in round table fashion

Comments

The City Administrator Natasha Henderson commented on the urgency of the situation stressing that time is of the essence and we hoped to achieve a consensus opinion from the Advisory Group.

System Overview/Update

DPW Director Howard Croft discussed the original formation of the group, the fact that the group was engaged throughout the TTHM concerns, and the value of having experts gathered to together along with the medical community for a substantive discussion. An additional goal is to have a more unified public voice all working to be solution driven with good communication.

VA Tech Findings

Marc Edwards of VA Tech (through a conference call in) narrated a presentation that he prepared for the meeting. (The presentation is provided on the email).

Laura Sullivan of Kettering translated a part of the presentation due to poor phone connection.

Q- John O'Brien of the Drain Commissioners office asked if the VA Tech study had compared Flint River water and water from DWSD running through comparable distribution systems. John also commented on the timetable and progress status of the KWA stating that 38 miles of pipe are in the ground and continues to be installed at ~5 miles a month projecting completion by mid-2016, weather permitting.

A – Marc Edwards's response was yes, the comparison was done on equal terms.

EPA Comments

Darren Lytle of the EPA spoke and said that he had toured the Flint Plant earlier in the day with Utilities Administrator Mike Glasgow and was comfortable with what he saw. His comments also touched on a technical nature which drew brief conversation from Warren Green of LAN.

Mr. Lytle agreed to stay involved through the implementation of KWA, requested more data to review and asked that Michael Schock of the EPA who could not attend today be considered one of the top lead experts in the nation and that we keep him updated at every step.

Mayor's Comments

DPW Director introduced Mayor Walling made comments thanking everyone for their participation and asked if anyone had a valid reason to NOT go back to DWSD.

There was no direct response but John O'Brien questioned what the expectations were going to be and that lead levels would not be reduced to zero. Several people responded that this was understood.

Dr. Lawrence Reynolds gave comments that focused on the short and long term impact of lead levels especially in children.

Pete Levine and Kirk Smith also commented that they saw no "pro" to staying on the Flint River as opposed to switching back to DWSD.

DWSD Option

City Administrator Natasha Henderson asked the committee to not look at cost but at the health and science of what is the best interim source of water for residents. She said she would like to go back to DWSD both as a resident and as City Administrator.

Warren Green of LAN asked that as an engineer, he would like to see the actual data that was derived from the VA Tech studies and brought up the need for corrosion control or the addition of phosphate regardless of the water source.

Corrosion Control

Discussion around corrosion control continued with Darren Lytle of the EPA, Marc Edwards, and Warren Green discussing dosing with each source and questioning the timetable of rebuilding a film layer.

Service Line Replacement

Skipping Filters for a moment, DPW Director Howard Croft displayed a draft copy of a Lead Service Line Replacement plan for Flint that mirrors the Washington D.C. model and looks for a grant funding source to assist with the homeowner side of the line. Mr. Croft also commented on the partnership formed with U of M Flint to get all of the lead service lines identified and put into GIS data points.

Update on Filters

Jamie Gaskin, United Way CEO gave a full update on how the United Way has been the hub for coordination efforts regarding distributing filters to residents. Jamie reiterated that they have made a request of the state to supply them with leadership support that has gone unfulfilled.

Jamie also addressed the early morning question of whether or not the 25,000 "Brita" filters that were being distributed would filter lead, this brand was purchased by the state and is being distributed by DHHS. Eden Wells the Michigan Chief Medical Official addressed that the research had been done and the filters were indeed NSF certified and filter lead.

Andy Leavitt commented on the scope of work that Jamie and the United Way undertook outside of their normal purview and their swift action.

Committee Recommendation

Howard Croft announced that as committee chair, given the meetings discussions, he was prepared to make a recommendation from the TAC tem to the City Administrator and Mayor that the city return to DWSD as a water source. (Pending any objections from the group – no objections were made)

Director also commented that providing water from the Treatment Plant was still under review and pro's and con's were being evaluated prior to a firm decision being brought forth.

Drawing the meeting to a close, the DPW Director committed that weekly updates would be provided to the Technical Advisory Committee and that November and December meetings would be set up to maintain better communication.

Meeting closed at approximately 4:15 pm.

Howard Croft

Public Works Director
City of Flint

Rennaker, Joanne (DEQ)

From: Prysby, Mike (DEQ)
Sent: Thursday, October 08, 2015 7:24 AM
To: Busch, Stephen (DEQ); Cook, Pat (DEQ); Benzie, Richard (DEQ); Shekter Smith, Liane (DEQ)
Subject: FW: TAC Team Summary 10_7_15
Attachments: Flint Corrosion Presentation final.pdf

Attached is VA Tech's ppt discussion of the corrosion concerns in Flint and the comparison to Detroit water regarding corrosion. It would be more helpful to see the methodology of the study, actual data, and how samples were collected.

Michael Prysby, P.E.
 District Engineer
 Office of Drinking Water and Municipal Assistance
 517 290-8817

From: Howard Croft [<mailto:hcroft@cityofflint.com>]
Sent: Wednesday, October 07, 2015 9:43 PM
To: Amy Hovey; Andy Leavitt; Brent Wright; Darren Lytle; Dayne Walling; donna. cole; edwardsm; Gerald (Jed) Natzke; Howard Croft; James Henry; Jamie Gaskin; Jason Lorenz; jmikewright; JoAnne Herman; John O'Brien; Kirk Smith; larry.koehler@mcc.edu; Laura Sullivan; Lawrence Reynolds; Lawrence Reynolds; Michael Glasgow; Michael Wright; Mike Lane; Prysby, Mike (DEQ); Natasha Henderson; Norb Birchmeier; Pete Levine; Robert Bincsik; rosejo@msu.edu; Russell Hudson; Samir Matta; schock.michael@epa.gov; Sean Kammer; Busch, Stephen (DEQ); Warren Green; John Monsees
Subject: TAC Team Summary 10_7_15

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Thank you,

Howard Croft

Public Works Director

City of Flint

1101 S. Saginaw Street

Flint, MI 48502

PH# 810.766.7135 Ext.2043

hcroft@cityofflint.com

Synergistic Impacts of Corrosive Water and Interrupted Corrosion Control on Chemical/ Microbiological Water Quality: The Flint, MI Water Crisis



NSF RAPID:

National Science Foundation

“used for proposals having a severe urgency...., including quick-response research on natural or anthropogenic disasters and similar unanticipated events.”

Flint
Water
is very
corrosive.

Detroit
water is
not.

Table 1. Water quality parameters for drinking water supplied in Flint, MI before and after the April 2014 switch

Parameter	Before ¹	After ²
pH	7.38	7.61
Hardness (mg/L as CaCO ₃)	101	183
Alkalinity (mg/L as CaCO ₃)	78	77
Chloride (mg/L)	11.4	92
Sulfate (mg/L)	25.2	41
CSMR ³	0.45	1.6
Inhibitor (mg/L as P)	0.35	NONE
Larson Ratio ⁴	0.5	2.3

¹Source: City of Flint Monthly Operation Report, June 2015 Available from www.cityofflint.com

Corrosive Water: Destroys Pipe Infrastructure



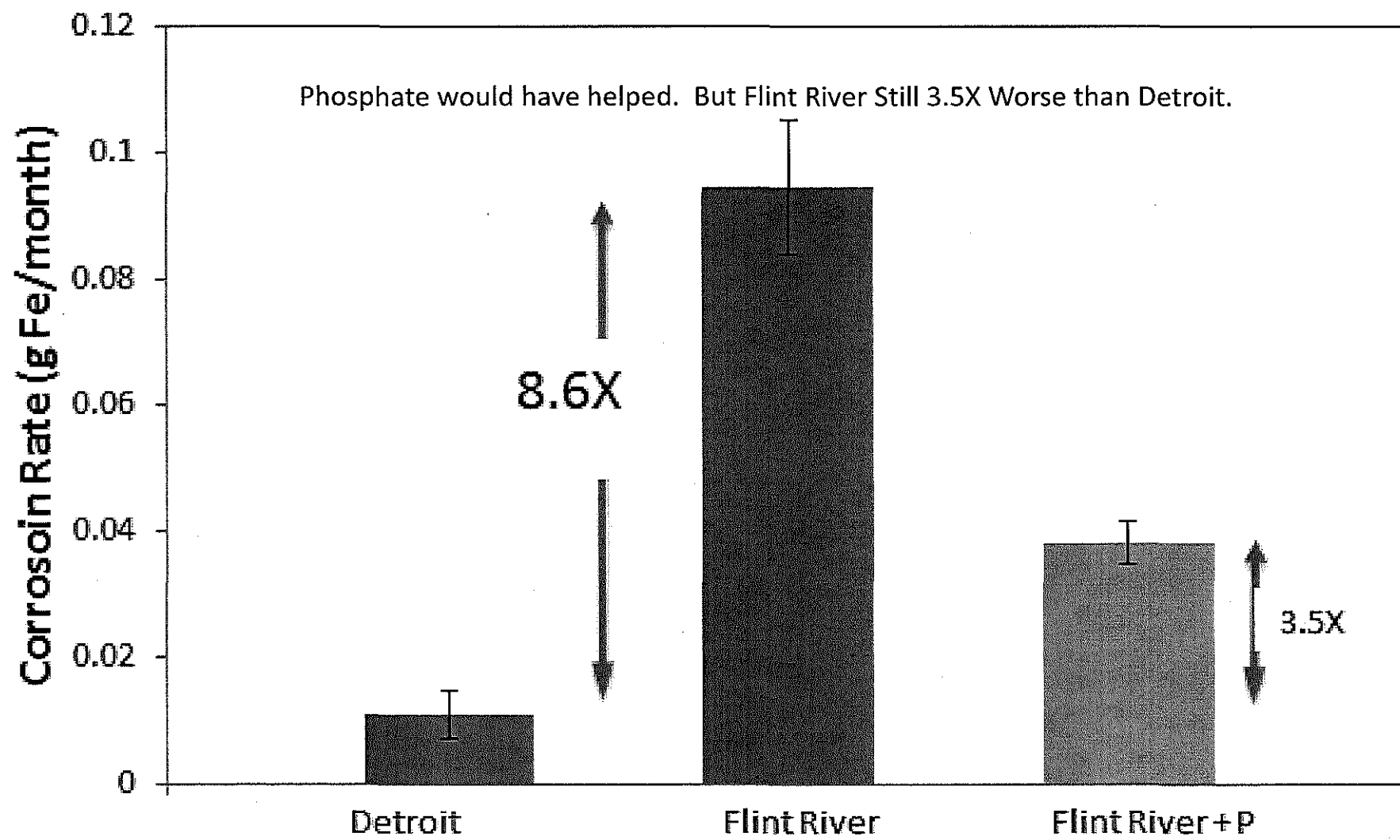
Detroit Water



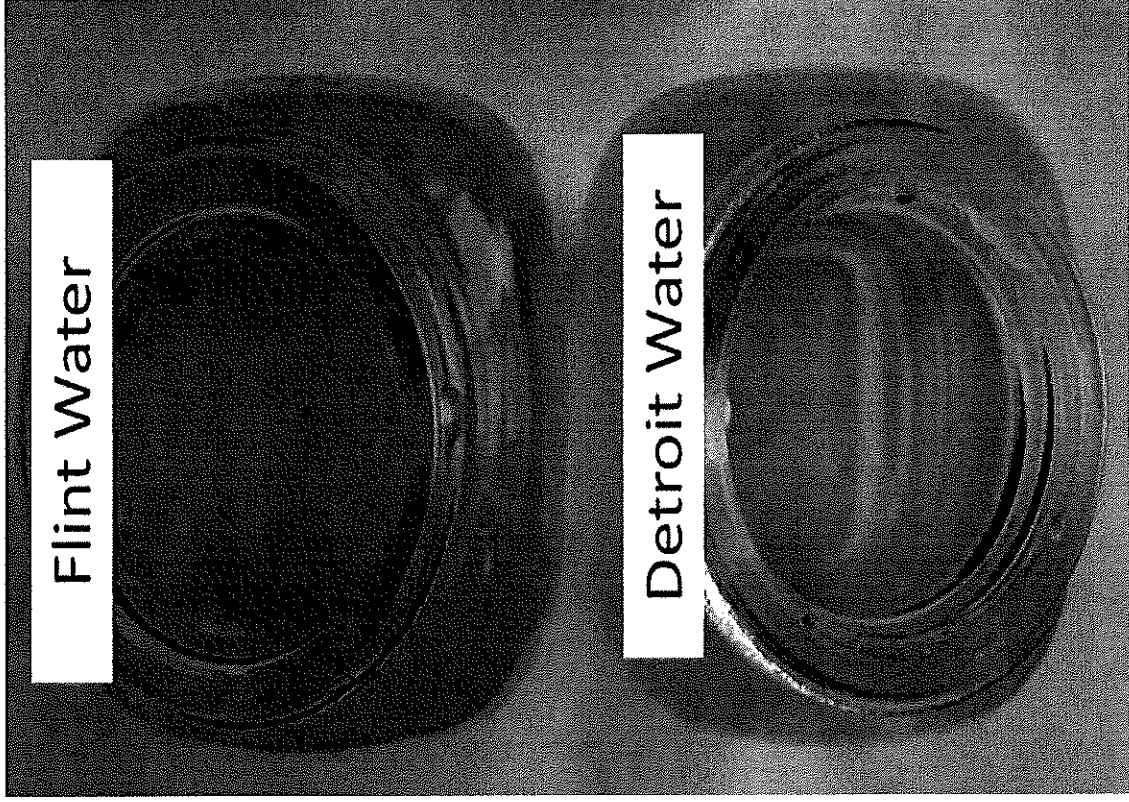
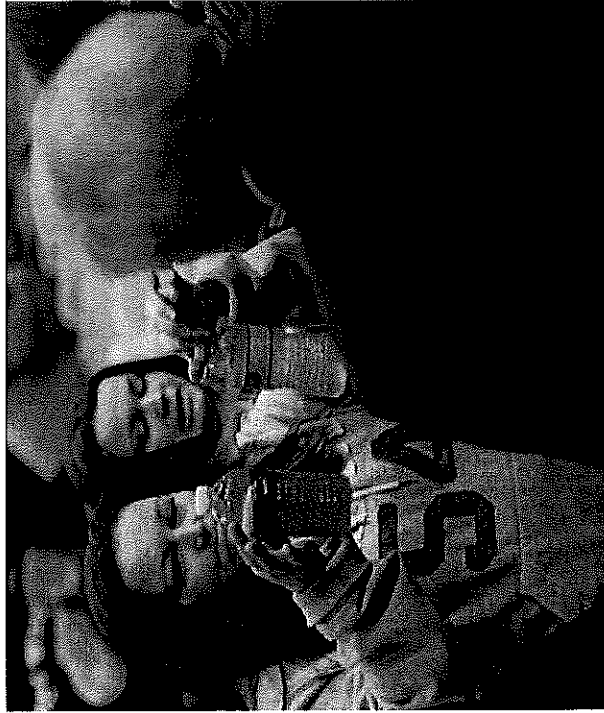
Flint Water



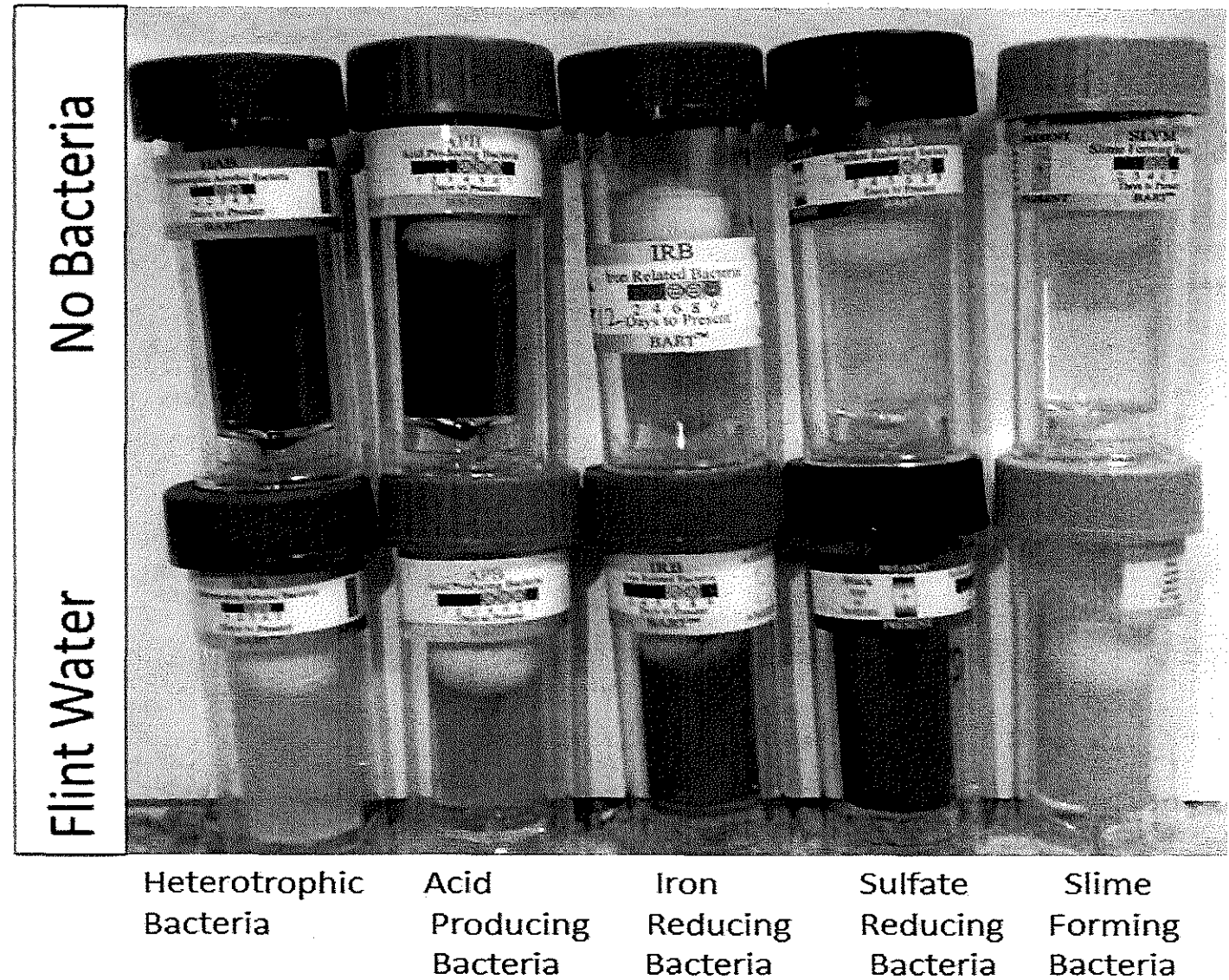
Steel Exposed One Month to Detroit vs. Flint River Water



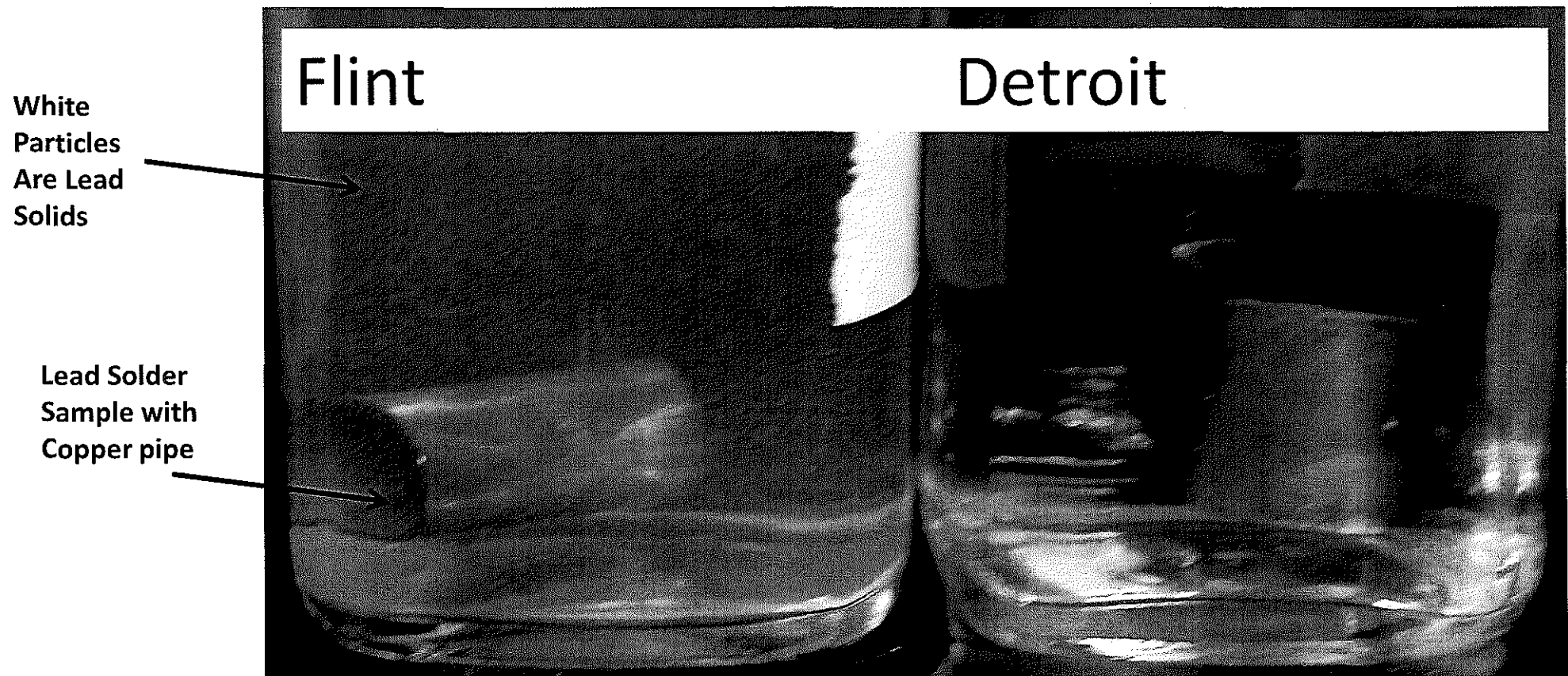
Corrosive Water: Causes Odors, Colors, Bad Tastes



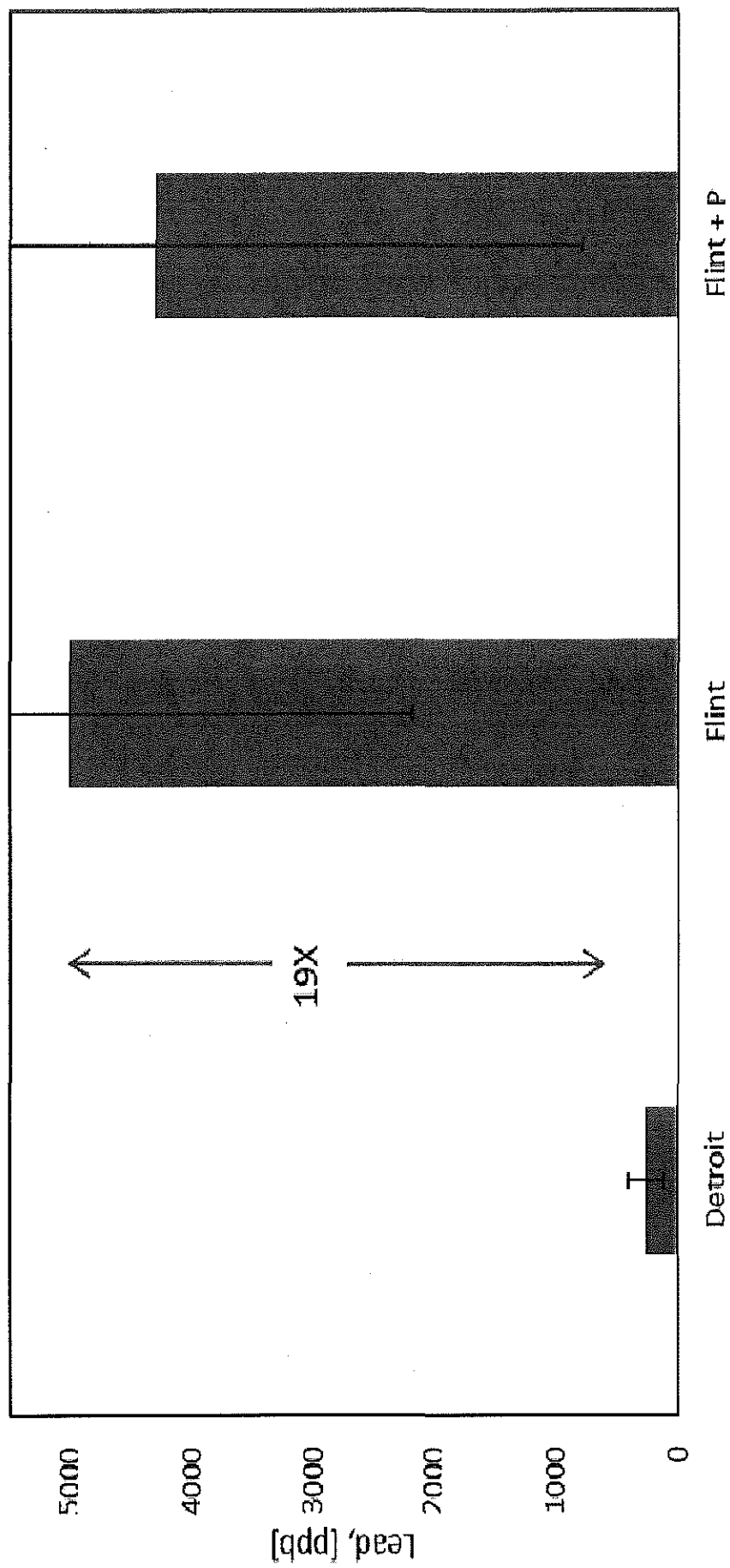
High Levels of Corrosion Causing Bacteria



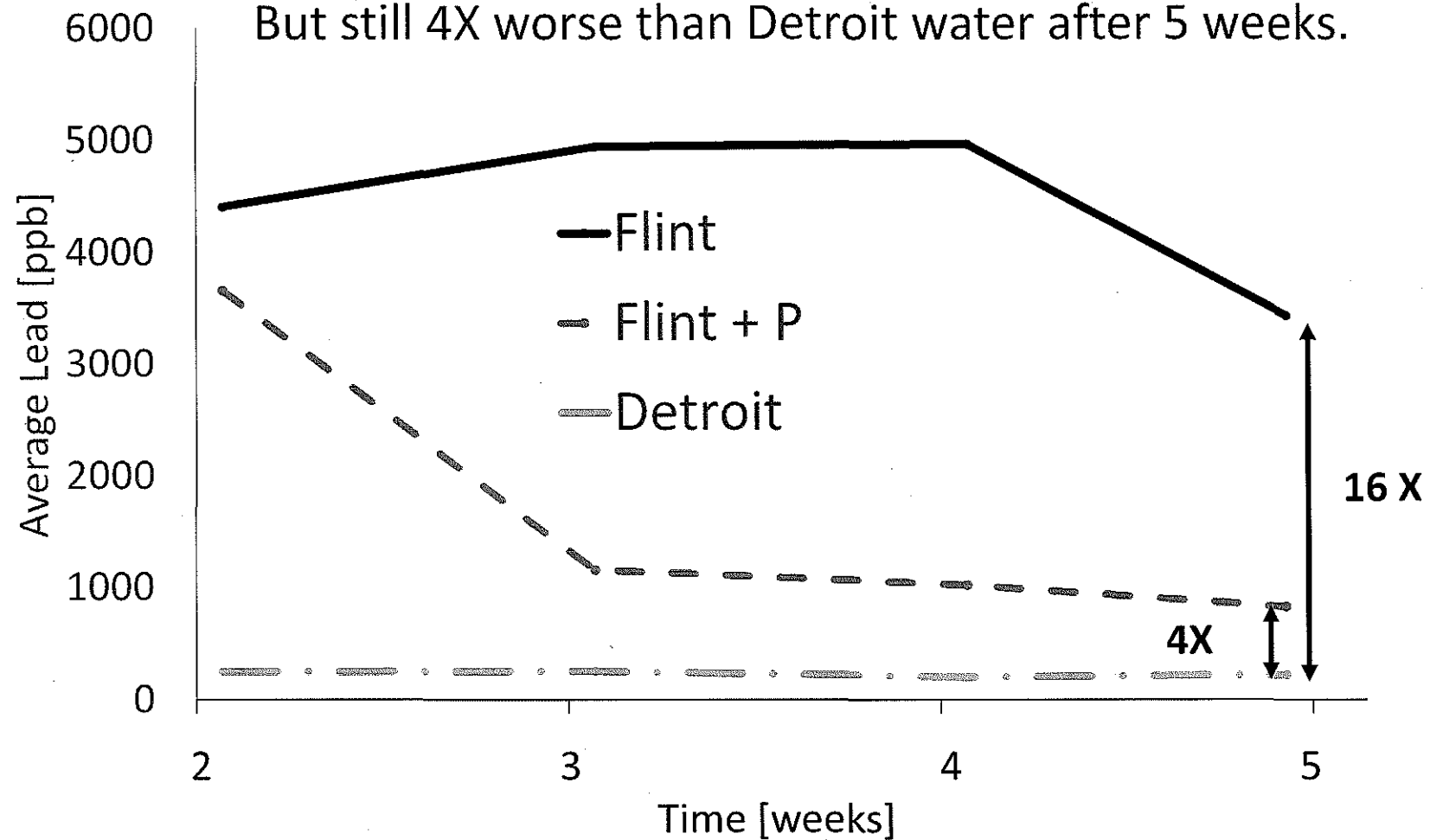
Corrosive Water: Increases Lead. Effects VISIBLE immediately in lab tests!



5000 ppb = Hazardous Waste Levels of Lead



Phosphate (P) corrosion inhibitor would have helped.
But still 4X worse than Detroit water after 5 weeks.



INITIATED CONFIRMATION TESTING OF LEAD CORROSIVITY AT ONE LOCAL ELEMENTARY AND ONE HIGH SCHOOL

Vickie Weiss

City School ~ Room 00
11920 S. Saginaw
Grand Blanc MI – 48439

4-5th Graders
12+5 Bottles

Emily Cizmas

2283 E. Scottwood Ave.
Burton, MI 48529

Bendle High School,
Burton
14+5 Bottles

**Experimental Rigs has
also been sent to:**

Brad Wurfel

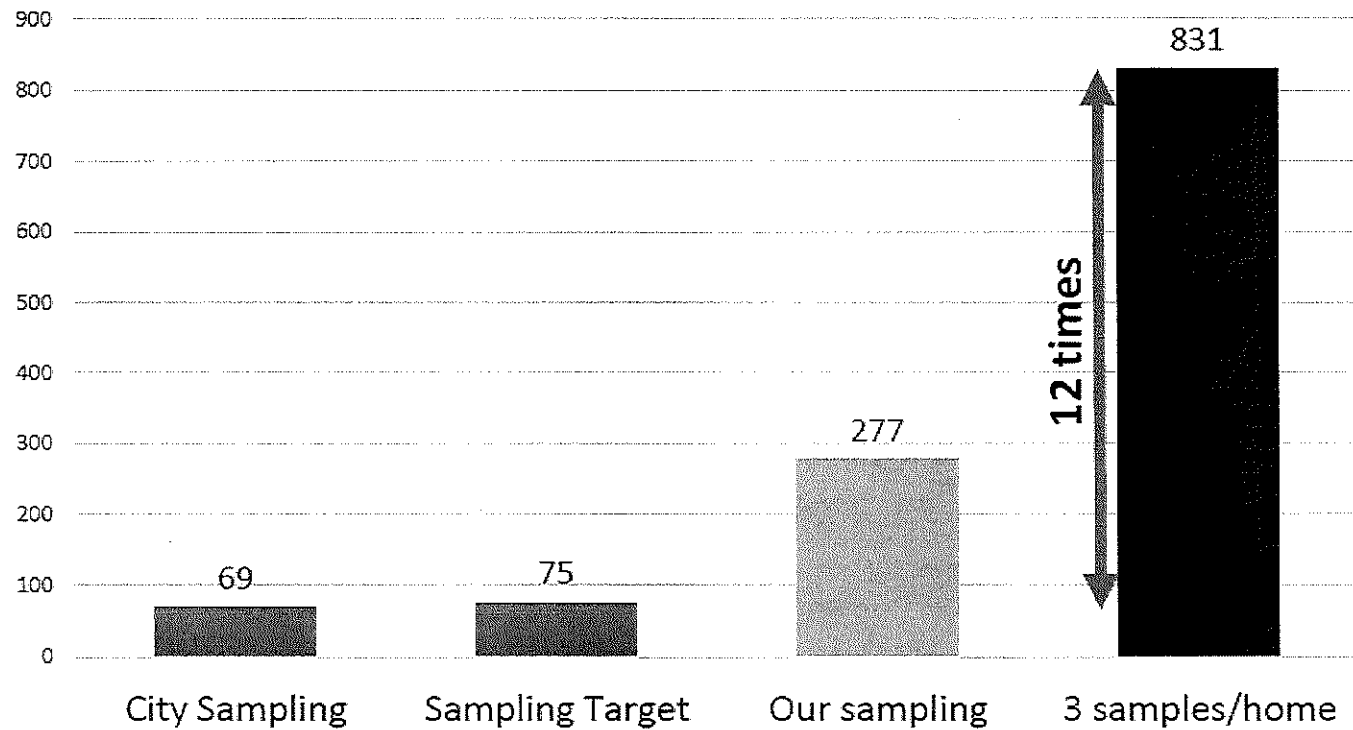
Director of
Communication
Michigan DEQ
P.O. Box 30473
Lansing, MI 48909-6700

9 Bottles

Aug 20 - Sep 8

#FlintWater sampling response from #FlintCitizenScientists

No. of samples tested for Lead



The Team in Flint and from ACLU-Michigan



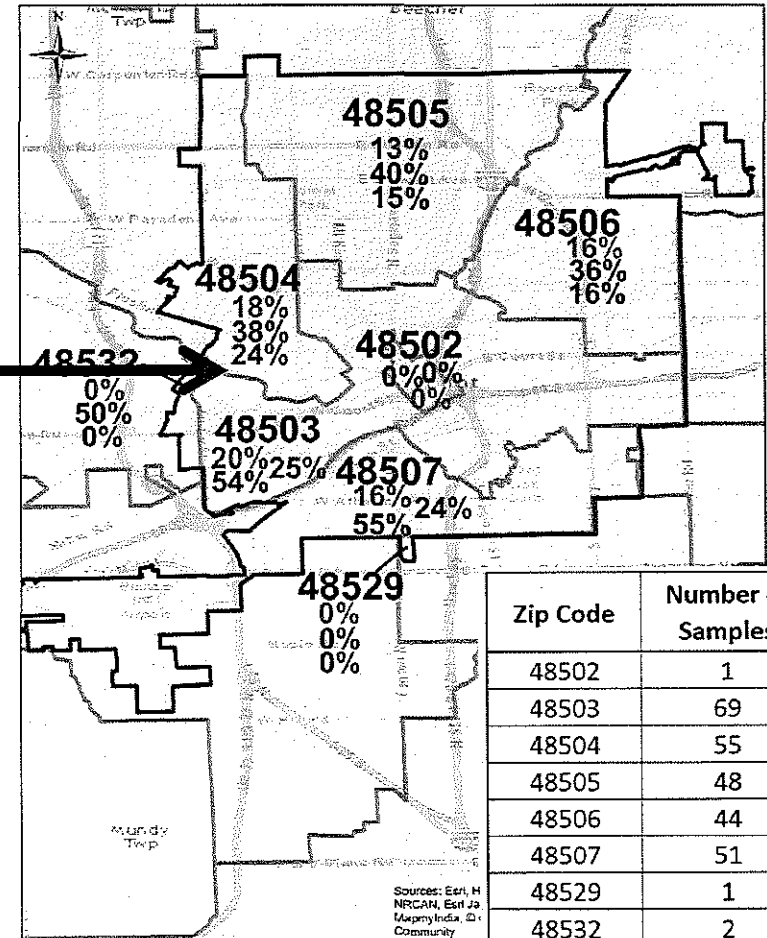
PEDIATRIC LEAD EXPOSURE IN FLINT, MI: CONCERNS FROM THE MEDICAL COMMUNITY

Higher Risk Zip Codes
For EBL

90%'ile from low risk homes
> EPA Action Level

Flint, MI

Legend:
Blue %: Percent First Draw Samples over 15 ppb
Black %: Percent Any Samples over 5 ppb
Red %: Percent Any Samples over 15 ppb



Sources: EBL, H
NRCAN, EBL Jo
MapmyIndia, Q
Community

Corrosion control treatment to reduce lead in Flint water.

1. **Switch back to the non-corrosive Detroit water.**

Flint's lead levels would drop markedly in about one month.

2. Add orthophosphate to Flint River water. Orthophosphate will not reduce lead leaching from all lead plumbing sources. Based on experimental data, lead levels would likely be reduced by 5X, but still 4X higher than Detroit. Iron corrosion still much higher than Detroit.

If orthophosphate had been added to Flint water, continuing the corrosion control used in Detroit water, the Flint Water Crisis would not have occurred.

About us

Research Team

Undergraduate Students:

Margaret **Carolan**, Kim **Hughes**,
Rebecca **Jones**

Graduate Students

(in alphabetical order):

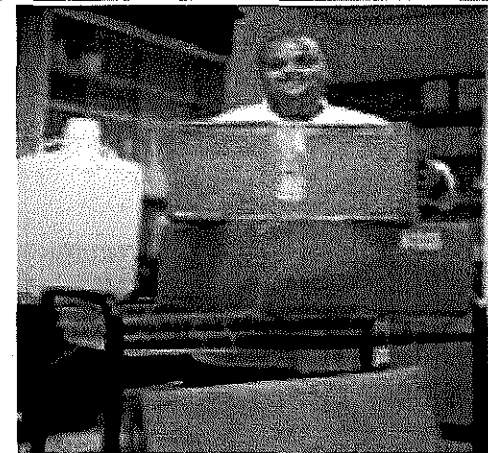
Christina **Devine**, Emily **Garner**,
Anurag **Mantha**, Rebekah **Martin**,
Colin **Richards**, William **Rhoads**,
Siddhartha **Roy**, Min **Tang**,
Ni "Joyce" **Zhu**

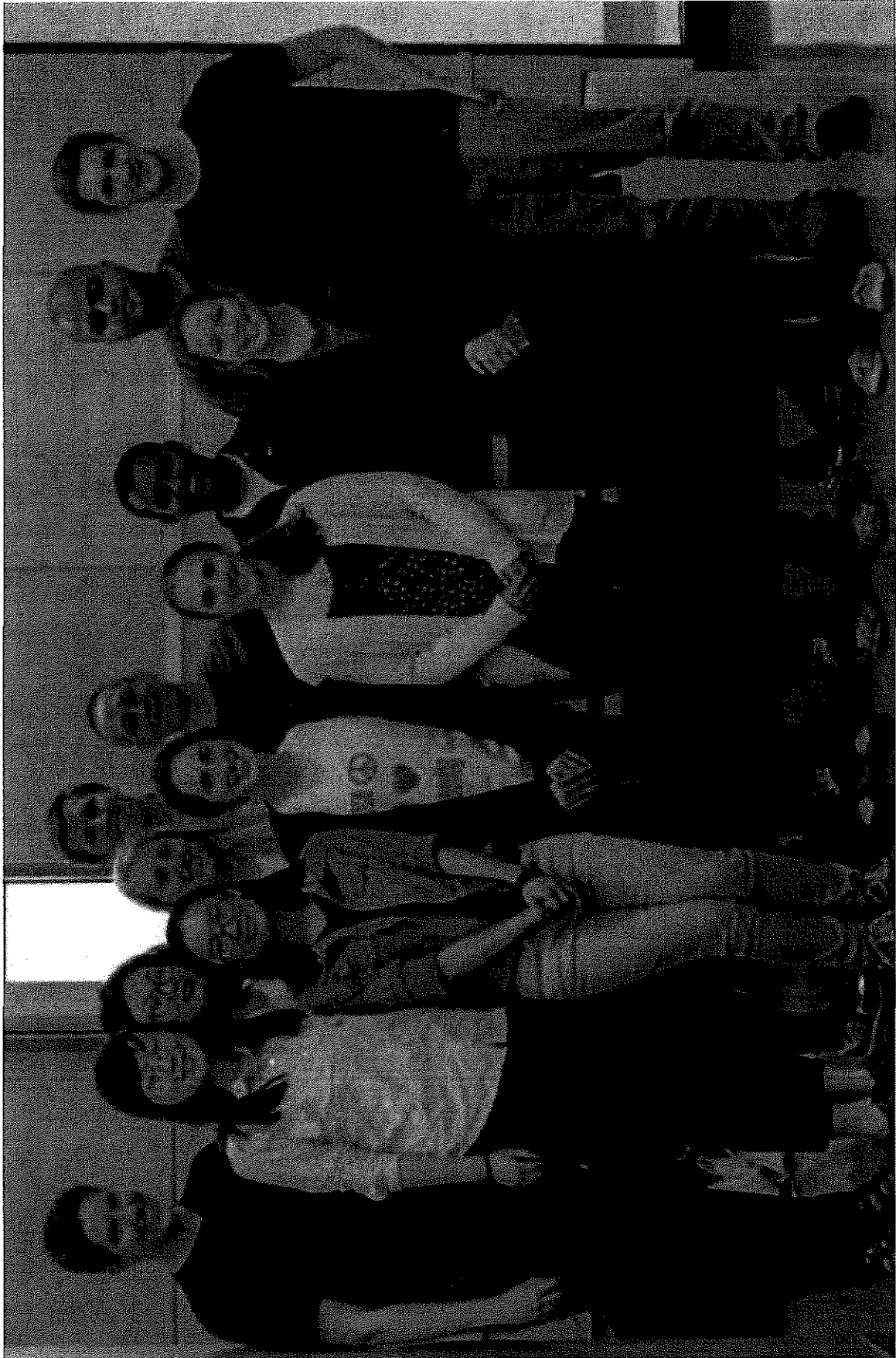
Post-docs/Research Scientists (in alphabetical order): Drs.

Brandi **Clark**, Dongjuan **Dai**, Sheldon **Masters**, Jeffrey **Parks**,
Kelsey **Pieper**, David "Otto" **Schwake**, Fei **Wang**

Principal Investigators: Dr. Marc Edwards, Dr. Amy Pruden, Dr.

Joseph Falkinham III

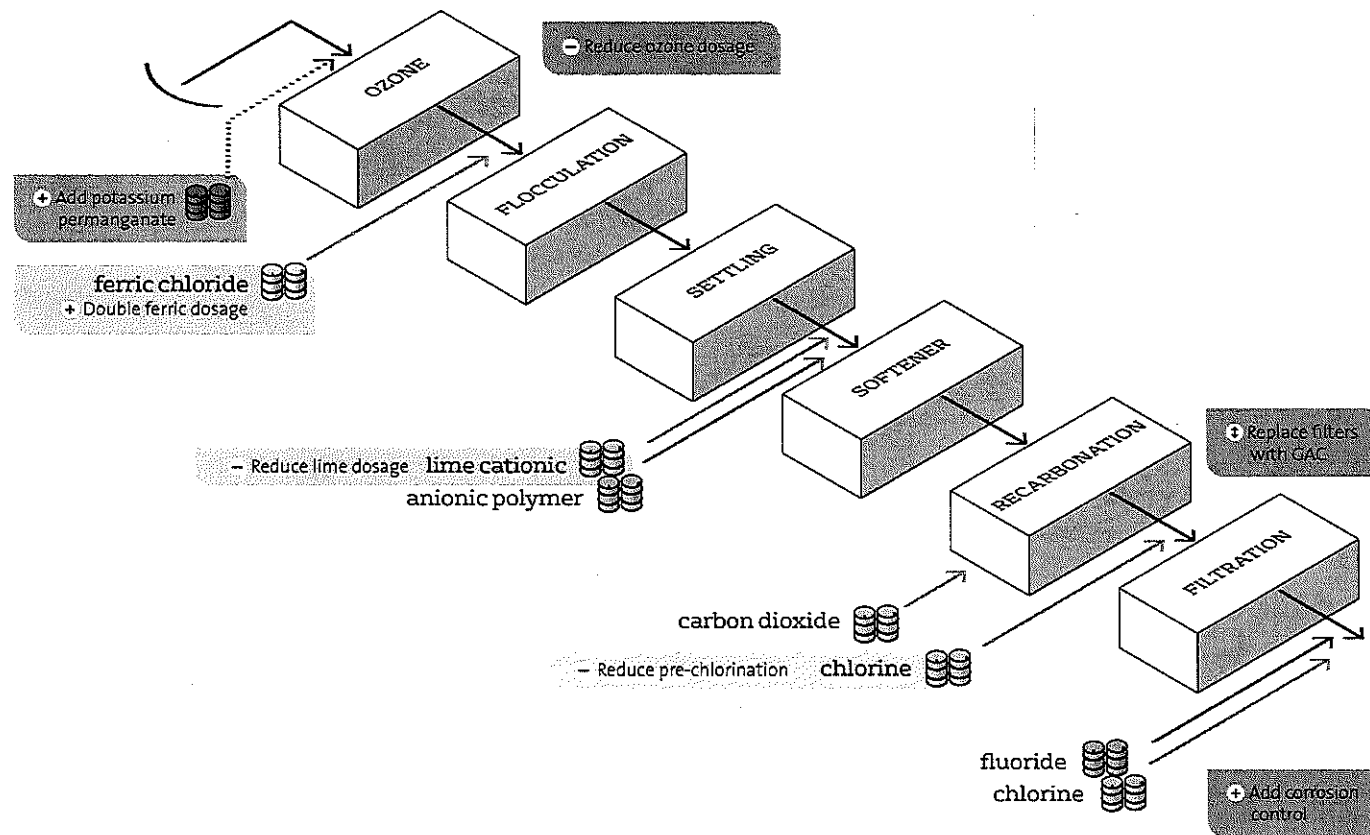




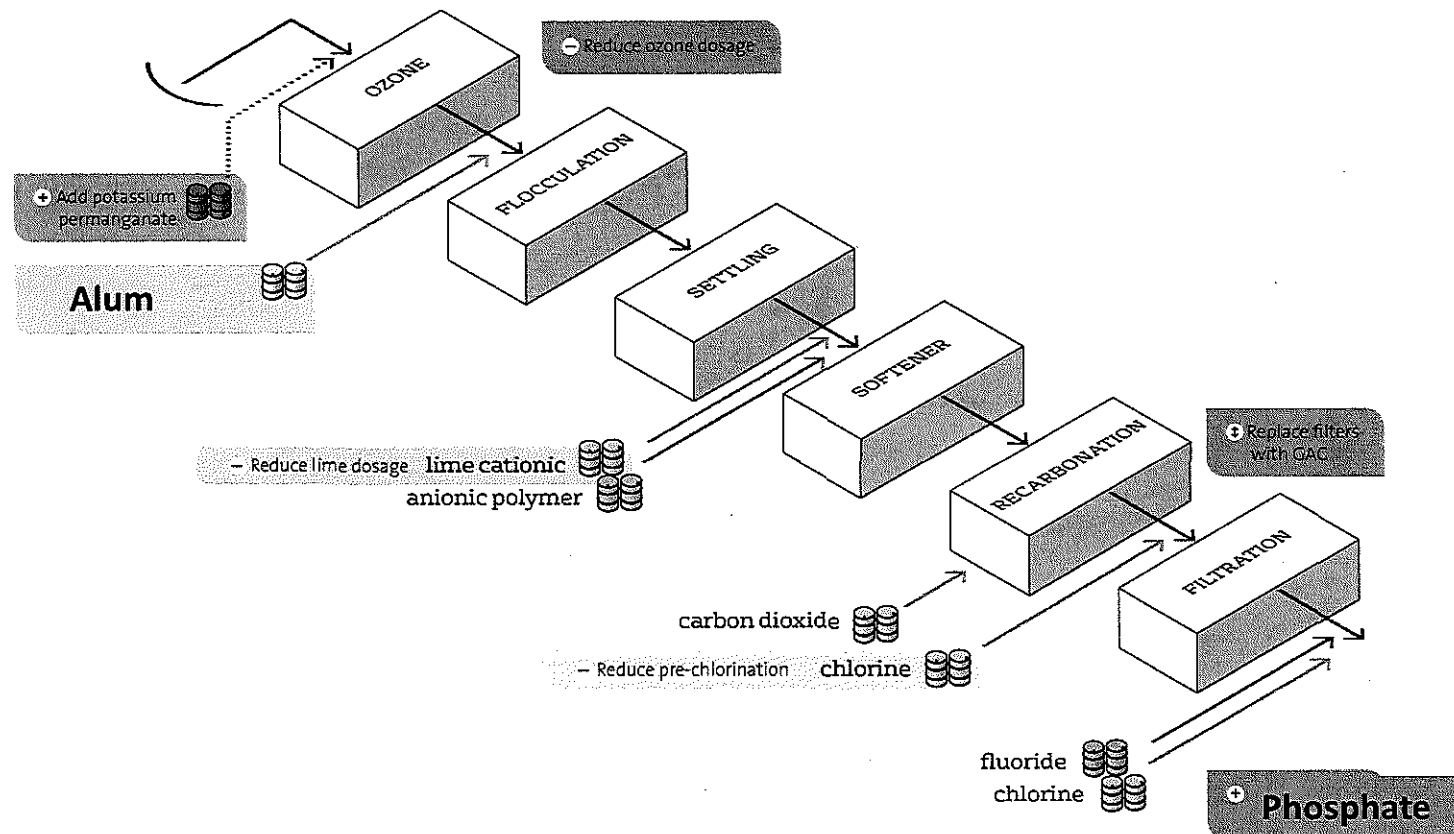
Acknowledgements

- NSF
 - Flint Citizens
 - Wateryoufightingfor (Melissa Mays and Lee-Anne Walters)
 - Miguel Del Toral (Region 5 EPA)
 - ACLU-MICHIGAN (Curt Guyette)
 - Senator Ananich and Dan Kildee (and Great Staff)
 - **Flint Medical Community (esp. Mona Hanna-Attisha and Hurley team)**
 - Genesee County Health Department
 - Concerned Pastors for Social Action
 - Democracy Defense League
 - Others
-
- City of Flint Water Department (Glasgow/Croft)

Treatment Option 1



Treatment Option 2



CSMR for Ferric Chloride vs Alum

	Cl ⁻	SO ⁻	CSMR
Ferric Chloride	80	27	2.96
Alum	44	77	0.57

Rennaker, Joanne (DEQ)

From: Howard Croft <hcroft@cityofflint.com>
Sent: Thursday, October 08, 2015 5:41 AM
To: Amy Hovey; Andy Leavitt; Brent Wright; Darren Lytle; Dayne Walling; donna. cole; edwardsm; Gerald (Jed) Natzke; Howard Croft; James Henry; Jamie Gaskin; Jason Lorenz; jmikewright; JoAnne Herman; John O'Brien; Kirk Smith; larry.koehler@mcc.edu; Laura Sullivan; Lawrence Reynolds; Lawrence Reynolds; Michael Glasgow; Michael Wright; Mike Lane; Prysby, Mike (DEQ); Natasha Henderson; Norb Birchmeier; Pete Levine; Robert Bincsik; rosejo@msu.edu; Russell Hudson; Samir Matta; schock.michael@epa.gov; Sean Kammer; Busch, Stephen (DEQ); Warren Green; John Monsees; Kevin Keane
Subject: Re: TAC Team Summary 10_7_15
Attachments: TAC Meeting Summary 10_7_15.pdf

All,

Please find attached, the summary of Wednesday's meeting.

Thank you,

On Wed, Oct 7, 2015 at 9:42 PM, Howard Croft <hcroft@cityofflint.com> wrote:
 All,

I want to personally thank everyone for participating in today's meeting, it is encouraging to see the commitment that exists to address the concerns around health. I apologize for the poor phone reception we experienced today, I will have that corrected at the next meeting.

I am sending a summary of today's meeting and have attempted to chronicle the highlights or major points that we discussed. I have also included an electronic version of Marc Edwards presentation and will forward any other documents that are requested.

Please look for continued communication from me as we work to move forward as fast as possible. I expect to have November and December dates selected very soon and will maintain the stream of information to this team as it becomes available.

Please do not hesitate to email or call me with any questions or requests.

Thank you,

--
Howard Croft
 Public Works Director
 City of Flint
 1101 S. Saginaw Street
 Flint, MI 48502

PH# 810.766.7135 Ext.2043
hcroft@cityofflint.com

Howard Croft
Public Works Director
City of Flint
1101 S. Saginaw Street
Flint, MI 48502
PH# 810.766.7135 Ext.2043
hcroft@cityofflint.com

**City of Flint
Technical Advisory Committee Meeting
Summary**

Location: Flint City Hall

Date: Wednesday October 7, 2015

Time: 2:00 pm

Introductions

Everyone gave individual introductions in round table fashion

Comments

The City Administrator Natasha Henderson commented on the urgency of the situation stressing that time is of the essence and we hoped to achieve a consensus opinion from the Advisory Group.

System Overview/Update

DPW Director Howard Croft discussed the original formation of the group, the fact that the group was engaged throughout the TTHM concerns, and the value of having experts gathered to together along with the medical community for a substantive discussion. An additional goal is to have a more unified public voice all working to be solution driven with good communication.

VA Tech Findings

Marc Edwards of VA Tech (through a conference call in) narrated a presentation that he prepared for the meeting. (The presentation is provided on the email).

Laura Sullivan of Kettering translated a part of the presentation due to poor phone connection.

Q- John O'Brien of the Drain Commissioners office asked if the VA Tech study had compared Flint River water and water from DWSD running through comparable distribution systems. John also commented on the timetable and progress status of the KWA stating that 38 miles of pipe are in the ground and continues to be installed at ~5 miles a month projecting completion by mid-2016, weather permitting.

A – Marc Edwards's response was yes, the comparison was done on equal terms.

EPA Comments

Darren Lytle of the EPA spoke and said that he had toured the Flint Plant earlier in the day with Utilities Administrator Mike Glasgow and was comfortable with what he saw. His comments also touched on a technical nature which drew brief conversation from Warren Green of LAN.

Mr. Lytle agreed to stay involved through the implementation of KWA, requested more data to review and asked that Michael Schock of the EPA who could not attend today be considered one of the top lead experts in the nation and that we keep him updated at every step.

Mayor's Comments

DPW Director introduced Mayor Walling made comments thanking everyone for their participation and asked if anyone had a valid reason to NOT go back to DWSD.

There was no direct response but John O'Brien questioned what the expectations were going to be and that lead levels would not be reduced to zero. Several people responded that this was understood.

Dr. Lawrence Reynolds gave comments that focused on the short and long term impact of lead levels especially in children.

Pete Levine and Kirk Smith also commented that they saw no "pro" to staying on the Flint River as opposed to switching back to DWSD.

DWSD Option

City Administrator Natasha Henderson asked the committee to not look at cost but at the health and science of what is the best interim source of water for residents. She said she would like to go back to DWSD both as a resident and as City Administrator.

Warren Green of LAN asked that as an engineer, he would like to see the actual data that was derived from the VA Tech studies and brought up the need for corrosion control or the addition of phosphate regardless of the water source.

Corrosion Control

Discussion around corrosion control continued with Darren Lytle of the EPA, Marc Edwards, and Warren Green discussing dosing with each source and questioning the timetable of rebuilding a film layer.

Service Line Replacement

Skipping Filters for a moment, DPW Director Howard Croft displayed a draft copy of a Lead Service Line Replacement plan for Flint that mirrors the Washington D.C. model and looks for a grant funding source to assist with the homeowner side of the line. Mr. Croft also commented on the partnership formed with U of M Flint to get all of the lead service lines identified and put into GIS data points.

Update on Filters

Jamie Gaskin, United Way CEO gave a full update on how the United Way has been the hub for coordination efforts regarding distributing filters to residents. Jamie reiterated that they have made a request of the state to supply them with leadership support that has gone unfulfilled.

Jamie also addressed the early morning question of whether or not the 25,000 "Brita" filters that were being distributed would filter lead, this brand was purchased by the state and is being distributed by DHHS. Eden Wells the Michigan Chief Medical Official addressed that the research had been done and the filters were indeed NSF certified and filter lead.

Andy Leavitt commented on the scope of work that Jamie and the United Way undertook outside of their normal purview and their swift action.

Committee Recommendation

Howard Croft announced that as committee chair, given the meetings discussions, he was prepared to make a recommendation from the TAC tem to the City Administrator and Mayor that the city return to DWSD as a water source. (Pending any objections from the group – no objections were made)

Director also commented that providing water from the Treatment Plant was still under review and pro's and con's were being evaluated prior to a firm decision being brought forth.

Drawing the meeting to a close, the DPW Director committed that weekly updates would be provided to the Technical Advisory Committee and that November and December meetings would be set up to maintain better communication.

Meeting closed at approximately 4:15 pm.

Howard Croft

Public Works Director
City of Flint

Rennaker, Joanne (DEQ)

From: Howard Croft <hcroft@cityofflint.com>
Sent: Wednesday, October 07, 2015 9:43 PM
To: Amy Hovey; Andy Leavitt; Brent Wright; Darren Lytle; Dayne Walling; donna. cole; edwardsm; Gerald (Jed) Natzke; Howard Croft; James Henry; Jamie Gaskin; Jason Lorenz; jmikewright; JoAnne Herman; John O'Brien; Kirk Smith; larry.koehler@mcc.edu; Laura Sullivan; Lawrence Reynolds; Lawrence Reynolds; Michael Glasgow; Michael Wright; Mike Lane; Prysby, Mike (DEQ); Natasha Henderson; Norb Birchmeier; Pete Levine; Robert Bincsik; rosejo@msu.edu; Russell Hudson; Samir Matta; schock.michael@epa.gov; Sean Kammer; Busch, Stephen (DEQ); Warren Green; John Monsees
Subject: TAC Team Summary 10_7_15
Attachments: Flint Corrosion Presentation final.pdf

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Please do not hesitate to email or call me with any questions or requests.

Thank you,

--
Howard Croft
 Public Works Director
 City of Flint
 1101 S. Saginaw Street
 Flint, MI 48502
 PH# 810.766.7135 Ext.2043
hcroft@cityofflint.com

**Synergistic Impacts of Corrosive Water and
Interrupted Corrosion Control on Chemical/
Microbiological Water Quality:
The Flint, MI Water Crisis**



NSF RAPID:

National Science Foundation

“used for proposals having a severe urgency...., including quick-response research on natural or anthropogenic disasters and similar unanticipated events.”

Flint
Water
is very
corrosive.

Detroit
water is
not.

Table 1. Water quality parameters for drinking water supplied in Flint, MI before and after the April 2014 switch

Parameter	Before ¹	After ²
pH	7.38	7.61
Hardness (mg/L as CaCO ₃)	101	183
Alkalinity (mg/L as CaCO ₃)	78	77
Chloride (mg/L)	11.4	92
Sulfate (mg/L)	25.2	41
CSMR ³	0.45	1.6
Inhibitor (mg/L as P)	0.35	NONE
Larson Ratio ⁴	0.5	2.3

¹Source: City of Flint Monthly Operation Report, June 2015 Available from www.cityofflnt.com

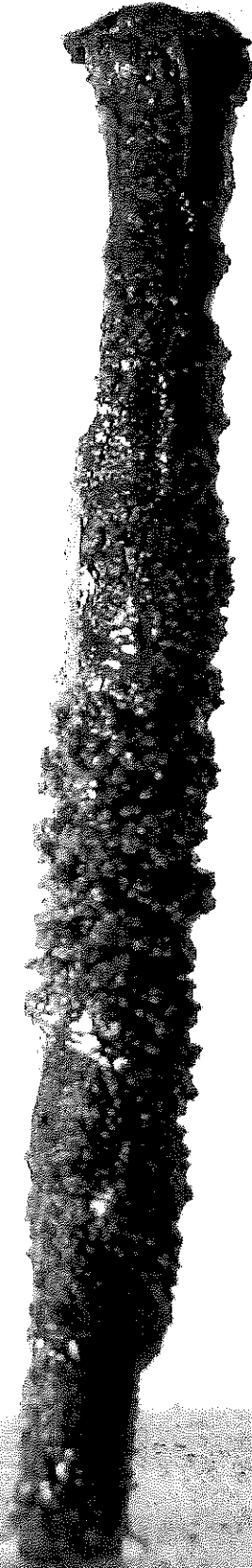
Corrosive Water: Destroys Pipe Infrastructure



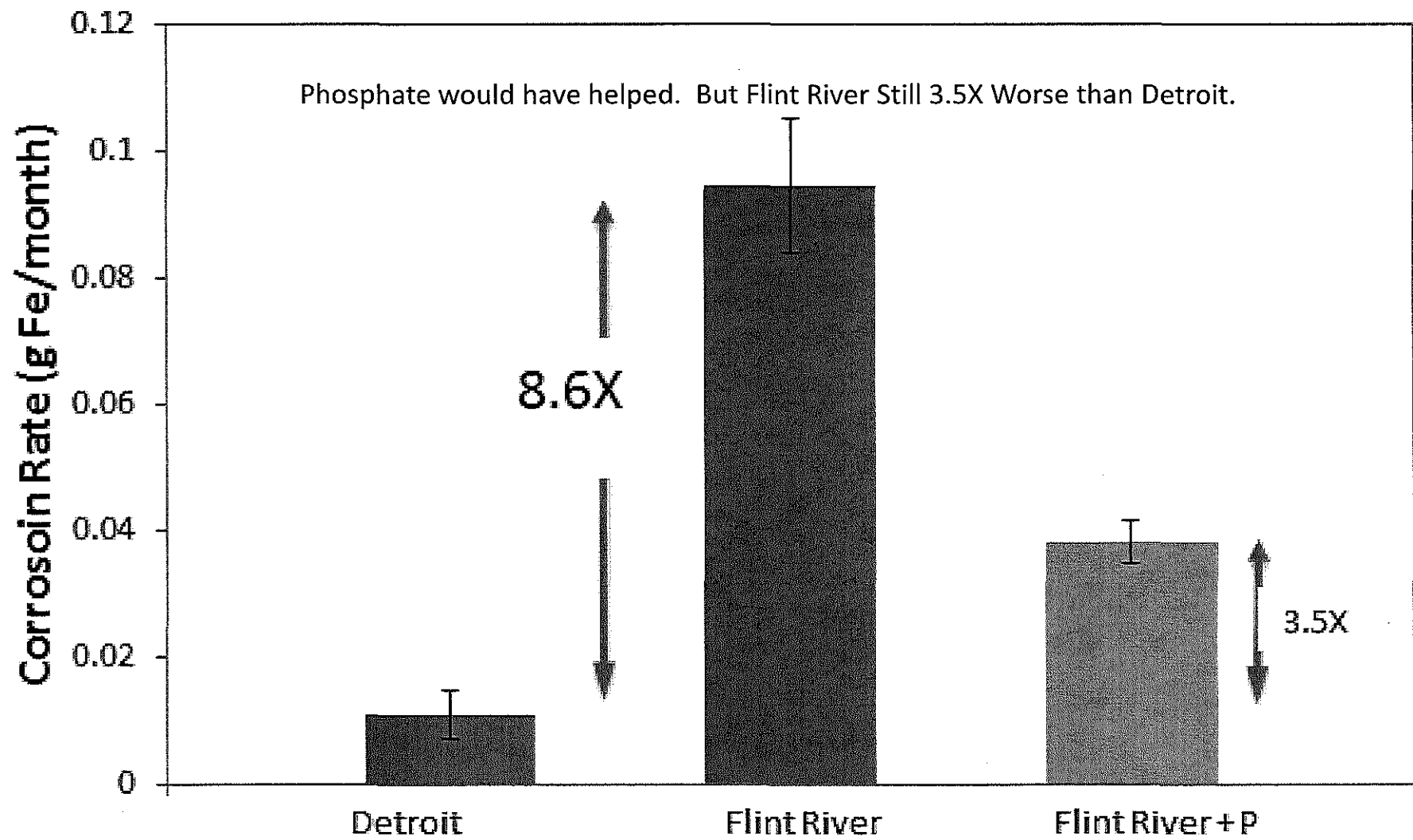
Detroit Water



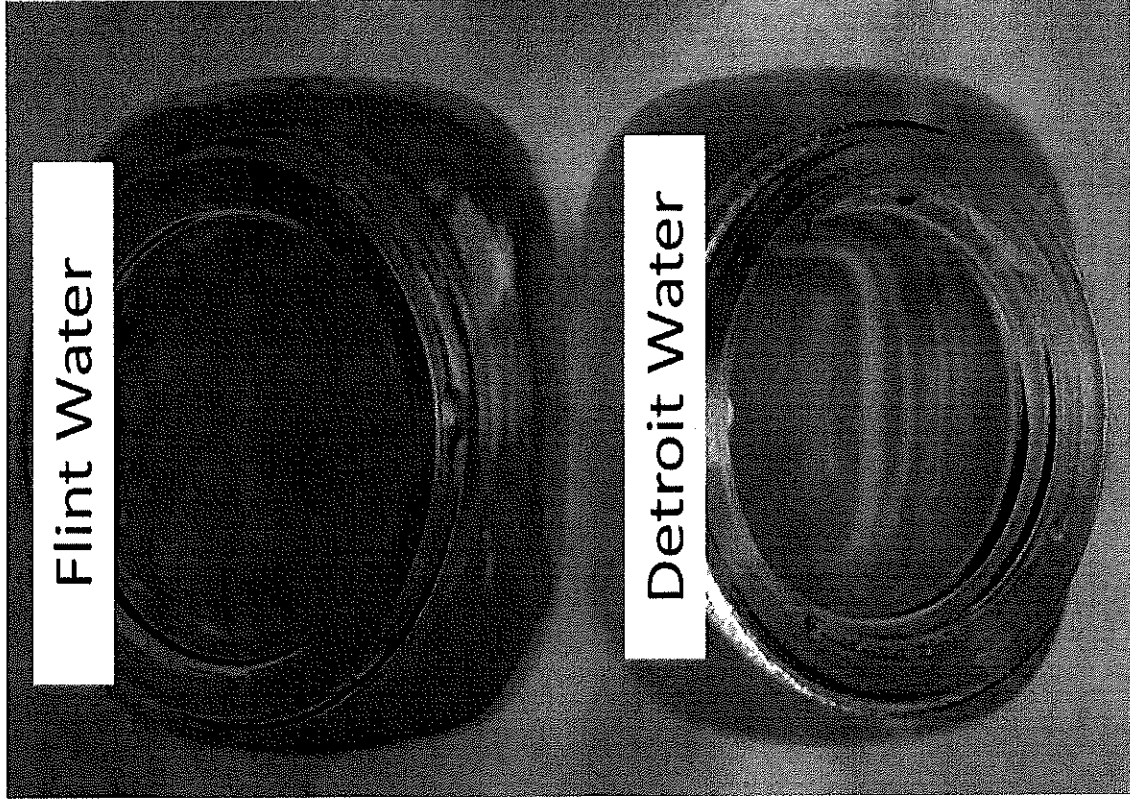
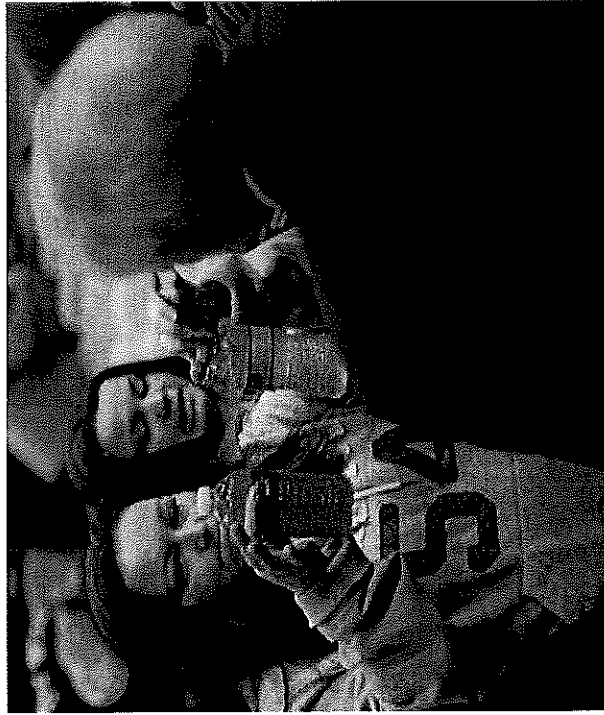
Flint Water



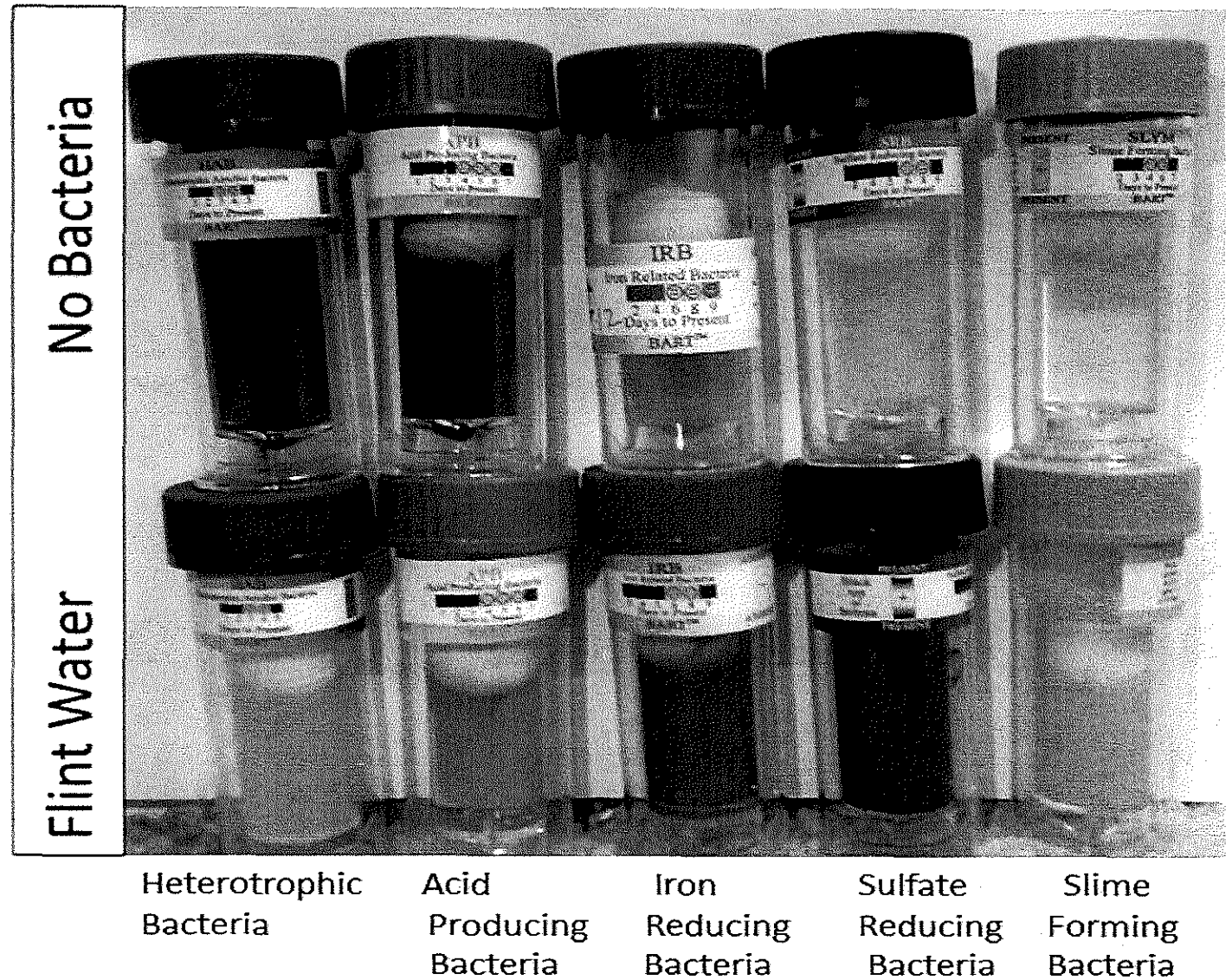
Steel Exposed One Month to Detroit vs. Flint River Water



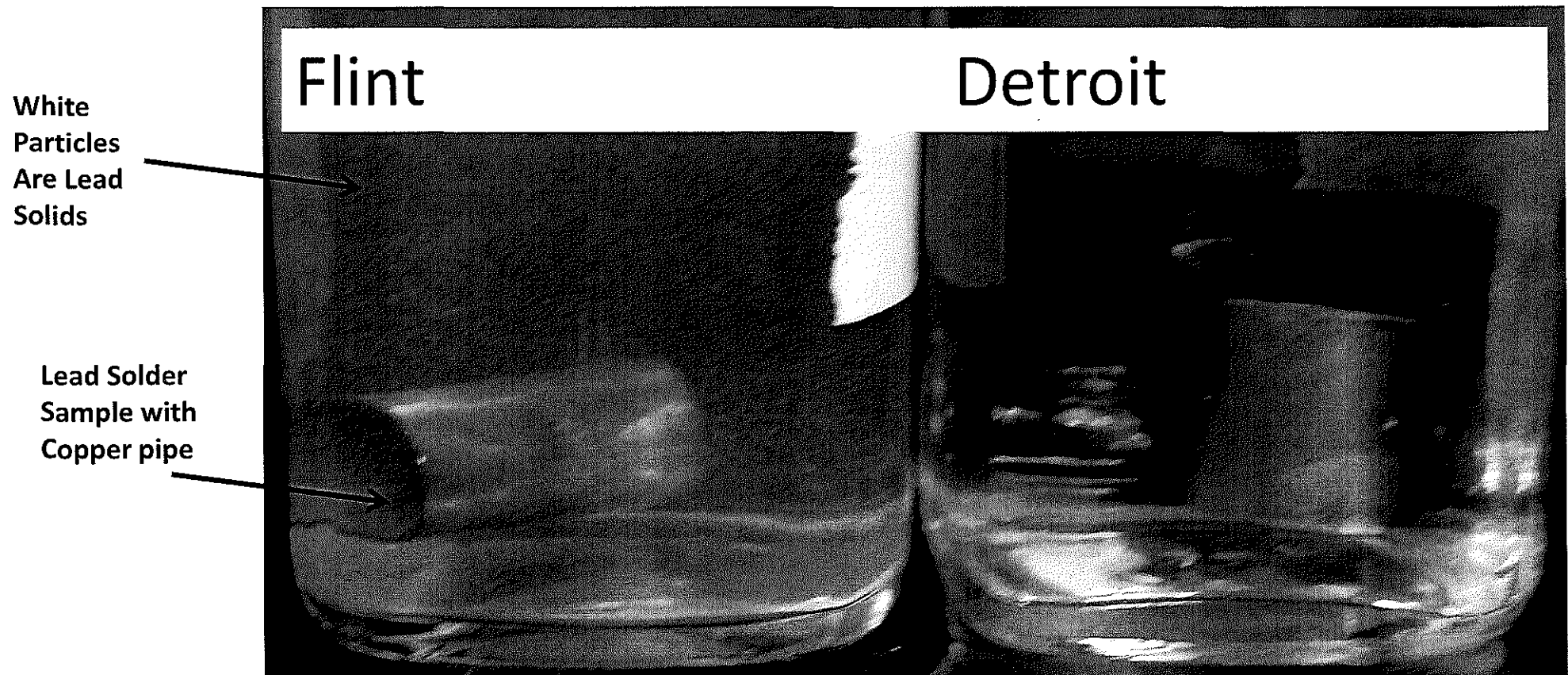
Corrosive Water: Causes Odors, Colors, Bad Tastes



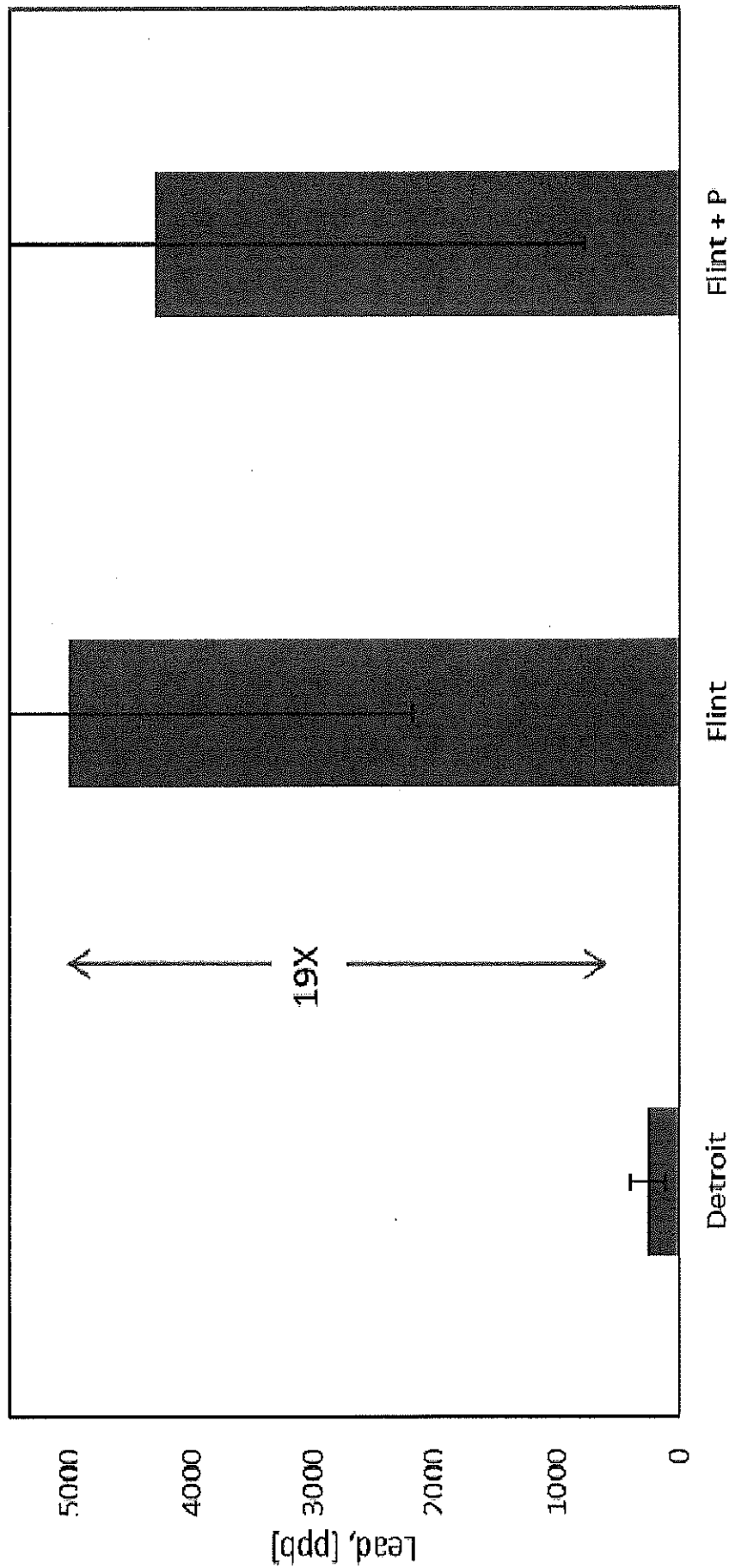
High Levels of Corrosion Causing Bacteria



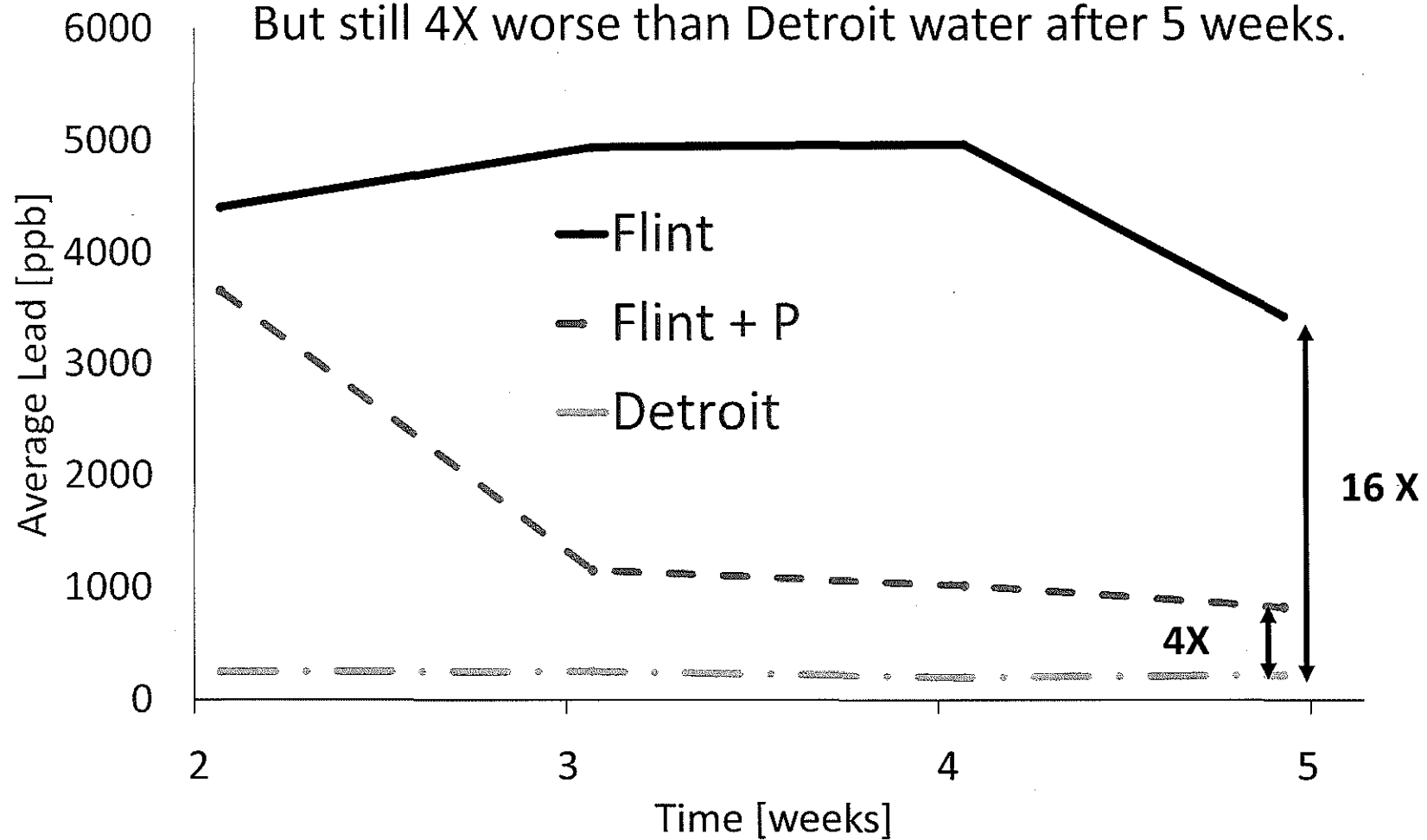
Corrosive Water: Increases Lead. Effects VISIBLE immediately in lab tests!



5000 ppb = Hazardous Waste Levels of Lead



Phosphate (P) corrosion inhibitor would have helped.
But still 4X worse than Detroit water after 5 weeks.



INITIATED CONFIRMATION TESTING OF LEAD CORROSIVITY AT ONE LOCAL ELEMENTARY AND ONE HIGH SCHOOL

Vickie Weiss

City School ~ Room 00
11920 S. Saginaw
Grand Blanc MI – 48439

4-5th Graders
12+5 Bottles

Emily Cizmas

2283 E. Scottwood Ave.
Burton, MI 48529

Bendle High School,
Burton
14+5 Bottles

**Experimental Rigs has
also been sent to:**

Brad Wurfel

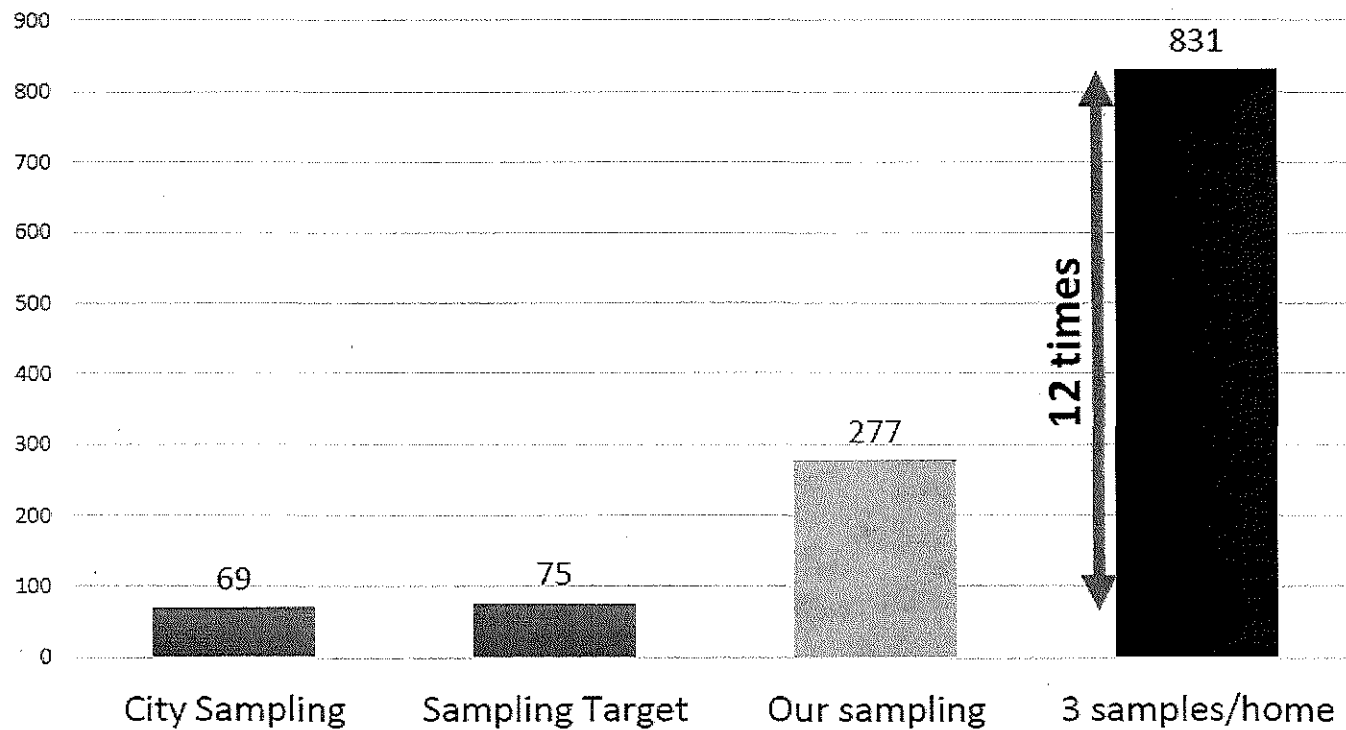
Director of
Communication
Michigan DEQ
P.O. Box 30473
Lansing, MI 48909-6700

9 Bottles

Aug 20 - Sep 8

#FlintWater sampling response from #FlintCitizenScientists

No. of samples tested for Lead



The Team in Flint and from ACLU-Michigan



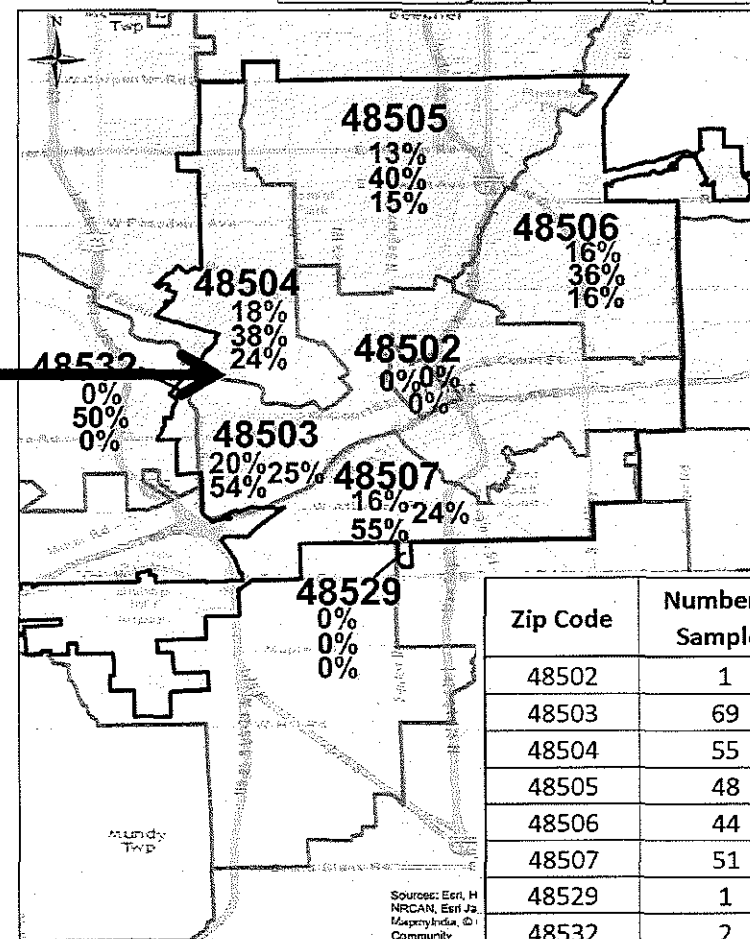
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> EPA Action Level

Flint, MI

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Blue %: Percent First Draw Samples over 15 ppb
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Red %: Percent Any Samples over 15 ppb



Sources: EERI, H
NRCAN, EERI JA
MapmyIndia, ©
Community

Corrosion control treatment to reduce lead in Flint water.

1. Switch back to the non-corrosive Detroit water.

Flint's lead levels would drop markedly in about one month.

2. Add orthophosphate to Flint River water. Orthophosphate will not reduce lead leaching from all lead plumbing sources. Based on experimental data, lead levels would likely be reduced by 5X, but still 4X higher than Detroit. Iron corrosion still much higher than Detroit.

If orthophosphate had been added to Flint water, continuing the corrosion control used in Detroit water, the Flint Water Crisis would not have occurred.

About us

Research Team

Undergraduate Students:

Margaret **Carolan**, Kim **Hughes**,
Rebecca **Jones**

Graduate Students

(in alphabetical order):

Christina **Devine**, Emily **Garner**,
Anurag **Mantha**, Rebekah **Martin**,
Colin **Richards**, William **Rhoads**,
Siddhartha **Roy**, Min **Tang**,
Ni "Joyce" **Zhu**

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Brandi **Clark**, Dongjuan **Dai**, Sheldon **Masters**, Jeffrey **Parks**,
Kelsey **Pieper**, David "Otto" **Schwake**, Fei **Wang**

Principal Investigators: Dr. Marc Edwards, Dr. Amy Pruden, Dr.

Joseph Falkinham III

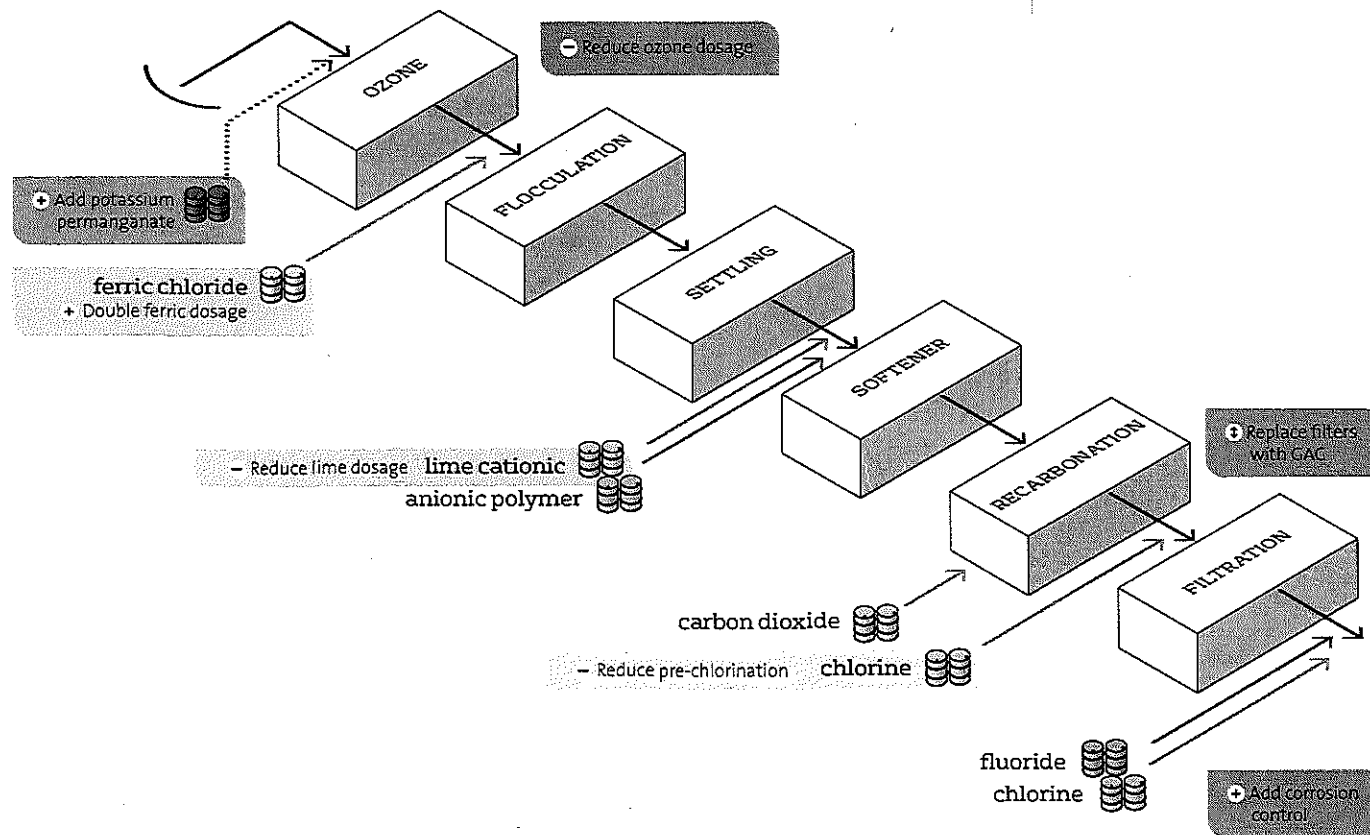




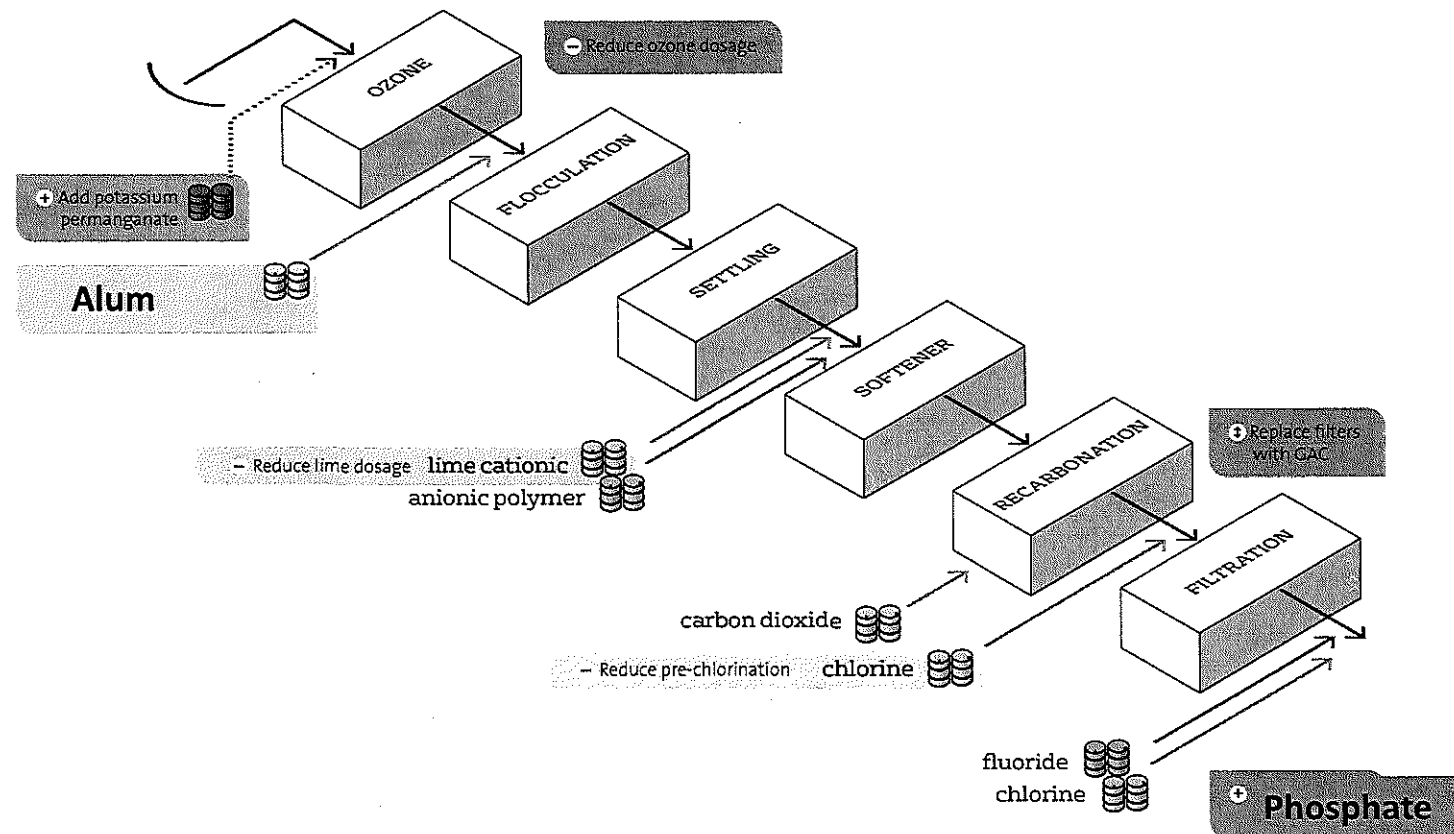
Acknowledgements

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 - Genesee County Health Department
 - Concerned Pastors for Social Action
 - Democracy Defense League
 - Others
-
- City of Flint Water Department (Glasgow/Croft)

Treatment Option 1



Treatment Option 2



CSMR for Ferric Chloride vs Alum

	Cl ⁻	SO ⁻	CSMR
Ferric Chloride	80	27	2.96
Alum	44	77	0.57

Rennaker, Joanne (DEQ)

From: Prysby, Mike (DEQ)
Sent: Wednesday, October 07, 2015 4:57 PM
To: Sygo, Jim (DEQ)
Subject: TAC Meeting Highlights

Below is a summary of the Flint TAC meeting to obtain the committee's endorsement to switch back to Detroit water.

1. The TAC endorses the switch back to the DWSD
2. Marc Edwards of VA Tech supports the switchover to DWSD with conclusion that Flint River water with corrosion control will still be 4 times more corrosive than water from DWSD after 5 weeks of treatment.
3. Genesee County states two weeks to prepare pipeline for re-use (flush, disinfect, sample, etc)
4. Supplemental corrosion control still needed with DWSD water and ACT 399 submittal can be made in approx one week.
5. No pros were brought to the table for staying on the Flint River.

Sent from my iPhone

Rennaker, Joanne (DEQ)

From: Wright, Michael <Wright.Michael@epa.gov>
Sent: Wednesday, October 07, 2015 4:45 PM
To: Howard Croft; Amy Hovey; Andy Leavitt; Brent Wright; Lytle, Darren; Dayne Walling; donna. cole; edwardsm; Gerald (Jed) Natzke; James Henry; Jamie Gaskin; Jason Lorenz; jmikewright; JoAnne Herman; John O'Brien; Kirk Smith; larry.koehler@mcc.edu; Laura Sullivan; Michael Glasgow; Mike Lane; Prysby, Mike (DEQ); Natasha Henderson; Norb Birchmeier; Pete Levine; Robert Bincsik; rosejo@msu.edu; Russell Hudson; Samir Matta; Schock, Michael; Sean Kammer; Busch, Stephen (DEQ); Warren Green
Subject: RE: Technical Advisory Meeting

Howard

Thanks for setting up that call. I think we may have been speaking over each other towards the end there, but I wanted to make sure my last point was clear. If Lead is the primary concern right now (which is definitely should be), I hope there is no discussion of a boil advisory in response to the Lead issue. From an exposure assessment perspective, this makes little sense and will only exacerbate matters. This is because heating water can concentrate lead levels and increase exposures via drinking water. I hope this was clear especially to the clinicians in the room, if concerned patients are coming to them for advice (like they were with the THM situation). Again, I missed a lot of the conversation and may have mis-heard details on that. But, I just wanted to make sure this point was made *if* a boil advisory (presumably to combat microbial issues??) is really on that table.

Mike

From: Howard Croft [<mailto:hcroft@cityofflint.com>]

Sent: Monday, October 05, 2015 2:54 PM

To: Amy Hovey; Andy Leavitt; Brent Wright; Lytle, Darren; Dayne Walling; donna. cole; edwardsm; Gerald (Jed) Natzke; Howard Croft; James Henry; Jamie Gaskin; Jason Lorenz; jmikewright; JoAnne Herman; John O'Brien; Kirk Smith; larry.koehler@mcc.edu; Laura Sullivan; Michael Glasgow; Wright, Michael; Mike Lane; Mike Prysby (DEQ); Natasha Henderson; Norb Birchmeier; Pete Levine; Robert Bincsik; rosejo@msu.edu; Russell Hudson; Samir Matta; Schock, Michael; Sean Kammer; Stephen Busch (DEQ); Warren Green

Subject: Technical Advisory Meeting

All,

I am confirming that our Technical Advisory Meeting will be this Wednesday October 7th at 2:00 - 4:30 pm at City Hall.

The meeting will discuss the emergence of the lead concerns and we will have up to date discussion around the immediate response of filter distribution.

There will be expert discussion about corrosion control, the DWSD option, how the long term solution of line replacement would unfold, and details on the status of KWA. The agenda will be distributed at the meeting.

We look forward to everyone's attendance, please email me with any questions.

--

Howard Croft

Public Works Director

City of Flint

1101 S. Saginaw Street

Flint, MI 48502

PH# 810.766.7135 Ext.2043

hcroft@cityofflint.com

Rennaker, Joanne (DEQ)

From: Wurfel, Brad (DEQ)
Sent: Wednesday, October 07, 2015 2:51 PM
To: Alana Holland
Cc: Busch, Stephen (DEQ); Prysby, Mike (DEQ)
Subject: RE: Reporter from TV5 today

Hi, Alana. Thanks for stopping in. Much confusion around this issue so we appreciate you covering it.

The City added Lime to its process to soften the water. This adjusts the pH level (and has a corrosion control effect, while not an outright corrosion control).

Point is, figures I've seen indicate the present pH of the water is within .02 of where it was on the Detroit system. I've copied our two Flint water specialists to correct me if I'm wrong and offer any other technical information you might need.

Again, thanks.

b

From: Alana Holland [<mailto:Alana.Holland@wnem.com>]
Sent: Wednesday, October 07, 2015 2:46 PM
To: Wurfel, Brad (DEQ)
Subject: Reporter from TV5 today

Hi Brad,

Thanks for setting up the meeting for us today. If you need anything, you can e-mail me at Alana.holland@wnem.com or call at (989)758-2026.

Also, Dan said he didn't have the specifics at the time, but we could get the pH levels of Flint water vs. ideal drinking water. Is that something we could have?

Thank you,

Alana Holland

WNEM TV5 Reporter
Alana.holland@wnem.com
(989)274-1397 - cell
(989)758-2026 - desk



This electronic message, including any attachments, may contain proprietary, confidential or privileged information for the sole use of the intended recipient(s). You are hereby notified that any unauthorized disclosure, copying, distribution, or use of this message is prohibited. If you have received this message in error, please immediately notify the sender by reply e-mail and delete it.

Rennaker, Joanne (DEQ)

From: Howard Croft <hcroft@cityofflint.com>
Sent: Tuesday, October 06, 2015 4:54 PM
To: Amy Hovey; Andy Leavitt; Brent Wright; Darren Lytle; Dayne Walling; donna. cole; edwardsm; Gerald (Jed) Natzke; Howard Croft; James Henry; Jamie Gaskin; Jason Lorenz; jmikewright; JoAnne Herman; John O'Brien; Kirk Smith; larry.koehler@mcc.edu; Laura Sullivan; Michael Glasgow; Michael Wright; Mike Lane; Prysby, Mike (DEQ); Natasha Henderson; Norb Birchmeier; Pete Levine; Robert Bincsik; rosejo@msu.edu; Russell Hudson; Samir Matta; schock.michael@epa.gov; Sean Kammer; Busch, Stephen (DEQ); Warren Green; Wells, Eden (DHHS)
Subject: Technical Committee Agenda and Number
Attachments: TAC Meeting_10_7_15_Agenda.pdf

Team,

We are looking forward to a very productive meeting on Wednesday with those in attendance and those calling in.

I am sending a brief document that includes an agenda and an anticipated attendance list as we expect most of the meeting to be good discussion.

Below is the call in information for those that cannot make it:

Number: (641) 715-3580

Access Code: 373-510

Thank you,

--

Howard Croft
 Public Works Director
 City of Flint
 1101 S. Saginaw Street
 Flint, MI 48502
 PH# 810.766.7135 Ext.2043
hcroft@cityofflint.com



City of Flint

TECHNICAL ADVISORY COMMITTEE

Meeting
October 7th 2:00 pm

Agenda

Introductions

Comments - Natasha Henderson (City Administrator)

System Overview/Update - Howard Croft (DPW Director)

Purpose of Committee

TTHM Review

Lead Concerns

Virginia Tech Findings - Marc Edwards (VA Tech Lead Expert)

EPA Comments - Darren Lytle (EPA Lead Expert)

Open Discussion - Q & A

Solutions (short term & long term)

- DWSD Option - Natasha Henderson (City Administrator)
- Corrosion Control - Samir Matta (LAN Engineer)
- Update on Filter Efforts - Jamie Gaskin (United Way CEO)
- Service Line Replacement - Howard Croft (DPW Director)
- Update on KWA - John O'Brien (KWA Engineer PE)

Open Discussion - Q & A

Committee Recommendations

Next Meeting Dates

November Date

December Date

Close

TAC - Participants

Member	Organization	
Donna Cole	Greater Flint Health Coalition	
** Eden Wells	State of Michigan – Chief Medical Executive	
Gerald Natzke	Genesys	
** Jamie Gaskin	United Way	
Jim Henry	Genesee County Health Department	
JoAnne Herman	Genesys	
John O'Brien	Genesee County Drain Commission	
** Kevin Kilby	KWA Associate	
Kirk Smith	Greater Flint Health Coalition	
Larry Kohler	Mott Community College	
Laura Sullivan	Kettering University	
Mike Lane	University of Michigan Flint	
Mike Sargent	Flint Strong	
Norb Birchmeier	Hurley Medical Center	
Joan Rose	Michigan State University	
Pete Levine	Genesee County Medical Society	
Russell Hudson	McLaren Hospital	
Warren Green	Lockwood Andrews Newnam - Engineering	
Samir Matta	Lockwood Andrews Newnam - Engineering	
** Amy Hovey	U.S. Congressional Representative	
** Andy Leavitt	State Senate Representative	
Mike Prysby	DEQ	
** Jim Sygo	DEQ	
** George Krisztian	DEQ	
Michael Wright	EPA	By Ph.
** Darren Lytle	EPA	
** Michel Schock	EPA	Out
** Marc Edwards	Virginia Tech	By Ph.

**** New Member or Special Guest**

Rennaker, Joanne (DEQ)

From: Henry, James <jhenry@gchd.us>
Sent: Tuesday, October 06, 2015 12:31 PM
To: Prysby, Mike (DEQ)
Subject: Flint Schools

Mike, do you have water results for Flint schools?

Jim Henry RS, MBA
Environmental Health Supervisor
Genesee County Health Department www.gchd.us
630 S. Saginaw St., Suite 4
Flint, MI 48502-1540
Phone (810) 257-3618 Fax (810) 257-3125
E-mail jhenry@gchd.us



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For a copy of the Health Department's Notice of Information Practices, contact the Health Department or visit the Health Department's website at <http://www.gchd.us/>

Rennaker, Joanne (DEQ)

From: Howard Croft <hcroft@cityofflint.com>
Sent: Monday, October 05, 2015 2:54 PM
To: Amy Hovey; Andy Leavitt; Brent Wright; Darren Lytle; Dayne Walling; donna. cole; edwardsm; Gerald (Jed) Natzke; Howard Croft; James Henry; Jamie Gaskin; Jason Lorenz; jmikewright; JoAnne Herman; John O'Brien; Kirk Smith; larry.koehler@mcc.edu; Laura Sullivan; Michael Glasgow; Michael Wright; Mike Lane; Prysby, Mike (DEQ); Natasha Henderson; Norb Birchmeier; Pete Levine; Robert Bincsik; rosejo@msu.edu; Russell Hudson; Samir Matta; schock.michael@epa.gov; Sean Kammer; Busch, Stephen (DEQ); Warren Green
Subject: Technical Advisory Meeting

All,

I am confirming that our Technical Advisory Meeting will be this Wednesday October 7th at 2:00 - 4:30 pm at City Hall.

The meeting will discuss the emergence of the lead concerns and we will have up to date discussion around the immediate response of filter distribution.

There will be expert discussion about corrosion control, the DWSD option, how the long term solution of line replacement would unfold, and details on the status of KWA. The agenda will be distributed at the meeting.

We look forward to everyone's attendance, please email me with any questions.

--

Howard Croft
 Public Works Director
 City of Flint
 1101 S. Saginaw Street
 Flint, MI 48502
 PH# 810.766.7135 Ext.2043
hcroft@cityofflint.com

Rennaker, Joanne (DEQ)

From: Rep. Sheldon Neeley (District 34) <SheldonNeeley@house.mi.gov>
Sent: Monday, October 05, 2015 2:03 PM
To: Pallone, Maggie (DEQ); Wurfel, Brad (DEQ); Prysby, Mike (DEQ)
Cc: Clyde Edwards; neeleyrep34@gmail.com
Subject: Additional testing

Good Afternoon,

In addition to the water in public schools in the Flint area being tested, I am requesting that private and charter schools also be tested.

Thank you.

Rennaker, Joanne (DEQ)

From: Crooks, Jennifer <crooks.jennifer@epa.gov>
Sent: Friday, October 02, 2015 12:46 PM
To: Busch, Stephen (DEQ); Prysby, Mike (DEQ); Rosenthal, Adam (DEQ); Benzie, Richard (DEQ)
Cc: Poy, Thomas
Subject: Flint schematic in OEL

Hi, all. Sorry to have bugged you about this; I thought Mike and Darren wanted something more in detail than what was provided in the OEL, and they have the OEL. I asked if they need further detail than this. We'll find out.

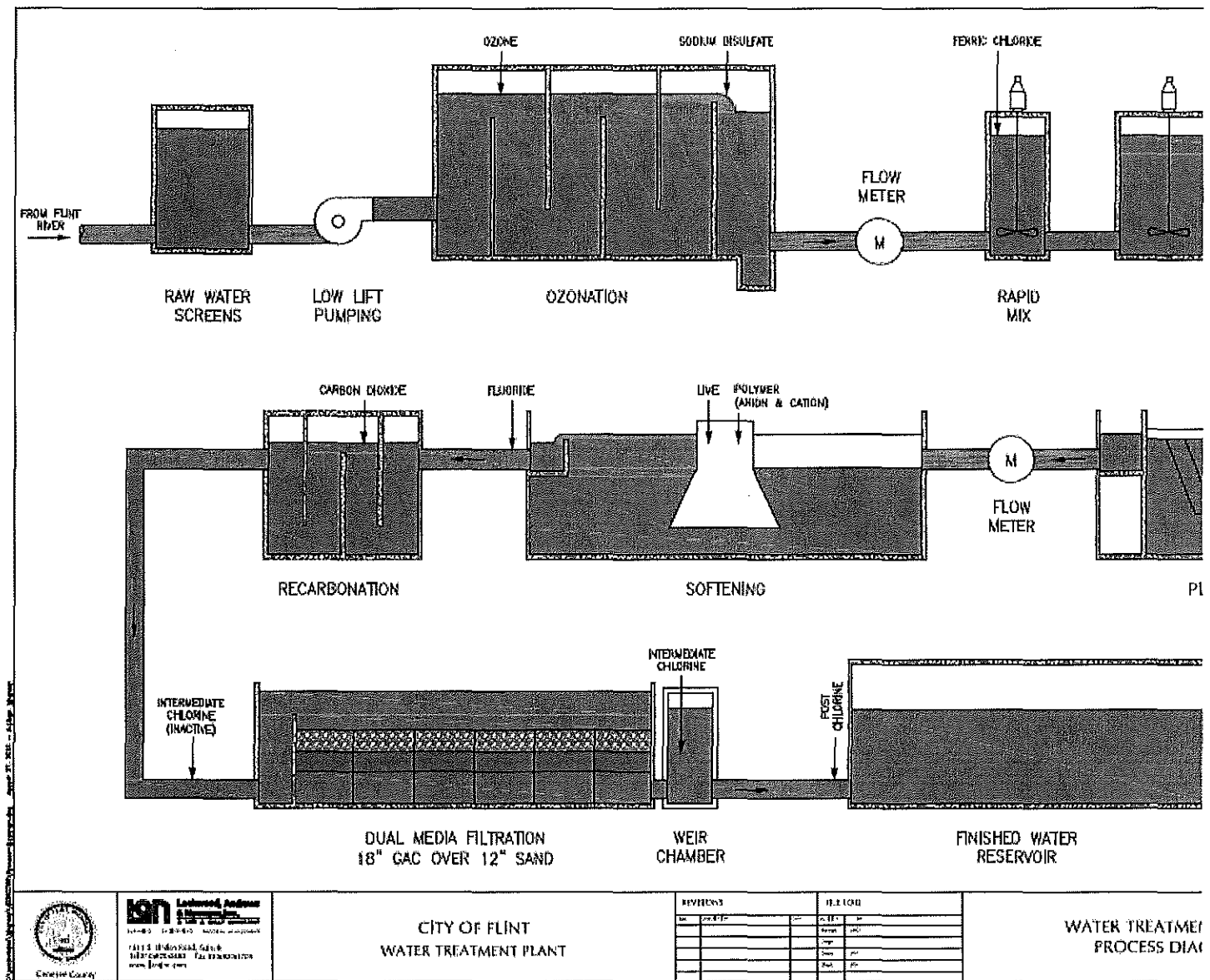
Jennifer

From: Porter, Andrea
Sent: Friday, October 2, 2015 9:56 AM
To: Crooks, Jennifer; Schock, Michael; Lytle, Darren
Cc: Poy, Thomas; Deltoral, Miguel
Subject: RE: Flint schematic

Hi All,

If you need a schematic for the Flint water treatment plant, there's one included in the August 2015 OEL report posted on City of Flint's website.

Source = <https://www.cityofflint.com/wp-content/uploads/Flint-TTHM-Operational-Evaluation-Report-August-2015.pdf>



Hope that helps,
Andrea Porter

Environmental Engineer
Ground Water & Drinking Water Branch
U.S. EPA, Region 5 (WG-15J)
77 W. Jackson Blvd.
Chicago, IL 60604
Phone: 312-886-4427
Fax: 312-697-2656

From: Crooks, Jennifer
Sent: Thursday, October 01, 2015 5:02 PM
To: Schock, Michael; Lytle, Darren
Cc: Poy, Thomas; Deltoral, Miguel; Porter, Andrea
Subject: no Flint schematic yet

I think MI DEQ has been hit hard this week with public inquiries, congressional inquiries, etc., so I have not heard back from them today. Tomorrow is a press release with MI DEQ and EPA. I did send them an email just now to say if they have the schematic, they should email it to you directly since I'm out of the office tomorrow. But I'll be back on Monday, so I'll continue to follow up with them.

Jennifer

Rennaker, Joanne (DEQ)

From: Prysby, Mike (DEQ)
Sent: Friday, October 02, 2015 10:22 AM
To: lytle.darren@epa.gov
Subject: FW: question for ORD/Mike Schock
Attachments: SCAN0912.pdf

Darren,

See Flint WTP flow diagram

Michael Prysby, P.E.
District Engineer
Office of Drinking Water and Municipal Assistance
517 290-8817

From: Prysby, Mike (DEQ)
Sent: Friday, October 02, 2015 10:16 AM
To: 'schock.michael@epa.gov'
Cc: Busch, Stephen (DEQ)
Subject: FW: question for ORD/Mike Schock

Michael,

Attached is the flow schematic for the Flint WTP....the schematic shows UV disinfection; however, this is not in place....and the operators are using lime for softening. Soda ash is not being used at this time.

Michael Prysby, P.E.
District Engineer
Office of Drinking Water and Municipal Assistance
517 290-8817

From: Crooks, Jennifer [<mailto:crooks.jennifer@epa.gov>]
Sent: Thursday, October 01, 2015 5:57 PM
To: Rosenthal, Adam (DEQ); Prysby, Mike (DEQ); Busch, Stephen (DEQ)
Cc: Benzie, Richard (DEQ); Phillip, Kris (DEQ); Poy, Thomas
Subject: RE: question for ORD/Mike Schock

I'm out of the office tomorrow, so if you've been able to track down a schematic of the Flint's treatment plant, perhaps you can forward it to Mike Schock in Cincinnati? His email is schock.michael@epa.gov.

If not, I'm back in the office on Monday and maybe you can steer me toward the City to obtain a schematic. I'll check in with you then.

Thank you all.

Jennifer

From: Crooks, Jennifer
Sent: Wednesday, September 30, 2015 11:51 AM
To: Rosenthal, Adam (DEQ); Prysby, Mike (DEQ); 'Busch, Stephen (DEQ)'
Cc: Richard Benzie; kris philip; Thomas Poy
Subject: question for ORD/Mike Schock
Importance: High

Tom P told me that your Director, Dan Wyatt, asked that his staff work with ORD/Mike Schock and Darren Lytle. Mike and Darren are both working on getting up to speed on the basics of the Flint water treatment scheme. I had a request from Mike Schock this morning about information about treatment and various sample results for Flint. So, I sent them the final OEL report from Flint that is on their website, as well as the 5 MORs that are also on Flint's website.

Mike had an additional question; he's looking for a schematic of the Flint treatment process to help him evaluate the possible successfulness of phosphate treatment at Flint. See Mike's brief explanation below.

I don't want to make this a big project if it's not handy; would Mike Glasgow have this schematic?

Thank you all! I know your time is very valuable right now.

Jennifer

From: Schock, Michael
Sent: Wednesday, September 30, 2015 10:57 AM
To: Crooks, Jennifer
Cc: Lytle, Darren
Subject: RE: more pdfs

Jennifer;

Thank you so much!

Would you happen to know if any other report has, or that you might have somewhere, a currently-valid process schematic for the entire set of treatments done at the Flint plant? It would be helpful to have a better picture of where things like softening, type of coagulant and GAC fit into the picture. There are several potential interrelationships that would affect the successfulness of the phosphate treatment proposed and dosage, and the instability cause by the major chemistry change from Detroit finished water (which I understand was from their Lake Huron-fed plant).

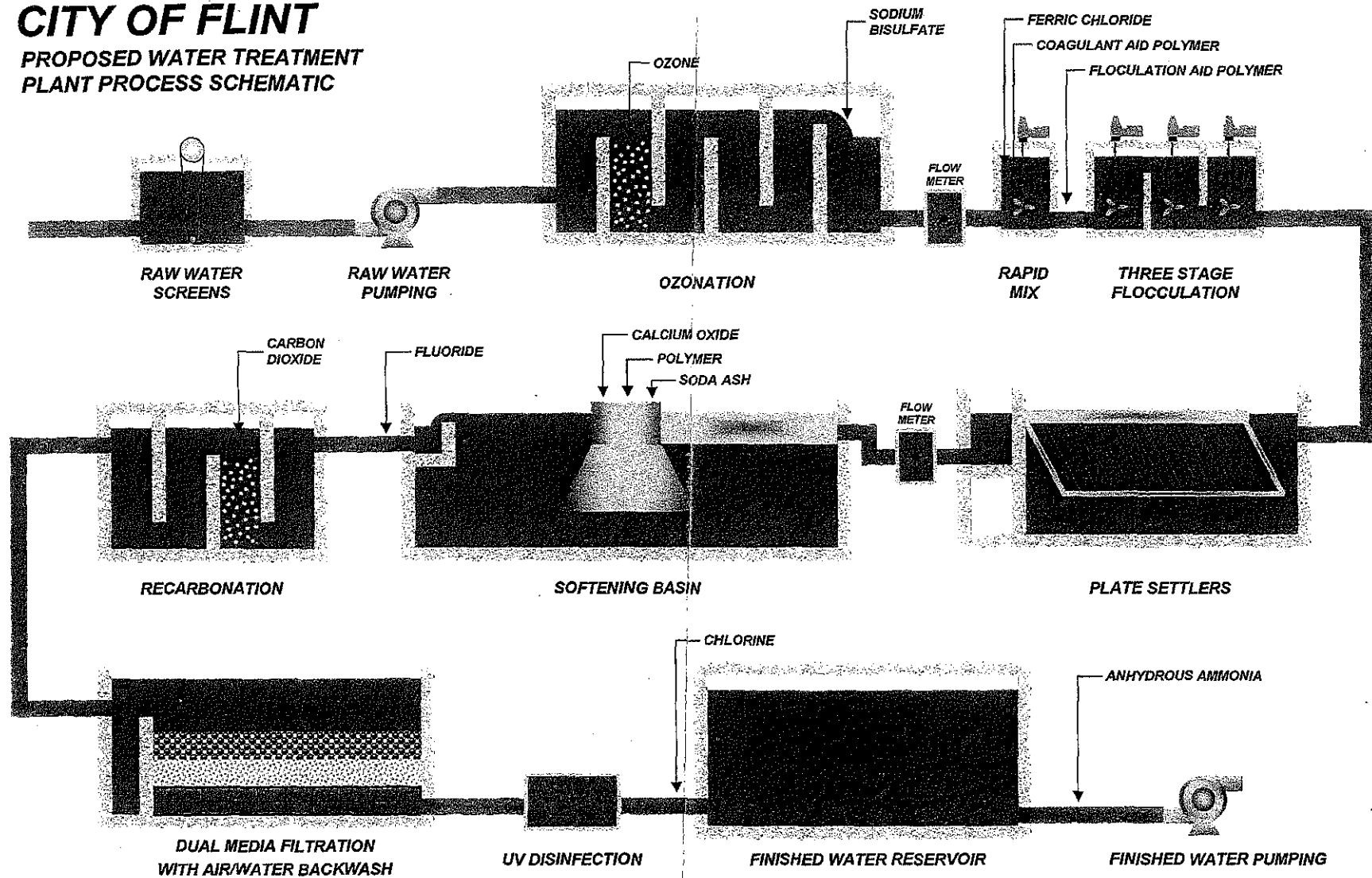
--Mike

From: Crooks, Jennifer
Sent: Wednesday, September 30, 2015 9:29 AM
To: Schock, Michael; Lytle, Darren
Subject: more pdfs

April 2015 MOR is not on the website.

CITY OF FLINT

PROPOSED WATER TREATMENT PLANT PROCESS SCHEMATIC



Rennaker, Joanne (DEQ)

From: Prysby, Mike (DEQ)
Sent: Friday, October 02, 2015 10:04 AM
To: sheila.bw@hotmail.com
Cc: Busch, Stephen (DEQ); Benzie, Richard (DEQ)
Subject: RE: Ticket #23002-490657 Response Sent

Sheila,

I am responding to your e-mail to address your concerns with lead Flint's drinking water. The drinking water treated at the Water Treatment Plant (WTP) and distributed to Flint residents meets all applicable drinking water standards and has not detected the presence of lead in any plant tap samples (water that leaves the WTP). Although the drinking water standards are being met, and compliance with the Action Level for lead is being achieved (90% of selected sites sampled throughout the city are at or below the 15 parts per billion Action Level for lead in accordance to EPA's monitoring requirements), there is no safe level for lead in drinking water. Compliance with the lead Action Level; however, does not mean that under certain conditions that some residents may have water within their domestic plumbing system that has leached lead from either a lead service line or lead solder.

The only way to know if you are being exposed to a higher concentration of lead at your residency is to have a sample collected from your residency and analyzed for lead at a certified laboratory. It is our understanding that the city of Flint is working with their customers on lead sampling requests without charge. You will need contact the city to arrange for the sampling.

If lead is present in the water at your home or if there is uncertainty, our advice is to minimize stagnation of the water prior to consumption by running your faucet for several minutes to clear out the stagnated water from your plumbing and service line.

Below is a link that provide additional information regarding lead in drinking water.

<http://water.epa.gov/drink/contaminants/basicinformation/lead.cfm>

If you have any further concerns regarding lead in your drinking water or on any other water related matter, please don't hesitate to contact me.

Michael Prysby, P.E.
District Engineer
Office of Drinking Water and Municipal Assistance
517 290-8817

From: Sheila Bailey-Waddell [mailto:sheila.bw@hotmail.com]
Sent: Wednesday, September 30, 2015 8:43 PM
To: Hill, Charles (DEQ); Selden, Barry (DEQ); Smith, Laura (DEQ); Prysby, Mike (DEQ)
Subject: RE: Ticket #23002-490657 Response Sent

Hello,

Have you not heard that the water quality in Michigan is detrimental to its residents? It is filled with lead; killing our children and the elderly who are most vulnerable. What is the EPA doing about this? Even the hospitals are forced to order distilled water for patients (in/out). I want expeditious answers.

Thank you,
 Sheila

From: sheila.bw@hotmail.com
To: hillc@michigan.gov; seldenb@michigan.gov; smithl16@michigan.gov
Subject: FW: Ticket #23002-490657 Response Sent
Date: Thu, 7 May 2015 17:16:50 -0400

From: sheila.bw@hotmail.com
To: safewater_support@supportportal.com; bartholi@msu.edu; info@cityofflint.com; senator@stabenow.senate.gov; bennettc4@michigan.gov
Subject: RE: Ticket #23002-490657 Response Sent
Date: Thu, 7 May 2015 16:41:38 -0400

Hello,

It is unfortunate that you don't track local drinking water information. So in essence your tracking efforts are limited to the auspices of NRCS Water Division only for the conservation of farming and other natural (non-human) resources. What if, by chance, the local water source is not being accurate in their reporting of safe drinking water and source supply?

Thank you,
 Sheila

<http://mi.water.usgs.gov/pubs/MISC/RTSMI-0121/pdf/WTO222b.pdf>

From: safewater_support@supportportal.com
To: sheila.bw@hotmail.com
Date: Thu, 20 Feb 2014 08:25:04 -0500
Subject: Ticket #23002-490657 Response Sent

The Safe Drinking Water Hotline has responded to your question(s).

Hello,

Thank you for contacting the Safe Drinking Water Hotline. You had some concerns regarding your local water quality. Please review the information included below:

The Safe Drinking Water Hotline does not track local drinking water information. The best source of specific information about your drinking water is your water supplier. Water suppliers that serve the same people year-round are required to send their customers an annual water quality report called a Consumer Confidence Report (CCR). The CCR describes any contaminants that have been detected in your drinking water, how these detection levels compare to health-based national drinking water standards, and the source of your drinking water. To obtain a copy of your CCR, you may search online at <http://cfpub.epa.gov/safewater/ccr/index.cfm>.

If your water system's report is not online, you should contact your local water provider to obtain a copy of this report. To find the telephone number for your local water provider, please check your water utility bill, your local phone book, or search online at <http://cfpub.epa.gov/safewater/ccr/index.cfm>.

If your city has a population in excess of 100,000, they are obligated to publish the reports online. Many local governments have sites where reports can be posted, even if a system itself does not have a site. EPA will make links from its Web site (<http://water.epa.gov/drink/index.cfm>) to all the reports of which it is aware (Preparing Your Drinking Water Consumer Confidence Report: Revised Guidance for Community Water Suppliers), EPA816-R-05-002).

If your city has not made the 2012 report available, please contact your state water program. They are the regulatory and enforcement agency for all public water systems in your state. The state water program should help you find the data. You can find contact information to your state by following the link below:

<http://water.epa.gov/drink/local/index.cfm>. <http://cfpub.epa.gov/safewater/ccr/index.cfm>.

EPA's Safe Drinking Water Hotline answers questions about the regulations and programs developed in response to the Safe Drinking Water Act. The Safe Drinking Water Hotline provides information, including access to publications, on EPA's drinking water standards, source water protection, and underground injection wells. The Hotline also provides referrals to state public water supply supervision programs, state underground injection control programs, and state laboratory certification programs.

If you have additional questions, you may contact the Safe Drinking Water Hotline at the following number: (800) 426-4791 -- Toll Free

For more information, please visit EPA's Office of Ground Water and Drinking Water Internet web site:

<http://water.epa.gov/drink/index.cfm>.

Thank you for your interest in safe drinking water.

Ticket Information:

Ticket #: 23002-490657

Date Created: 2/19/2014 02:18 PM EST

Subject: Water Quality Assessment

Question: I live in Flint Michigan. What I have learned is Michigan appears to have 2012 and 2014 reports but neither are being reported by EPA. On this side of reporting for this data, we have no information as to the status of the 2012 or 2014 data. There are automotive plants in my area and the water quality is suspected to be less than satisfactory for residents.

To update or check the status of this Ticket:

1. Go to: <http://safewater.supportportal.com/link/portal/23002/23015/Ticket/490657>
2. Log in, and you will be automatically taken to the Ticket page.

Rennaker, Joanne (DEQ)

From: Prysby, Mike (DEQ)
Sent: Friday, October 02, 2015 9:17 AM
To: Rosenthal, Adam (DEQ)
Cc: Busch, Stephen (DEQ)
Subject: FW: Lead & Copper Report
Attachments: Updated Final Report.pdf

Flint's updated PB/CU report

Michael Prysby, P.E.
District Engineer
Office of Drinking Water and Municipal Assistance
517 290-8817

From: Michael Glasgow [<mailto:mglasgow@cityofflint.com>]
Sent: Friday, October 02, 2015 9:02 AM
To: Prysby, Mike (DEQ)
Subject: Lead & Copper Report

Mike,

Here was the last version of the lead & copper report after talking with Steve and Adam a month ago.

--

Mike Glasgow
Utilities Administrator
City of Flint
1101 S. Saginaw St.
Flint, MI 48502
(810)766-7135 ext. 2602

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
OFFICE OF DRINKING WATER AND MUNICIPAL ASSISTANCE
**LEAD AND COPPER REPORT AND
CONSUMER NOTICE OF LEAD RESULT
CERTIFICATE FOR COMMUNITY WATER SUPPLY**



Issued under authority of 1976 PA 399, MCL 325.1001 *et al.*, and Administrative Rules, as amended.

Failure to submit this information is a violation of Act 399 and may subject the water supply to enforcement penalties.

Administrative Rule R 325.10710d requires water supplies to report lead and copper monitoring information within 10 days after the end of the monitoring period. This form may be used to meet this requirement. Submit the information to the appropriate Department of Environmental Quality (DEQ) district office. For district office addresses, visit www.michigan.gov/deq and click on Locations.

1. Water Supply Name: City of Flint Water Plant
2. County: Genesee 3. WSSN: 2310
4. Population: 99,763 5. Monitoring Period: From: 1/1/15 To: 6/30/15
6. Minimum # of Samples Required: 60 7. # of Samples Taken: 69
8. Name of Certified Laboratory: DEQ Drinking Water Laboratory

9. SAMPLE CRITERIA:

Yes	No	Explain No responses in Comments block.
☐	☒	a. Are the same sampling points used as in the previous monitoring period?
☐	☒	b. Are all samples from Tier 1 sites?
☒	☐	c. Are all samples from Tier 1, 2, or 3 sites giving Tier 1 priority?
☒	☐	d. If no Tier 1, 2, or 3 sites are available, do all sites have plumbing materials commonly found at other locations in the system?
☒	☐	e. Is the minimum number of lead service line samples taken (when applicable)?

For more information see *Instructions* paragraph 11, subparagraph "Sample Category."

Comments: Revised report after conference call with DEQ staff. Two samples were removed from list for not meeting sample criteria, and due to population the number of samples required was reduced to 60.

10. NAME:

Name: Michael Glasgow
Title: Utilities Administrator Phone: 810-766-7135 Date: 8/20/2015

11. TAP SAMPLING DATA: (Use additional sheets as needed)

Water Supply Name/County City of Flint Water PlantWSSN 2310

RESULTS:

Sample Location	Sample Date	Sample Category ¹	Service Lines ²	Bldg Plumb-ing ²	Lead (ppb)	Copper (ppb)	Lab #
2205 Flusing Rd	2/15/15	1	L	C,P	N.D.	0.13	54663
1809 Stevenson St.	2/10/15	1	L	P	10	N.D.	54956
4202 Custer Ave.	3/4/15	1	L	C,P	6	0.27	56223
401 E. Newall St.	3/2/15	1	L	P	5	N.D.	56225
215 Browning Ave.	3/21/15	1	L	C,P	N.D.	0.16	56226
2615 Trumbull Ave.	2/27/15	1	L	C,P	3	N.D.	56227
201 Browning Ave.	3/5/15	1	L	P	N.D.	N.D.	56228
1224 Decker St.	3/17/15	1	L	C,P	13	0.10	57728
1220 Decker St.	3/17/15	1	L	P	4	N.D.	57730
1379 Washington Ave.	3/19/15	1	L	P	8	N.D.	57731
1383 Washington Ave.	3/19/15	1	L	C,P	6	0.17	57734
1372 Washington Ave.	3/19/15	1	L	C,P	2	0.14	57733
1367 Washington Ave.	3/17/15	1	L	P	1	N.D.	57735
1701 Marquette Dr.	3/14/15	1	L	C,P	1	0.19	57736
778 Bundy Ave.	3/24/15	1	L	P	N.D.	N.D.	58413
3714 Beecher Rd.	3/24/15	1	L	C	2	0.52	58414
1016 Ingleside Ave.	4/9/15	1	L	C,P	7	0.07	59749
1818 Rock Creek Ln.	4/6/15	1	L	C,P	3	0.11	59750
3010 Cheyenne St.	4/3/15	1	L	C,P	5	0.10	59751
2606 Mountain Ave.	4/15/2015	1	L	P	N.D.	N.D.	60546

¹ Sample Category: Enter a number 1 through 6 to designate the category of tap sample site. For more information see *Instructions* paragraph 11, subparagraph "Sample Category."

² Materials used for service line and building plumbing: Enter C = copper; G = galvanized; L = lead; or P = plastic.

TO BE DETERMINED BY DEQ

	90 th percentile	Ave	Max	# > AL
Pb				
Cu				

11. TAP SAMPLING DATA: (Use additional sheets as needed)

Water Supply Name/County City of Flint Water PlantWSSN 2310

RESULTS:

Sample Location	Sample Date	Sample Category ¹	Service Lines ²	Bldg Plumb-ing ²	Lead (ppb)	Copper (ppb)	Lab #
2020 Crooked Ln.	4/24/15	1	L	C,P	5	0.10	61845
310 E. Moore St.	4/22/15	1	L	P	5	N.D.	61846
631 Alvord Ave.	5/6/15	1	L	P	42	N.D.	63410
216 Browning Ave.	5/7/15	1	L	C,P	22	0.31	63411
3714 Beecher Rd.	5/14/15	1	L	C,P	8	0.15	64283
912 Lexington Ave.	5/15/15	1	L	P	6	N.D.	64285
349 Robbie Ln.	5/31/15	1	L	P	2	N.D.	67428
353 Robbie Ln.	5/30/15	1	L	C,P	5	0.11	67427
341 Robbie Ln.	5/31/15	1	L	C,P	3	0.05	67426
328 Robbie Ln.	5/30/15	1	L	C,P	2	0.09	67425
357 Robbie Ln.	5/31/15	1	L	C	3	0.20	67424
344 Robbie Ln.	5/31/15	1	L	C,P	4	0.11	67423
1807 Oren Ave.	6/8/15	1	L	P	21	N.D.	68023
421 Lyon St.	6/14/15	1	L	C,P	7	0.14	68788
1528 Delaware Ave.	6/12/15	1	L	P	3	N.D.	68789
3811 Brentwood Dr.	6/14/15	1	L	P	42	N.D.	68790
1615 S. Franklin Ave.	6/14/15	1	L	P	N.D.	N.D.	68791
853 E. 7th St.	6/12/15	1	L	C,P	7	0.07	68792
1150 Woodside Dr.	6/14/15	1	L	P	29	N.D.	68793
547 Copeman Blvd.	6/15/14	1	L	P	18	N.D.	68794

¹ Sample Category: Enter a number 1 through 6 to designate the category of tap sample site. For more information see *Instructions* paragraph 11, subparagraph "Sample Category."

² Materials used for service line and building plumbing: Enter C = copper; G = galvanized; L = lead; or P = plastic.

TO BE DETERMINED BY DEQ

	90 th percentile	Ave	Max	# > AL
Pb				
Cu				

11. TAP SAMPLING DATA: (Use additional sheets as needed)

Water Supply Name/County City of Flint Water PlantWSSN 2310

RESULTS:

Sample Location	Sample Date	Sample Category ¹	Service Lines ²	Bldg Plumb-ing ²	Lead (ppb)	Copper (ppb)	Lab #
2114 Flushing Rd.	6/30/15	1	L	P	5	0.05	71170
709 Frost St.	6/30/15	1	L	P	2	N.D.	72033
920 Stocker Ave.	6/21/15	1	L	P	1	N.D.	69622
742 Lincoln Ave.	6/19/15	1	L	P	2	N.D.	69623
3517 Bennett Ave.	6/24/15	1	L	C,P	3	0.06	69624
1730 Overhill Dr.	6/22/15	1	L	C,P	1	0.08	69625
2117 Stanford Ave.	6/23/15	1	L	C,P	5	0.08	69626
2432 Beta Ln.	6/21/15	1	L	P	N.D.	N.D.	69627
2023 Miller Rd.	6/21/15	1	L	C,P	3	0.06	69628
721 East St. Apt #2	6/25/15	4	L	C,P	10	0.16	70222
3814 Whitter	6/25/15	1	L	P	2	N.D.	70223
3120 Norwood	6/24/15	1	L	P	5	N.D.	70224
2122 Pierce St.	6/21/15	1	L	P	2	N.D.	70225
3521 Bennett Ave.	6/25/15	1	L	P	3	N.D.	70226
1602 Raspberry Ln.	6/24/15	1	L	P	N.D.	N.D.	70227
1809 Lynbrook	6/26/15	1	L	P	3	N.D.	70228
2112 Sherff	6/24/15	1	L	C,P	9	0.06	70229
1205 Blanchard Ave.	6/24/15	1	L	C,P	11	0.05	70230
860 Schafer St.	6/26/15	1	L	C,P	N.D.	0.06	70231
2110 Flushing Rd.	6/30/15	1	L	C	N.D.	0.10	71158

¹ Sample Category: Enter a number 1 through 6 to designate the category of tap sample site. For more information see *Instructions* paragraph 11, subparagraph "Sample Category."

² Materials used for service line and building plumbing: Enter C = copper; G = galvanized; L = lead; or P = plastic.

TO BE DETERMINED BY DEQ

	90 th percentile	Ave	Max	# > AL
Pb				
Cu				

11. TAP SAMPLING DATA: (Use additional sheets as needed)

Water Supply Name/County City of Flint Water PlantWSSN 2310

RESULTS:

Sample Location	Sample Date	Sample Category ¹	Service Lines ²	Bldg Plumb- ing ²	Lead (ppb)	Copper (ppb)	Lab #
2300 Flushing Rd.	6/29/15	1	L	C	3	0.28	71159
2130 Flushing Rd.	6/28/15	1	L	C,P	6	0.05	71160
2202 Flushing Rd.	6/29/15	1	L	C,P	2	0.06	71162
2429 Flushing Rd.	6/30/15	1	L	C,P	N.D.	0.06	71163
4013 Brownell Blvd.	6/29/15	1	L	C,P	2	0.08	71165
2414 Flushing Rd.	6/30/15	1	L	P	N.D.	N.D.	71166
1914 Penbrook Ln	6/29/15	1	L	P	2	N.D.	71167
3901 Leedra St.	6/26/15	1	L	P	N.D.	N.D.	71168
3142 McClure	6/26/15	1	L	P	3	N.D.	71169

¹ Sample Category: Enter a number 1 through 6 to designate the category of tap sample site. For more information see *Instructions* paragraph 11, subparagraph "Sample Category."

² Materials used for service line and building plumbing: Enter C = copper; G = galvanized; L = lead; or P = plastic.

TO BE DETERMINED BY DEQ

	90 th percentile	Ave	Max	# > AL
Pb				
Cu				

Consumer Notice of Lead Result in Drinking Water

Water Supply Name:	City of Flint		
County:	Genesee	WSSN:	2310
Sample Location:	401 E. Newall St.	Date Sampled:	3/2/15

Thank you for participating in the lead and copper monitoring of drinking water. The levels of lead and copper found at your location are in the table below.

Key to Table	Contaminant	AL	MCLG	Your Result
Action Level (AL): The concentration of a contaminant which, if exceeded, triggers treatment or other requirements that a water system must follow. Maximum Contaminant Level Goal (MCLG): The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety. ppb: parts per billion or micrograms per liter.	Lead (ppb)	15	0	5
	Copper (ppb)	1300	1300	Not Detected

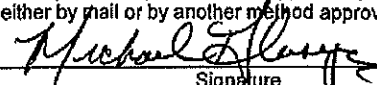
Lead can cause serious health problems if too much enters your body from drinking water or other sources. It can cause damage to the brain and kidneys, and it can interfere with the production of red blood cells that carry oxygen to all parts of your body. The greatest risk of lead exposure is to infants, young children, and pregnant women. Scientists have linked the effects of lead on the brain with lowered IQ in children. Adults with kidney problems and high blood pressure can be affected by low levels of lead more than healthy adults. Lead is stored in the bones, and it can be released later in life. During pregnancy, the child receives lead from the mother's bones, which may affect brain development.

To reduce exposure to lead in drinking water:

- *Run your water to flush out lead.* Run the water until it becomes cold.
- *Use cold water for cooking and preparing baby formula.* Do not cook with or drink water from the hot water tap; lead dissolves more easily in hot water.
- *Do not boil water to remove lead.* Boiling water will not reduce lead levels.
- *Look for alternative sources or treatment of water.* If your lead result is above 15 ppb, you may want to consider purchasing bottled water or a water filter. Read the package to be sure the filter is approved to reduce lead or contact NSF International at 800-NSF-8010, or www.nsf.org for information on performance standards for water filters.
- *Identify if your plumbing fixtures contain lead.* New faucets, fittings, and valves, may contain up to 8 percent lead including those advertised or labeled as "lead-free" and may contribute lead to drinking water. Consumers should be aware of this when choosing fixtures and take appropriate precautions.

Although the primary sources of lead exposure for most children are deteriorating lead-based paint, lead-contaminated dust, and lead-contaminated soil, the U.S. EPA estimates that 10 to 20 percent of human exposure to lead may come from drinking water.

For more information, contact us at: City of Flint Water Plant (810) 787-6537.
 For more information on reducing lead exposure around your home and the health effects of lead, visit the U.S. EPA's Web site at www.epa.gov/lead, call the National Lead Information Center at 800-424-LEAD, or contact your health care provider.

Certification: I certify that this public water supply has provided the consumer notice of lead result to persons served at each of the taps that was tested, either by mail or by another method approved by the DEQ, within 30 days of knowing the result. The Notice includes required content.	WSSN: <u>2310</u>
 Signature	<u>UTILITIES ADMINISTRATOR</u> Title
	<u>3/17/15</u> Date Sent to Consumer

Reminder to water supplier: Complete this certification on only one (1) example copy of a notice sent to a consumer and submit it to the DEQ.

Rennaker, Joanne (DEQ)

From: Michael Glasgow <mglasgow@cityofflint.com>
Sent: Friday, October 02, 2015 9:02 AM
To: Prysby, Mike (DEQ)
Subject: Lead & Copper Report
Attachments: Updated Final Report.pdf

Mike,

Here was the last version of the lead & copper report after talking with Steve and Adam a month ago.

--

Mike Glasgow
Utilities Administrator
City of Flint
1101 S. Saginaw St.
Flint, MI 48502
(810)766-7135 ext. 2602

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
OFFICE OF DRINKING WATER AND MUNICIPAL ASSISTANCE
**LEAD AND COPPER REPORT AND
CONSUMER NOTICE OF LEAD RESULT
CERTIFICATE FOR COMMUNITY WATER SUPPLY**



Issued under authority of 1976 PA 399, MCL 325.1001 *et al.*, and Administrative Rules, as amended.
Failure to submit this information is a violation of Act 399 and may subject the water supply to enforcement penalties.

Administrative Rule R 325.10710d requires water supplies to report lead and copper monitoring information within 10 days after the end of the monitoring period. This form may be used to meet this requirement. Submit the information to the appropriate Department of Environmental Quality (DEQ) district office. For district office addresses, visit www.michigan.gov/deq and click on Locations.

1. Water Supply Name: City of Flint Water Plant
2. County: Genesee 3. WSSN: 2310
4. Population: 99,763 5. Monitoring Period: From: 1/1/15 To: 6/30/15
6. Minimum # of Samples Required: 60 7. # of Samples Taken: 69
8. Name of Certified Laboratory: DEQ Drinking Water Laboratory

9. SAMPLE CRITERIA:

Yes	No	Explain No responses in Comments block.
☐	☒	a. Are the same sampling points used as in the previous monitoring period?
☐	☒	b. Are all samples from Tier 1 sites?
☒	☐	c. Are all samples from Tier 1, 2, or 3 sites giving Tier 1 priority?
☒	☐	d. If no Tier 1, 2, or 3 sites are available, do all sites have plumbing materials commonly found at other locations in the system?
☒	☐	e. Is the minimum number of lead service line samples taken (when applicable)?

For more information see *Instructions* paragraph 11, subparagraph "Sample Category."

Comments: Revised report after conference call with DEQ staff. Two samples were removed from list for not meeting sample criteria, and due to population the number of samples required was reduced to 60.

10. NAME:

Name: Michael Glasgow
Title: Utilities Administrator Phone: 810-766-7135 Date: 8/20/2015

11. TAP SAMPLING DATA: (Use additional sheets as needed)

Water Supply Name/County City of Flint Water PlantWSSN 2310

RESULTS:

Sample Location	Sample Date	Sample Category ¹	Service Lines ²	Bldg Plumb-ing ²	Lead (ppb)	Copper (ppb)	Lab #
2205 Flusing Rd	2/15/15	1	L	C,P	N.D.	0.13	54663
1809 Stevenson St.	2/10/15	1	L	P	10	N.D.	54956
4202 Custer Ave.	3/4/15	1	L	C,P	6	0.27	56223
401 E. Newall St.	3/2/15	1	L	P	5	N.D.	56225
215 Browning Ave.	3/21/15	1	L	C,P	N.D.	0.16	56226
2615 Trumbull Ave.	2/27/15	1	L	C,P	3	N.D.	56227
201 Browning Ave.	3/5/15	1	L	P	N.D.	N.D.	56228
1224 Decker St.	3/17/15	1	L	C,P	13	0.10	57728
1220 Decker St.	3/17/15	1	L	P	4	N.D.	57730
1379 Washington Ave.	3/19/15	1	L	P	8	N.D.	57731
1383 Washington Ave.	3/19/15	1	L	C,P	6	0.17	57734
1372 Washington Ave.	3/19/15	1	L	C,P	2	0.14	57733
1367 Washington Ave.	3/17/15	1	L	P	1	N.D.	57735
1701 Marquette Dr.	3/14/15	1	L	C,P	1	0.19	57736
778 Bundy Ave.	3/24/15	1	L	P	N.D.	N.D.	58413
3714 Beecher Rd.	3/24/15	1	L	C	2	0.52	58414
1016 Ingleside Ave.	4/9/15	1	L	C,P	7	0.07	59749
1818 Rock Creek Ln.	4/6/15	1	L	C,P	3	0.11	59750
3010 Cheyenne St.	4/3/15	1	L	C,P	5	0.10	59751
2606 Mountain Ave.	4/15/2015	1	L	P	N.D.	N.D.	60546

¹ Sample Category: Enter a number 1 through 6 to designate the category of tap sample site. For more information see *Instructions* paragraph 11, subparagraph "Sample Category."

² Materials used for service line and building plumbing: Enter C = copper; G = galvanized; L = lead; or P = plastic.

TO BE DETERMINED BY DEQ

	90 th percentile	Ave	Max	# > AL
Pb				
Cu				

11. TAP SAMPLING DATA: (Use additional sheets as needed)

Water Supply Name/County City of Flint Water PlantWSSN 2310

RESULTS:

Sample Location	Sample Date	Sample Category ¹	Service Lines ²	Bldg Plumb-ing ²	Lead (ppb)	Copper (ppb)	Lab #
2020 Crooked Ln.	4/24/15	1	L	C,P	5	0.10	61845
310 E. Moore St.	4/22/15	1	L	P	5	N.D.	61846
631 Alvord Ave.	5/6/15	1	L	P	42	N.D.	63410
216 Browning Ave.	5/7/15	1	L	C,P	22	0.31	63411
3714 Beecher Rd.	5/14/15	1	L	C,P	8	0.15	64283
912 Lexington Ave.	5/15/15	1	L	P	6	N.D.	64285
349 Robbie Ln.	5/31/15	1	L	P	2	N.D.	67428
353 Robbie Ln.	5/30/15	1	L	C,P	5	0.11	67427
341 Robbie Ln.	5/31/15	1	L	C,P	3	0.05	67426
328 Robbie Ln.	5/30/15	1	L	C,P	2	0.09	67425
357 Robbie Ln.	5/31/15	1	L	C	3	0.20	67424
344 Robbie Ln.	5/31/15	1	L	C,P	4	0.11	67423
1807 Oren Ave.	6/8/15	1	L	P	21	N.D.	68023
421 Lyon St.	6/14/15	1	L	C,P	7	0.14	68788
1528 Delaware Ave.	6/12/15	1	L	P	3	N.D.	68789
3811 Brentwood Dr.	6/14/15	1	L	P	42	N.D.	68790
1615 S. Franklin Ave.	6/14/15	1	L	P	N.D.	N.D.	68791
853 E. 7th St.	6/12/15	1	L	C,P	7	0.07	68792
1150 Woodside Dr.	6/14/15	1	L	P	29	N.D.	68793
547 Copeman Blvd.	6/15/14	1	L	P	18	N.D.	68794

¹ Sample Category: Enter a number 1 through 6 to designate the category of tap sample site. For more information see *Instructions* paragraph 11, subparagraph "Sample Category."

² Materials used for service line and building plumbing: Enter C = copper; G = galvanized; L = lead; or P = plastic.

TO BE DETERMINED BY DEQ

	90 th percentile	Ave	Max	# > AL
Pb				
Cu				

11. TAP SAMPLING DATA: (Use additional sheets as needed)

Water Supply Name/County City of Flint Water Plant WSSN 2310

RESULTS:

Sample Location	Sample Date	Sample Category ¹	Service Lines ²	Bldg Plumb-ing ²	Lead (ppb)	Copper (ppb)	Lab #
2114 Flushing Rd.	6/30/15	1	L	P	5	0.05	71170
709 Frost St.	6/30/15	1	L	P	2	N.D.	72033
920 Stocker Ave.	6/21/15	1	L	P	1	N.D.	69622
742 Lincoln Ave.	6/19/15	1	L	P	2	N.D.	69623
3517 Bennett Ave.	6/24/15	1	L	C,P	3	0.06	69624
1730 Overhill Dr.	6/22/15	1	L	C,P	1	0.08	69625
2117 Stanford Ave.	6/23/15	1	L	C,P	5	0.08	69626
2432 Beta Ln.	6/21/15	1	L	P	N.D.	N.D.	69627
2023 Miller Rd.	6/21/15	1	L	C,P	3	0.06	69628
721 East St. Apt #2	6/25/15	4	L	C,P	10	0.16	70222
3814 Whitter	6/25/15	1	L	P	2	N.D.	70223
3120 Norwood	6/24/15	1	L	P	5	N.D.	70224
2122 Pierce St.	6/21/15	1	L	P	2	N.D.	70225
3521 Bennett Ave.	6/25/15	1	L	P	3	N.D.	70226
1602 Raspberry Ln.	6/24/15	1	L	P	N.D.	N.D.	70227
1809 Lynbrook	6/26/15	1	L	P	3	N.D.	70228
2112 Sherff	6/24/15	1	L	C,P	9	0.06	70229
1205 Blanchard Ave.	6/24/15	1	L	C,P	11	0.05	70230
860 Schafer St.	6/26/15	1	L	C,P	N.D.	0.06	70231
2110 Flushing Rd.	6/30/15	1	L	C	N.D.	0.10	71158

¹ Sample Category: Enter a number 1 through 6 to designate the category of tap sample site. For more information see *Instructions* paragraph 11, subparagraph "Sample Category."

² Materials used for service line and building plumbing: Enter C = copper; G = galvanized; L = lead; or P = plastic.

TO BE DETERMINED BY DEQ

	90 th percentile	Ave	Max	# > AL
Pb				
Cu				

11. TAP SAMPLING DATA: (Use additional sheets as needed)

Water Supply Name/County City of Flint Water PlantWSSN 2310

RESULTS:

Sample Location	Sample Date	Sample Category ¹	Service Lines ²	Bldg Plumb-ing ²	Lead (ppb)	Copper (ppb)	Lab #
2300 Flushing Rd.	6/29/15	1	L	C	3	0.28	71159
2130 Flushing Rd.	6/28/15	1	L	C,P	6	0.05	71160
2202 Flushing Rd.	6/29/15	1	L	C,P	2	0.06	71162
2429 Flushing Rd.	6/30/15	1	L	C,P	N.D.	0.06	71163
4013 Brownell Blvd.	6/29/15	1	L	C,P	2	0.08	71165
2414 Flushing Rd.	6/30/15	1	L	P	N.D.	N.D.	71166
1914 Penbrook Ln	6/29/15	1	L	P	2	N.D.	71167
3901 Leedra St.	6/26/15	1	L	P	N.D.	N.D.	71168
3142 McClure	6/26/15	1	L	P	3	N.D.	71169

¹ Sample Category: Enter a number 1 through 6 to designate the category of tap sample site. For more information see *Instructions* paragraph 11, subparagraph "Sample Category."

² Materials used for service line and building plumbing: Enter C = copper; G = galvanized; L = lead; or P = plastic.

TO BE DETERMINED BY DEQ

	90 th percentile	Ave	Max	# > AL
Pb				
Cu				

Consumer Notice of Lead Result in Drinking Water

Water Supply Name: City of Flint
 County: Genesee WSSN: 2310
 Sample Location: 401 E. Newall St. Date Sampled: 3/2/15

Thank you for participating in the lead and copper monitoring of drinking water. The levels of lead and copper found at your location are in the table below.

Key to Table	Contaminant	AL	MCLG	Your Result
Action Level (AL): The concentration of a contaminant which, if exceeded, triggers treatment or other requirements that a water system must follow. Maximum Contaminant Level Goal (MCLG): The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety. ppb: parts per billion or micrograms per liter.	Lead (ppb)	15	0	5
	Copper (ppb)	1300	1300	Not Detected

Lead can cause serious health problems if too much enters your body from drinking water or other sources. It can cause damage to the brain and kidneys, and it can interfere with the production of red blood cells that carry oxygen to all parts of your body. The greatest risk of lead exposure is to infants, young children, and pregnant women. Scientists have linked the effects of lead on the brain with lowered IQ in children. Adults with kidney problems and high blood pressure can be affected by low levels of lead more than healthy adults. Lead is stored in the bones, and it can be released later in life. During pregnancy, the child receives lead from the mother's bones, which may affect brain development.

To reduce exposure to lead in drinking water:

- *Run your water to flush out lead.* Run the water until it becomes cold.
- *Use cold water for cooking and preparing baby formula.* Do not cook with or drink water from the hot water tap; lead dissolves more easily in hot water.
- *Do not boil water to remove lead.* Boiling water will not reduce lead levels.
- *Look for alternative sources or treatment of water.* If your lead result is above 15 ppb, you may want to consider purchasing bottled water or a water filter. Read the package to be sure the filter is approved to reduce lead or contact NSF International at 800-NSF-8010, or www.nsf.org for information on performance standards for water filters.
- *Identify if your plumbing fixtures contain lead.* New faucets, fittings, and valves, may contain up to 8 percent lead including those advertised or labeled as "lead-free" and may contribute lead to drinking water. Consumers should be aware of this when choosing fixtures and take appropriate precautions.

Although the primary sources of lead exposure for most children are deteriorating lead-based paint, lead-contaminated dust, and lead-contaminated soil, the U.S. EPA estimates that 10 to 20 percent of human exposure to lead may come from drinking water.

For more information, contact us at: City of Flint Water Plant (810) 787-6537.
 For more information on reducing lead exposure around your home and the health effects of lead, visit the U.S. EPA's Web site at www.epa.gov/lead, call the National Lead Information Center at 800-424-LEAD, or contact your health care provider.

Certification: WSSN: 2310
 I certify that this public water supply has provided the consumer notice of lead result to persons served at each of the taps that was tested, either by mail or by another method approved by the DEQ, within 30 days of knowing the result. The Notice includes required content.
Michael L. Flange UTILITIES ADMINISTRATOR 3/17/15
 Signature Title Date Sent to Consumer
 Reminder to water supplier: Complete this certification on only one (1) example copy of a notice sent to a consumer and submit it to the DEQ.

Rennaker, Joanne (DEQ)

From: Crooks, Jennifer <crooks.jennifer@epa.gov>
Sent: Thursday, October 01, 2015 5:57 PM
To: Rosenthal, Adam (DEQ); Prysby, Mike (DEQ); Busch, Stephen (DEQ)
Cc: Benzie, Richard (DEQ); Philip, Kris (DEQ); Poy, Thomas
Subject: RE: question for ORD/Mike Schock

I'm out of the office tomorrow, so if you've been able to track down a schematic of the Flint's treatment plant, perhaps you can forward it to Mike Schock in Cincinnati? His email is schock.michael@epa.gov.

If not, I'm back in the office on Monday and maybe you can steer me toward the City to obtain a schematic. I'll check in with you then.

Thank you all.

Jennifer

From: Crooks, Jennifer
Sent: Wednesday, September 30, 2015 11:51 AM
To: Rosenthal, Adam (DEQ); Prysby, Mike (DEQ); 'Busch, Stephen (DEQ)'
Cc: Richard Benzie; kris philip; Thomas Poy
Subject: question for ORD/Mike Schock
Importance: High

Tom P told me that your Director, Dan Wyatt, asked that his staff work with ORD/Mike Schock and Darren Lytle. Mike and Darren are both working on getting up to speed on the basics of the Flint water treatment scheme. I had a request from Mike Schock this morning about information about treatment and various sample results for Flint. So, I sent them the final OEL report from Flint that is on their website, as well as the 5 MORs that are also on Flint's website.

Mike had an additional question; he's looking for a schematic of the Flint treatment process to help him evaluate the possible successfulness of phosphate treatment at Flint. See Mike's brief explanation below.

I don't want to make this a big project if it's not handy; would Mike Glasgow have this schematic?

Thank you all! I know your time is very valuable right now.

Jennifer

From: Schock, Michael
Sent: Wednesday, September 30, 2015 10:57 AM
To: Crooks, Jennifer
Cc: Lytle, Darren
Subject: RE: more pdfs

Jennifer;

Thank you so much!

Would you happen to know if any other report has, or that you might have somewhere, a currently-valid process schematic for the entire set of treatments done at the Flint plant? It would be helpful to have a better picture of where things like softening, type of coagulant and GAC fit into the picture. There are several potential interrelationships that would affect the successfulness of the phosphate treatment proposed and dosage, and the instability cause by the major chemistry change from Detroit finished water (which I understand was from their Lake Huron-fed plant).

--Mike

From: Crooks, Jennifer

Sent: Wednesday, September 30, 2015 9:29 AM

To: Schock, Michael; Lytle, Darren

Subject: more pdfs

April 2015 MOR is not on the website.

Rennaker, Joanne (DEQ)

From: Robert Bincsik <rbincsik@cityofflint.com>
Sent: Thursday, October 01, 2015 5:22 PM
To: Prysby, Mike (DEQ)
Subject: Fwd: Flint Elementary School water supply lines
Attachments: School water supply lines.xls; School water supply lines.xls

----- Forwarded message -----

From: Alan Roberts <aroberts@cityofflint.com>
Date: Thu, Oct 1, 2015 at 12:37 PM
Subject: Fwd: Flint Elementary School water supply lines
To: Robert Bincsik <rbincsik@cityofflint.com>

Rob,

Here is the spreadsheet updated with the Northwestern, Southwestern, Admin building and food service facility information.

Cordially,

Alan Roberts

----- Forwarded message -----

From: Alan Roberts <aroberts@cityofflint.com>
Date: Wed, Sep 30, 2015 at 3:03 PM
Subject: Flint Elementary School water supply lines
To: Robert Bincsik <rbincsik@cityofflint.com>

Rob,

Per your instructions, please find attached a spreadsheet of data for the listing of selected schools you provided.

Also, see the link for the Google map.

Cordially,

Alan Roberts

--

Thank you,

Robert Bincsik
Water Service Center Supervisor
City of Flint
3310 E. Court Street
Flint, MI 48506
Ph: 810.766.7202 ext. 3413
Fx: 810.743.5758

Row #	School Name	Street Address	Supply line size, inches
1	Brownell K2 Stem Academy	6302 Oxley Dr., Flint, MI 48504	4
2	Doyle Ryder Elementary School	1040 N. Saginaw St., Flint, MI 48503	4
3	Durant-Tuuri-Mott Elementary School	1518 University Ave., Flint, MI 48504	6
4	Eisenhower Elementary School	1235 Pershing St., Flint, MI 48503	4
5	Freeman Elementary School	4001 Ogema Ave., Flint, MI 48507	4
6	Holmes 3-6 Stem Academy	6602 Oxley Dr., Flint, MI 48504	6
7	Neithercut Elementary School	2010 Crestbrook Ln., Flint, MI 48507	4
8	Pierce Elementary School	1101 W. Vernon Dr., Flint, MI 48503	(n/a)
9	Potter Elementary School	2500 N. Averill Ave., Flint, MI 48506	4
10	Northridge Academy	530 W. Pierson Rd., Flint, MI 48505	4
11	International Academy of Flint	2820 S. Saginaw St., 48503	4
12	Richfield Public School Academy	3807 N. Center Rd., Flint, MI 48506	2
13	Powers Catholic High School	1505 W. Court St., Flint, MI 48503	8
14	Michigan School for the Deaf	1235 W. Court St., Flint, MI 48503	8
15	Mott Middle College High School	1401 E. Court St., Flint, MI 48503	8

Supply line material	Map page	Street name	house no.	Notes
cast iron	D-2 mains	Oxley Dr.	6302	
cast iron	H-10 mains	N. Saginaw St.	1040	
cast iron	F-12 mains	University Ave.	1518	
cast iron	F-14 mains	Pershing St.	1235	
cast iron	K-17 mains	Ogema Ave.	4001	
cast iron	D-2 mains	Oxley Dr.	6602	
cast iron	F-17 mains	Crestbrook Ln.	2010	
(n/a)	K-12 mains	W. Vernon Dr.	1101	only the 8 inch fire line noted on dwg.
cast iron	M-8 mains	N. Averill Ave.	2500	
cast iron	F-4 mains	W. Pierson Rd.	530	noted on dwg as St. Agnes Church and School
cast iron	I-15 mains	S. Saginaw St.	2820	noted on dwg as Lincoln School
copper	N-6 curb box	N. Center Rd.	3807	
cast iron	F-14 mains	W. Court St.	1505	Also see G-14 mains
cast iron	F-14 mains	W. Court St.	1235	Also see G-14 mains
ductile iron	J-11 mains	E. Court St.	1401	noted on dwg as "Student Center"

Row #	School Name	Street Address	Supply line size, inches
1	Brownell K2 Stem Academy	6302 Oxley Dr., Flint, MI 48504	4
2	Doyle Ryder Elementary School	1040 N. Saginaw St., Flint, MI 48503	4
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8	Pierce Elementary School	1101 W. Vernon Dr., Flint, MI 48503	(n/a)
9	Potter Elementary School	2500 N. Averill Ave., Flint, MI 48506	4
10	Northridge Academy	530 W. Pierson Rd., Flint, MI 48505	4
11	International Academy of Flint	2820 S. Saginaw St., 48503	4
12	Richfield Public School Academy	3807 N. Center Rd., Flint, MI 48506	2
13	Powers Catholic High School	1505 W. Court St., Flint, MI 48503	8
14	Michigan School for the Deaf	1235 W. Court St., Flint, MI 48503	8
15	Mott Middle College High School	1401 E. Court St., Flint, MI 48503	8
16	Northwestern High School	2138 W. Carpenter Rd.	8
17	Southwestern High School	1420 W. Twelfth St.	6
18	Flint City Schools Admin Building	923 E. Kearsley St.	4
19	Main Kitchen - Flint Schools	305 Walnut St.	2

Supply line material	Map page	Street name	house no.	Notes
cast iron	D-2 mains	Oxley Dr.	6302	
cast iron	H-10 mains	N. Saginaw St.	1040	
cast iron	F-12 mains	University Ave.	1518	
cast iron	F-14 mains	Pershing St.	1235	
cast iron	K-17 mains	Ogema Ave.	4001	
cast iron	D-2 mains	Oxley Dr.	6602	
cast iron	F-17 mains	Crestbrook Ln.	2010	
(n/a)	K-12 mains	W. Vernon Dr.	1101	only the 8 inch fire line noted on dwg.
cast iron	M-8 mains	N. Averill Ave.	2500	
cast iron	F-4 mains	W. Pierson Rd.	530	noted on dwg as St. Agnes Church and School
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cast iron	F-14 mains	W. Court St.	1505	Also see G-14 mains
cast iron	F-14 mains	W. Court St.	1235	Also see G-14 mains
ductile iron	J-11 mains	E. Court St.	1401	noted on dwg as "Student Center"
ductile iron	E-1 mains	W. Carpenter Rd.	2138	
ductile iron	G-15 mains	W. Twelfth St.	1420	
cast iron	I-11	E. Kearsley St.	923	
copper	J-10 curb box	Walnut St.	305	

Rennaker, Joanne (DEQ)

From: Henry, James <jhenry@gchd.us>
Sent: Thursday, October 01, 2015 4:00 PM
To: Prysby, Mike (DEQ)
Subject: FW: MDEQ Water Testing for Flint Community Schools
Attachments: Lead_Copper_Sampling_Instructions_329915_7.pdf; Flint School List.pdf

From: Henry, James
Sent: Thursday, October 1, 2015 1:53 PM
To: 'Sitko, Anthony M'; Busch, Stephen (DEQ); Tawwab, Bilal; Lisa Ermak
Cc: Pallone, Maggie (DEQ); Wurfel, Brad (DEQ)
Subject: RE: MDEQ Water Testing for Flint Community Schools

Good afternoon, below is the message that I sent to GCHD staff today. Please let me know if there are questions or concerns.

Thanks Jim

Attached is the school list w/assignments and sampling protocol. If the school locations are more geographical convenient for someone else, please feel free to switch.

Plan

- Report to GCHD tomorrow morning at regular scheduled time to pick up the water bottles and forms.
- Report to first school office w/identification (approx. 8:30am). They will have designated three sample locations per school. The school will have followed their part of the sampling protocol.
- Follow our part of the sampling protocol. Be very specific when identifying the location on the MDEQ sample form i.e. classroom numbers, NSEW, ect.
- Return to office with samples. MDEQ will pick up samples for analysis.

Let me know if there are questions/concerns. Thanks for helping to expedite the schools sampling.

Thanks Jim

Jim Henry RS, MBA
 Environmental Health Supervisor
 Genesee County Health Department www.gchd.us
 630 S. Saginaw St., Suite 4
 Flint, MI 48502-1540
 Phone (810) 257-3618 Fax (810) 257-3125
 E-mail jhenry@gchd.us



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For a copy of the Health Department's Notice of Information Practices, contact the Health Department or visit the Health Department's website at <http://www.gchd.us/>

From: Sitko, Anthony M [<mailto:tsitko@flintschools.org>]
Sent: Wednesday, September 30, 2015 11:10 AM
To: Henry, James; Busch, Stephen (DEQ); Tawwab, Bilal; Lisa Ermak
Cc: Pallone, Maggie (DEQ); Wurfel, Brad (DEQ)
Subject: RE: MDEQ Water Testing for Flint Community Schools

Thank you.

We ask that the GCHD staff collecting samples please report to the main office of each school site to sign in as visitors and present GCHD identification. Principals will identify the selected fountains and direct you to their locations.

Respectfully,
 Tony

From: Henry, James [<mailto:jhenry@gchd.us>]
Sent: Wednesday, September 30, 2015 10:07 AM
To: Busch, Stephen (DEQ); Tawwab, Bilal; Sitko, Anthony M
Cc: Pallone, Maggie (DEQ); Wurfel, Brad (DEQ)
Subject: RE: MDEQ Water Testing for Flint Community Schools

Got it, Thanks

GCHD staff will collect samples Friday morning, if it works for the schools. I will follow up with more detailed information.

Jim Henry RS, MBA
 Environmental Health Supervisor
 Genesee County Health Department www.gchd.us
 630 S. Saginaw St., Suite 4
 Flint, MI 48502-1540
 Phone (810) 257-3618 Fax (810) 257-3125
 E-mail jhenry@gchd.us



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For a copy of the Health Department's Notice of Information Practices, contact the Health Department or visit the Health Department's website at <http://www.gchd.us/>

From: Busch, Stephen (DEQ) [<mailto:BUSCHS@michigan.gov>]
Sent: Wednesday, September 30, 2015 9:31 AM
To: Henry, James; btawwab@flintschools.org; tsitko@flintschools.org
Cc: Pallone, Maggie (DEQ); Wurfel, Brad (DEQ)
Subject: RE: MDEQ Water Testing for Flint Community Schools

A school based sampling instruction sheet is attached. We will provide copies to the Genesee County Health Department with sampling units.

A sheet should be completed for each sample. As discussed yesterday the plan is to collect 3 samples from each facility.

Stephen Busch, P.E.
 MDEQ Lansing District Coordinator
 Office of Drinking Water and Municipal Assistance
 Lansing and Jackson District Supervisor
 517-643-2314
buschs@michigan.gov

From: Pallone, Maggie (DEQ)
Sent: Tuesday, September 29, 2015 5:16 PM
To: Busch, Stephen (DEQ); Wurfel, Brad (DEQ)
Subject: FW: MDEQ Water Testing for Flint Community Schools

Steve-
 Can you work on putting together the quick info they will need?
 Thanks,
 Maggie

From: Sitko, Anthony M [<mailto:tsitko@flintschools.org>]
Sent: Tuesday, September 29, 2015 5:15 PM
To: Pallone, Maggie (DEQ) <PalloneM@michigan.gov>

Cc: Tawwab, Bilal <btawwab@flintschools.org>; Lisa Ermak <lermak@byrumfisk.com>

Subject: RE: MDEQ Water Testing for Flint Community Schools

Greetings Maggie,

Mr. Tawwab our Superintendent has a principal meeting tomorrow morning with our district principals.

If at all possible it would be good for us to be able to present them with the information needed (protocols) to prepare for the County Health Department to get the water samples from the schools on Thursday and/or Friday.

Mr. Tawwab would like to get them a memo communication in the morning to this effect. Therefore, please send the needed information that we discussed in the conference call as early as you can tomorrow for this important communication to our district principals.

Thanking you in advance,
Tony

From: Pallone, Maggie (DEQ) [<mailto:PalloneM@michigan.gov>]

Sent: Tuesday, September 29, 2015 3:12 PM

To: Sitko, Anthony M

Cc: Tawwab, Bilal; FARRIS SHARRECE; Lisa Ermak; Busch, Stephen (DEQ); Tommasulo, Karen (DEQ); Pallone, Maggie (DEQ)

Subject: RE: MDEQ Water Testing for Flint Community Schools

We would like to have this call at 4:00.

Conference call info: 1-888-251-2909

Access Code: 8426781

Please let me know if you have any questions.

Thanks!

Heather Feuerstein for Maggie Pallone
Management Assistant to
Maggie Pallone, Deputy Director and
Brad Wurfel, Communications Director
Department of Environmental Quality
517.284.6715

From: Sitko, Anthony M [<mailto:tsitko@flintschools.org>]

Sent: Tuesday, September 29, 2015 1:23 PM

To: Pallone, Maggie (DEQ)

Cc: Tawwab, Bilal; FARRIS SHARRECE; Lisa Ermak

Subject: MDEQ Water Testing for Flint Community Schools

Importance: High

Greetings, Maggie,

Thank you for taking the time to talk with me this afternoon regarding water testing for our schools. Please find the attached list of sites within the Flint Community Schools at which Superintendent Tawwab would like water tested.

Per our discussion on the phone this afternoon, the list of school buildings is attached and I will be available between 3:00PM and 5:00PM for a conference call with yourself and the identified other parties.

I await your reply on the time for the conference call.

Regards,
Tony

Drinking Water Lead & Copper Sampling Instructions

Dear Resident:

Thank you for helping to monitor for lead and copper in your drinking water. It is important that you follow these instructions so that we may collect an accurate measurement of the lead and copper in your drinking water. This sample is supposed to represent the water you would typically drink and the faucet from where you would drink the water. Call your water supply if you have any questions.

1. Select a faucet in the KITCHEN or BATHROOM that is commonly used for drinking. DO NOT sample from a laundry sink or a hose spigot as these samples cannot be used by your utility.
2. Flush the COLD water for at least 5 minutes. Let the water sit for at least 6 hours **before** you plan to collect the sample. If you have a single handle faucet, turn it to the COLD side. DO NOT use this faucet again until it is sampled.
3. Wait at least 6 hours before collecting your sample but we do not recommend sampling if the faucet has sat idle for more than 12 hours.
4. Fill the sample bottle to the neck with the "first draw" of COLD water from the faucet that you flushed at least 6 hours previous.

5. Please answer the following questions:

- a) Did you flush the water for at least 5 minutes and let it sit unused for 6 hours before you filled the bottle? ☐ Yes ☐ No
- b) What date and time did you **flush the faucet**? Date _____ Time _____ P.M.
- c) What date and time did you **fill the bottle**? Date _____ Time _____ A.M.
- d) Did you fill the bottle from the same faucet that was flushed 6 hours before? ☐ Yes ☐ No
If NO, please explain: _____
- e) Which faucet did you use to fill the bottle? ☐ Kitchen ☐ Main Bathroom ☐ Other
If OTHER, please describe: _____
- f) Is this faucet connected to a home treatment device such as a water softener, a reverse osmosis unit, an iron removal device OR is any kind of additive used in the home? ☐ Yes ☐ No
If YES, please describe: _____

Your Printed Name _____

Your Address _____

Your Signature _____

6. Attach this form to the bottle and leave it outside your front door for pick-up.

If you have any questions call:

Water Supply: _____

Manager or
Water Operator: _____

Phone: _____

Or contact:

Michigan Department of Natural Resources & Environment

DNRE contact: _____

Phone: _____

Thanks again for your help. Information on this year's lead and copper monitoring will be printed in the *Consumer Confidence Report* that will be made available to you by July 1 of next year. We will send you the results within 30 days of receiving them. Contact your utility if you have any questions.


FLINT COMMUNITY SCHOOLS
Expect More. Achieve More.

923 E. Kearsley Street • Flint, MI 48503
 Phone: (810) 760-1000 / Fax: (810) 760-7601
www.flintschools.org

**SCHOOL INFORMATION
 2015-2016**

SCHOOL	PHONE	FAX	ADDRESS	PRINCIPAL
SECONDARY SCHOOLS				
Northwestern High School	760-1780	760-6809	G-2138 W. Carpenter Rd., 48505	Tim Green
Accelerated Learning Academy (ALA)	760-8500	760-6809	G-2138 W. Carpenter Rd., 48505	Eddie Thomas
Southwestern Classical Academy	760-1400	760-7772	1420 W. Twelfth St., 48507	Cheryl Tate
ELEMENTARY SCHOOLS				
Brownell K-2 STEM Academy	760-1643	760-1538	6302 Oxley Dr., 48504	Darryl Grace
Doyle Ryder Elementary	760-8266	760-6118	1040 N. Saginaw St., 48503	Robert Bueche
Durant-Tuuri-Mott Elementary	760-1594	760-7729	1518 University Ave., 48504	Shelly Umphrey
Eisenhower Elementary	760-1607	760-7457	1235 Pershing St., 48503	Rachel Turner
Freeman Elementary	760-1797	760-6882	4001 Ogema St., 48507	Anita Miller
Holmes 3-6 STEM Academy	760-1968	760-1624	6602 Oxley Dr., 48504	Anna Johnson
Neithercut Elementary	760-1359	760-5133	2010 Crestbrook Ln., 48507	Debra Jackson-Noble
Pierce Elementary	760-1386	760-7147	1101 W. Vernon Dr., 48503	Shalonda Byas
Potter Elementary	760-1813	760-5156	2500 N. Averill Ave., 48506	Gretchen Shafer
OTHER BUILDINGS				
Administration Building	760-1000	760-7601	923 E. Kearsley St., 48503	
Central Kitchen	760-1073	760-7073	305 Walnut, 48503	

ANDREW

DAWN

ANDREW

BILL

BILL

TONY

TONY

ANDREW

BRIAN

SHERYL

BRIAN

JIM

TINA

Rennaker, Joanne (DEQ)

From: Henry, James <jhenry@gchd.us>
Sent: Thursday, October 01, 2015 3:57 PM
To: Prysby, Mike (DEQ); Busch, Stephen (DEQ)
Subject: FW: Public Health Emergency Declaration
Attachments: public health emergency announcement 10-1-15.pdf

From: Sandlin, Mary
Sent: Thursday, October 1, 2015 2:33 PM
To: GCHD-Everyone
Subject: Public Health Emergency Declaration

Mary E. Sandlin
Clerical Coordinator
Genesee County Health Department
630 S. Saginaw Street, Suite 4
Flint, MI 48502-1540
(810) 257-3812 FAX: (810) 257-3147
msandlin@gchd.us



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Genesee County Board of Commissioners

1101 BEACH STREET, ROOM 312 FLINT, MICHIGAN 48502

TELEPHONE: (810) 257-3020

FAX: (810) 257-3008

October 1, 2015

Public Health Emergency Declaration for People Using the Flint City Water Supply with the Flint River as the Source

The County is issuing an Emergency Advisory recommending that people not drink the water coming from the City of Flint using the Flint River as the water source unless:

It has been tested to assure it does not contain elevated levels of lead.

It is being filtered through a National Sanitation Foundation (NSF) approved filter certified to remove lead that meets ANSI standard 53.

Findings reported in the Detroit Free Press September 30, 2015 indicate that Governor Snyder has publically acknowledged that Flint's water supply "appears" to have problems. Snyder has conceded that "it appears that (water) lead levels could be higher or have increased," and that there are "probably things that weren't fully understood when the switch was made." This is in direct contrast to previous reports from the State that downplayed the severity of the situation and conflicted with local data released by researchers at Hurley Medical Center.

Young children are most vulnerable to leads effects, because prior to age six, their brain and central nervous system are still forming and easily susceptible to damage. For an adult to suffer significant health effects, exposure to lead would have to be sustained and more intense. Most adults who are affected by lead have been exposed in an occupational setting, such as working as a house painter or in a battery recycling plant.

Pregnant women are at special risk because the lead they absorb crosses the placenta and enters the fetus.

It's important to remember that there is no known safe level of lead in a human body. Experts now use a reference level of 5 micrograms per deciliter to identify children with blood lead levels that are much higher than most children's levels. This new level is based on the U.S. population of children ages 1-5 years who are in the highest 2.5% of children when tested for lead in their blood.

Lead in water can contribute to a child's blood lead level. The Michigan Department of Environmental Quality, who regulates municipal water supplies, has assured us that the water leaving the Flint Water Plant meets all Federal and State requirements. The City of Flint has a documented problem with lead in its drinking water due to service and household lines that may contain lead or lead solder which can leach lead because of the corrosivity of the water since changing to the Flint River as the source supply. Generally, those who are most vulnerable

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DISTRICT 8

PEGGE ADAMS
DISTRICT 9

to lead's health effects from exposure to unfiltered tap water are the very youngest children. For this reason, if you are not sure about the lead content in your tap water, it's best to either use a filter that has been found to be effective for reducing or eliminating lead, or to use bottled water instead. Water filters should be National Sanitation Foundation (NSF) certified to remove lead and meet ANSI standard 53. If these options are not available to you, then it's best to let the water run for at least five minutes before using it for either drinking or cooking purposes. Always use cold water instead of hot water for drinking and cooking.

It's especially important to avoid using untested or unfiltered tap water for mixing infant formula unless you can assure your water is lead free.

When leaded gasoline was in widespread use in this country, the lead came out the tail pipe and was deposited in yards near the roads. That lead may still be in those yards. In addition, lead paint continues to be a major source of childhood lead poisoning and can be found in homes built before 1978 when lead paint was banned in the U.S. and may be a hazard inside and outside the home especially where paint is worn or flaking.

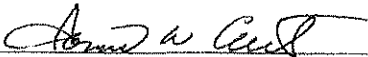
There are many other potential sources of lead exposure, including:

- "Home remedies" and cosmetics imported from other countries
- Tamarind or chili-based candies from Mexico
- Stained glass windows
- Fishing sinkers
- Firing ranges
- Old, deteriorated mini-blinds
- Bean pots and painted ceramics
- Crystal decanters
- Lead crystal glassware

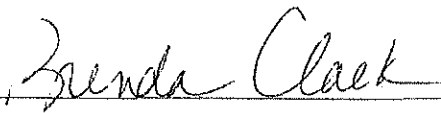
Since no safe level has been identified it is in everyone's interest to reduce exposure to lead as much as possible. Recommendations on ways to reduce lead exposure can be found on the Genesee County Health Department website www.gchd.us and Center for Disease Control and Prevention website: <http://www.cdc.gov/nceh/lead/tips.htm>.

Recent data provided by Hurley researchers has indicated a significant increase in blood lead levels in children after the switch to Flint River water. The County Health Officer has requested that MDHHS provide specific data to support their claim that state data is more comprehensive and does not show a significant increase. To date the state has failed to provide the requested data by the September 30, 2015 deadline in our previous request to the state.

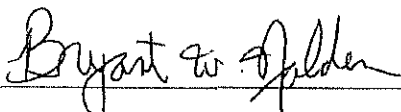
COUNTY OF GENESEE

BY: 

Jamie W. Curtis, Chairperson
Board of Commissioners

Date: 10-1-15BY: 

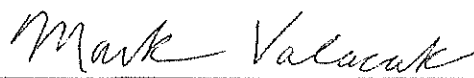
Brenda Clack, Chairperson
Human Services Committee
Board of Commissioners

Date: 10-1-15BY: 

Bryant W. Nolden, Vice Chairperson
Board of Commissioners

Date: 10-1-15

GENESEE COUNTY HEALTH DEPARTMENT

BY: 

Mark Valacak, M.P.H.
Health Officer

Date: 10-1-15

Rennaker, Joanne (DEQ)

From: Robert Bincsik <rbincsik@cityofflint.com>
Sent: Wednesday, September 30, 2015 4:17 PM
To: Prysby, Mike (DEQ)
Subject: Fwd: Additional link for Google map of school data
Attachments: School Supply Line Information.html

Mike lets try it this way. Please find attached a screen shot of the map, of the locations of the schools.

----- Forwarded message -----

From: **Alan Roberts** <aroberts@cityofflint.com>
Date: Wed, Sep 30, 2015 at 3:44 PM
Subject: Additional link for Google map of school data
To: Robert Bincsik <rbincsik@cityofflint.com>

Rob,

Here is the additional webpage for the map.

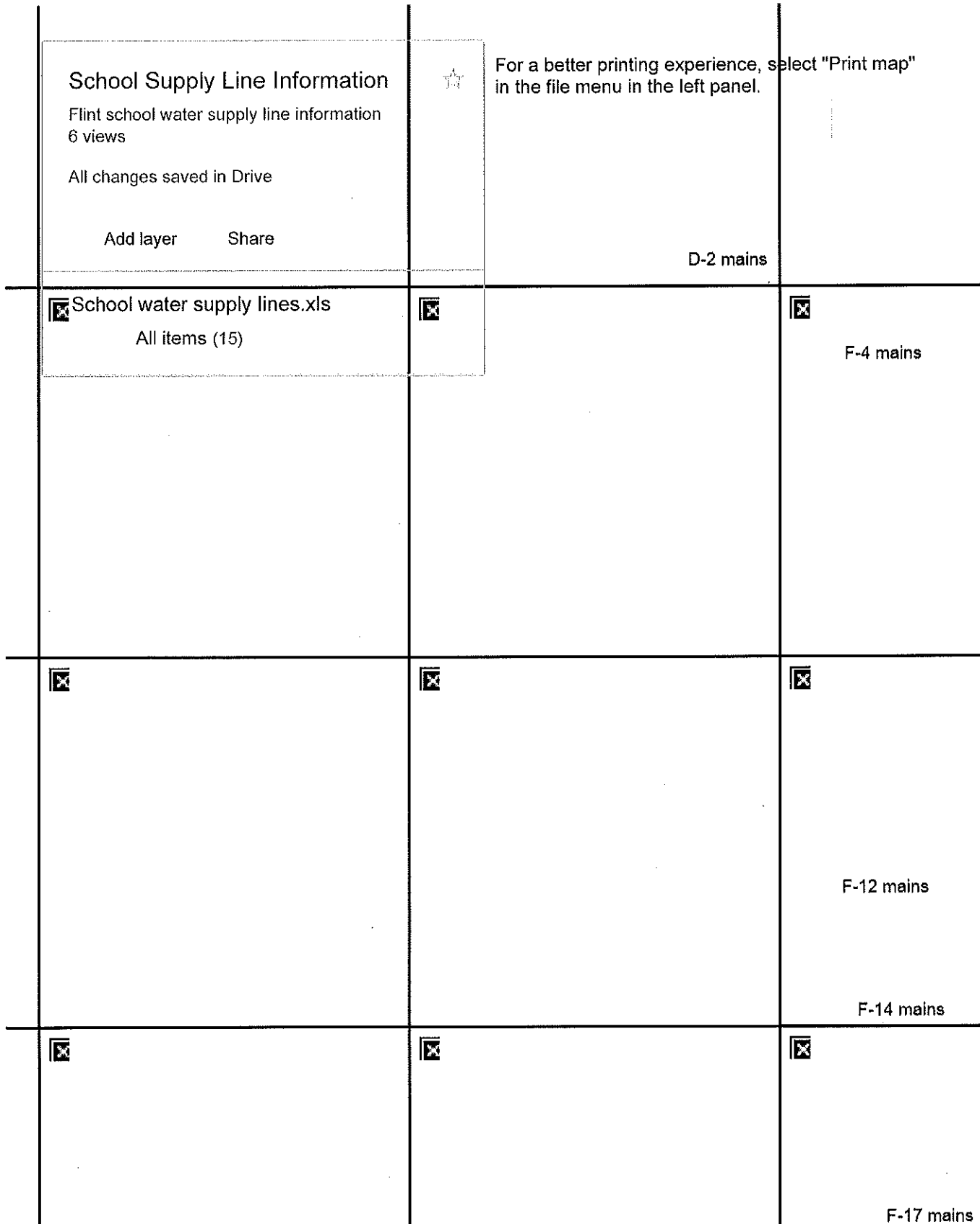
Cordially,

Alan Roberts

--

Thank you,

Robert Bincsik
Water Service Center Supervisor
City of Flint
3310 E. Court Street
Flint, MI 48506
Ph: 810.766.7202 ext. 3413
Fx: 810.743.5758



Rennaker, Joanne (DEQ)

From: Robert Bincsik <rbincsik@cityofflint.com>
Sent: Wednesday, September 30, 2015 3:17 PM
To: Prysby, Mike (DEQ)
Subject: Fwd: School Supply Line Information - Invitation to view
Attachments: School water supply lines.xls

Mike please find attached of list of what I believe to be all the active school buildings in Flint. Also there is a google map of their location. Hope this is what you're looking for if you need anything else please let me know and I will try to help in any way I can.

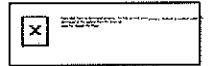
aroberts@cityofflint.com has invited you to **view** the following map:



School Supply Line Information

Open

Google My Maps is an easy-to-use map app for collaboratively authoring, maintaining or making decisions around maps.



Thank you,

Robert Bincsik
Water Service Center Supervisor
City of Flint
3310 E. Court Street
Flint, MI 48506
Ph: 810.766.7202 ext. 3413
Fx: 810.743.5758

Row #	School Name	Street Address	Supply line size, inches
1	Brownell K2 Stem Academy	6302 Oxley Dr., Flint, MI 48504	4
2	Doyle Ryder Elementary School	1040 N. Saginaw St., Flint, MI 48503	4
3	Durant-Tuuri-Mott Elementary School	1518 University Ave., Flint, MI 48504	6
4	Eisenhower Elementary School	1235 Pershing St., Flint, MI 48503	4
5	Freeman Elementary School	4001 Ogema Ave., Flint, MI 48507	4
6	Holmes 3-6 Stem Academy	6602 Oxley Dr., Flint, MI 48504	6
7	Neithercut Elementary School	2010 Crestbrook Ln., Flint, MI 48507	4
8	Pierce Elementary School	1101 W. Vernon Dr., Flint, MI 48503	(n/a)
9	Potter Elementary School	2500 N. Averill Ave., Flint, MI 48506	4
10	Northridge Academy	530 W. Pierson Rd., Flint, MI 48505	4
11	International Academy of Flint	2820 S. Saginaw St., 48503	4
12	Richfield Public School Academy	3807 N. Center Rd., Flint, MI 48506	2
13	Powers Catholic High School	1505 W. Court St., Flint, MI 48503	8
14	Michigan School for the Deaf	1235 W. Court St., Flint, MI 48503	8
15	Mott Middle College High School	1401 E. Court St., Flint, MI 48503	8

Supply line material	Map page	Street name	house no.	Notes
cast iron	D-2 mains	Oxley Dr.	6302	
cast iron	H-10 mains	N. Saginaw St.	1040	
cast iron	F-12 mains	University Ave.	1518	
cast iron	F-14 mains	Pershing St.	1235	
cast iron	K-17 mains	Ogema Ave.	4001	
cast iron	D-2 mains	Oxley Dr.	6602	
cast iron	F-17 mains	Crestbrook Ln.	2010	
(n/a)	K-12 mains	W. Vernon Dr.	1101	only the 8 inch fire line noted on dwg.
cast iron	M-8 mains	N. Averill Ave.	2500	
cast iron	F-4 mains	W. Pierson Rd.	530	noted on dwg as St. Agnes Church and School
cast iron	I-15 mains	S. Saginaw St.	2820	noted on dwg as Lincoln School
copper	N-6 curb box	N. Center Rd.	3807	
cast iron	F-14 mains	W. Court St.	1505	Also see G-14 mains
cast iron	F-14 mains	W. Court St.	1235	Also see G-14 mains
ductile iron	J-11 mains	E. Court St.	1401	noted on dwg as "Student Center"

Rennaker, Joanne (DEQ)

From: Benzie, Richard (DEQ)
Sent: Wednesday, September 30, 2015 3:07 PM
To: Busch, Stephen (DEQ); Rennaker, Joanne (DEQ); Prysby, Mike (DEQ); Rosenthal, Adam (DEQ); Skinker, Bethel (DEQ); Joseph, Mark (DEQ); Swendsen, Kurt (DEQ)
Cc: Shekter Smith, Liane (DEQ); Devereaux, Tracy Jo (DEQ); Philip, Kris (DEQ); Cook, Pat (DEQ); Howd, Pamela (DEQ)
Subject: RE: Flint calls

ODWMA is receiving a lot of calls with questions from Flint residents concerned about the safety of their drinking water. If you receive one of these calls, our message should be consistent – the drinking water distributed to city customers currently meets all drinking water standards and is considered safe. However, there is no safe level for lead. The fact that Flint meets the drinking water standard is based on an evaluation of the effectiveness of their treatment system to minimize lead leaching from plumbing materials. Compliance does not mean that under certain conditions that some homeowners may still have water in their domestic plumbing that has leached some lead from lead pipes or lead solder.

The only way for a resident to know if they may be exposed to lead leaching from their plumbing system is having a sample from that residence analyzed for lead at a certified laboratory. The DEQ laboratory is not providing that service at no cost. The city of Flint currently is accommodating requests from residents without charging them, but the residents have to go through the city to arrange that sampling, and the city may have a backlog right now.

If the caller has a result that indicates lead is present, or in the absence of a result, our advice should be to minimize any stagnation of the water before consumption, even without knowing if they have plumbing that contains lead. You could tell them they can do so by letting a faucet run for a few minutes or until the water is cooler (don't set a time – it can be so variable) and then use it for drinking or cooking.

Please be polite and empathetic if you receive one of these calls.

I also want to thank you for the effort you have made to respond to this issue. It is noticed and appreciated. In recognition of your performance, I have arranged for you to receive a 2 percent merit increase starting tomorrow.

Richard

Richard Benzie, P.E., Chief
 Field Operations Section
 Office of Drinking Water and Municipal Assistance, MDEQ
 517-284-6512

Rennaker, Joanne (DEQ)

From: Howard Croft <hcroft@cityofflint.com>
Sent: Wednesday, September 30, 2015 1:01 PM
To: Brent Wright; Dayne Walling; donna. cole; edwardsm; Gerald (Jed) Natzke; Howard Croft; James Henry; Jason Lorenz; jmikewright; JoAnne Herman; John O'Brien; Kirk Smith; larry.koehler@mcc.edu; Laura Sullivan; Michael Glasgow; Michael Wright; Mike Lane; Prysby, Mike (DEQ); Natasha Henderson; Norb Birchmeier; Pete Levine; Robert Bincsik; rosejo@msu.edu; Russell Hudson; Samir Matta; schock.michael@epa.gov; Sean Kammer; Warren Green; Busch, Stephen (DEQ); lytle.darren@epa.gov; Amy Hovey; Andy Leavitt; James Gaskin
Subject: Re: Technical Advisory Meeting

Team,

I am writing to again confirm our meeting which is scheduled for next Wednesday October 7th at 2:00 pm. We have decided to hold the meeting at City Hall but due to rapidly evolving events I will wait until early next week to put out an agenda. In general, we expect to update the most recent water status in order to get everyone on the same page, and then have a targeted agenda that points at both a short term and long term goals.

In staying consistent with our other meetings we anticipate a full sharing of information along with open discussion and a clear direction going forward. Darren Lytle of the EPA has committed to being at the meeting and Marc Edwards of Virginia Tech has agreed to call in.

Please email me if there are any questions.

Thank you,

On Wed, Sep 23, 2015 at 3:52 PM, Howard Croft <hcroft@cityofflint.com> wrote:

Technical Advisory Team,

I am writing to inform everyone that we have scheduled the next Technical Advisory Committee meeting to be Wednesday October 7th, 2015 from 2:00 – 4:30 pm. We are extending invitations to Marc Edwards of Virginia Tech along with two lead experts from the EPA (Darren Lytle & Michael Schock) to become a part of the technical team and we are hopeful that they will all be present at the upcoming meeting.

At the meeting we will discuss an overview of the City water system, compliance with the Safe Drinking Water Act, lead concerns, corrosion control, water testing, public education, capital improvement plans, the KWA pipeline, and next steps.

I will forward a specific location and agenda in the near future but we are firmly committing to the time and date. As with previous meetings we look forward to this group having positive dialogue that will benefit the community.

Thank you,

--

Howard Croft

Public Works Director

City of Flint

1101 S. Saginaw Street

Flint, MI 48502

PH# 810.766.7135 Ext.2043

hcroft@cityofflint.com

--

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Rennaker, Joanne (DEQ)

From: Crooks, Jennifer <crooks.jennifer@epa.gov>
Sent: Wednesday, September 30, 2015 12:51 PM
To: Rosenthal, Adam (DEQ); Prysby, Mike (DEQ); Busch, Stephen (DEQ)
Cc: Benzie, Richard (DEQ); Philip, Kris (DEQ); Poy, Thomas
Subject: question for ORD/Mike Schock

Importance: High

Tom P told me that your Director, Dan Wyatt, asked that his staff work with ORD/Mike Schock and Darren Lytle. Mike and Darren are both working on getting up to speed on the basics of the Flint water treatment scheme. I had a request from Mike Schock this morning about information about treatment and various sample results for Flint. So, I sent them the final OEL report from Flint that is on their website, as well as the 5 MORs that are also on Flint's website.

Mike had an additional question; he's looking for a schematic of the Flint treatment process to help him evaluate the possible successfulness of phosphate treatment at Flint. See Mike's brief explanation below.

I don't want to make this a big project if it's not handy; would Mike Glasgow have this schematic?

Thank you all! I know your time is very valuable right now.

Jennifer

From: Schock, Michael
Sent: Wednesday, September 30, 2015 10:57 AM
To: Crooks, Jennifer
Cc: Lytle, Darren
Subject: RE: more pdfs

Jennifer;

Thank you so much!

Would you happen to know if any other report has, or that you might have somewhere, a currently-valid process schematic for the entire set of treatments done at the Flint plant? It would be helpful to have a better picture of where things like softening, type of coagulant and GAC fit into the picture. There are several potential interrelationships that would affect the successfulness of the phosphate treatment proposed and dosage, and the instability cause by the major chemistry change from Detroit finished water (which I understand was from their Lake Huron-fed plant).

--Mike

From: Crooks, Jennifer
Sent: Wednesday, September 30, 2015 9:29 AM
To: Schock, Michael; Lytle, Darren
Subject: more pdfs

April 2015 MOR is not on the website.

Rennaker, Joanne (DEQ)

From: Howard Croft <hcroft@cityofflint.com>
Sent: Monday, September 28, 2015 3:54 PM
To: Aaron Dionne; Amy Hovey; Brennan Elm Park Senior Community Corporation; Carma Lewis; catherine.sheppard; cbruett; Chris Zuwala; City Of Flint; Clarence Pierce; Clayton, Stacie (GOV); connie.russell; crmcclinton; ctoomm; Diana Phillips; dpmgt; flintfreedom_fund; Florisa Stebbins; gla; Jack Stock; Jackie Poplar; James Henry; Jamie Gaskin; Janet Van De Winkle; Jason Caya; jcurtis; jiking155; jmanse; John Waddell; johnsonreid; jwright@co.genesees.mi.us; kboles@valleyaaa.org; Kevin J. Keane; kevin.roach; khamlet; kittle.robert; krodody; LaMonica Harris; Laura Sullivan; lisa.poma; mcarnevale; mddst; Melissa Mays; Mike Sargent; mmelenbrink; Montel Meniffee; nkopek; Norb Birchmeier; rcarter; Rebecca Fedewa; repphelps@house.mi.gov; revalharris1; rstanley; Russell Hudson; sborrego; sheldonneeley; suptmarshall; Tony Martin; William Hammond; Elizabeth Murphy
Cc: Michael Glasgow; Brent Wright; Jason Lorenz; schock.michael@epa.gov; lytle.darren@epa.gov; Prysby, Mike (DEQ); Marc Edwards; Robert Bincsik
Subject: Re: Citizen Advisory Team Update
Attachments: Lead Advisory Release.pdf; GCHD Lead in Water Fact Sheet.pdf

All,

As a follow up to the previous email I am forwarding a copy of the Lead Advisory that was issued by the City last week along with a "Lead in Water Fact Sheet" from the Health Department.

We will continue to disseminate releases and information through this email list as it becomes available.

Thank you ,

On Mon, Sep 28, 2015 at 11:19 AM, Howard Croft <hcroft@cityofflint.com> wrote:

Dear Citizen Advisory Committee,

It has been some time since our last **citizen** advisory team meeting and we wanted to reach out at this time to those of you who were part of this committee and provide you direct information.

It was encouraging for us to successfully install the recommended Granulated Activated Carbon which led to the City being compliant with the Safe Drinking Water Act but we are now facing questions surrounding the amount of lead that is leaching into drinking water through plumbing and service lines in certain homes. A significant aspect of lead in drinking water is the public education that gives everyone a clear and proper understanding of how this occurs and what are the avenues to reduce the risk.

As we consider when it may be beneficial to reconvene another community meeting, we want to extend to everyone the opportunity to provide input, and to be aware of the latest information.

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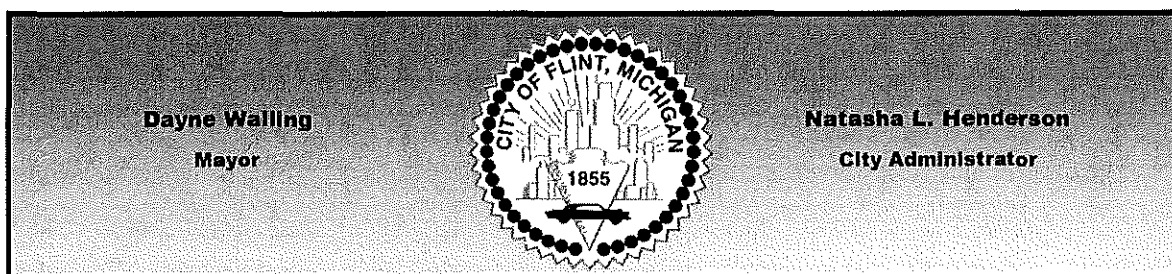
Please do not hesitate to email this group or **me directly** if you have any questions

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Jason Lorenz
Public Information Officer
Office: (810) 237-2039
Cell: (810) 875-2576
jlorenz@cityofflint.com

For Immediate Release

City of Flint Issues Lead Advisory

Flint, Michigan – September 25, 2015 – The City of Flint is issuing a Lead Advisory for residents to be aware of lead levels in drinking water after hearing concerns from the medical community. While the City is in full compliance with the Federal Safe Drinking Water Act, this information is being shared as part of a public awareness campaign to ensure that everyone takes note that no level of lead is considered safe.

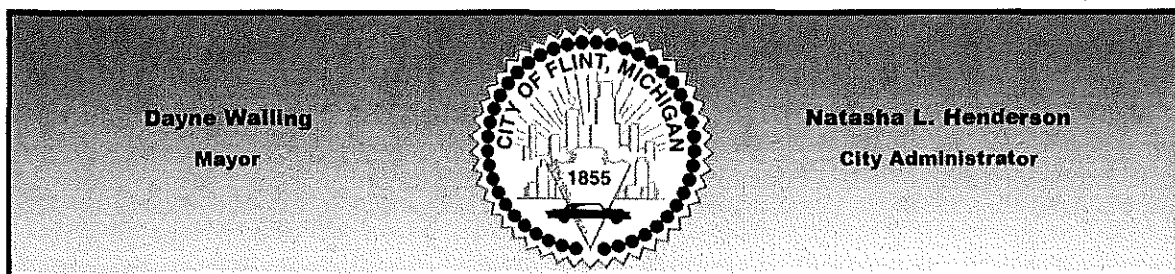
The Genesee County Health Department has issued a fact sheet regarding lead precautions for residents. The fact sheet can be found on their website at www.gchd.us. Here are a few of the suggestions the Health Department recommends:

- Flush your cold-water pipes by running the water for approximately 5 minutes
- Use only water from the cold-water tap for drinking, cooking, and especially for making baby formula.
- Install a water filter that is NSF-certified for lead removal.

Lead contamination can leach into water from a home's lead water service lines, lead solder, and leaded plumbing materials including fixtures, faucets, and fittings. Older service lines with pipes and fixtures installed before 1986 can sometimes be more susceptible to lead issues due to materials used in the home such as lead based paint and lead pipes.

This message is meant as a precaution to residents and does not mean that all homes in the City will experience the same issue. Residents with concerns about lead service lines

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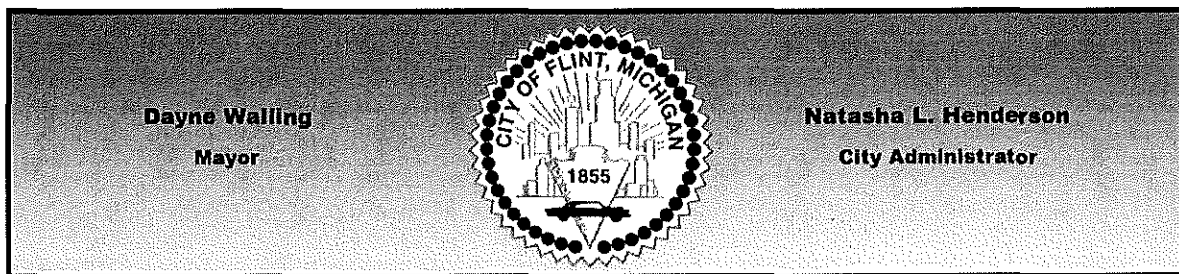
and lead in home plumbing fixtures are encouraged to contact the City's Utilities Division to schedule a free water testing by calling the Water Treatment Plant at 810-787-6537 and pressing #1 after prompted or by emailing flintwater@cityofflint.com.

The City of Flint is working proactively along with the County Health Department, the Michigan Department of Environmental Quality, and the U.S. Environmental Protection Agency to improve the water system throughout the City. An accelerated plan to add a corrosion control agent to our water within 30 to 60 days with expedited approval from the Michigan Department of Environmental Quality is already underway. This will reduce corrosion which can cause lead in old pipes to leach into the water.

This plan is in addition to Mayor Walling's letter requesting \$30 Million in water infrastructure assistance funding from the State of Michigan. \$10 Million of that request would be for the replacement of lead service lines in households to ensure that lead no longer presents a danger to the drinking water of our residents. As the letter states, "It is the City's position that the abatement of lead through the removal of lead containing pipes and fixtures in homes is the best long term solution to keeping our residents' water safe."

Mayor Walling further stated: "I am extremely concerned about the risks around lead with Flint's children and I will be working tirelessly to ensure the water is safe and all of our families have the information they need. I also will continue to pursue funding for infrastructure improvements and a comprehensive healthy homes initiative that addresses lead in paint and pipes. We have to get the lead out of our community to eliminate the threat of childhood lead poisoning."

The City of Flint continues working proactively with the County Health Department, the Michigan Department of Environmental Quality, and the U.S. Environmental Protection Agency to improve the water system throughout the City. The City remains committed to working with all of our partners in the Water Technical Advisory Committee to address all



issues of public health and quality concerns that face the community. Updates on progress made in addressing this issue will be made during regular public meetings including City Council and other scheduled meetings. Information on this and all related matters will continue to be posted on the City of Flint's website, cityofflint.com.

-END-



Genesee County Health Department

Mark Valacak, M.P.H., Health Officer
Gary K. Johnson, M.D., M.P.H., Medical Director

How does lead get into my tap water?

Under typical circumstances, lead will dissolve into the water. The concentration of lead in drinking water can vary greatly, depending on the corrosiveness of the water, the type and age of the plumbing materials and the length of time that the water stands in the pipes. The highest levels of lead occur when very corrosive water stands motionless in lead or lead soldered pipe for long periods of time.

How do I know if my tap water is contaminated with lead?

The only way to know whether your tap water contains lead is to have it tested. You cannot see, taste, or smell lead in drinking water. There are different sampling methods for sampling lead in drinking water. To determine your household risk, it is recommended to take a first draw sample.

Does lead in my tap water cause health effects?

Lead can cause damage to the brain, red blood cells and kidneys. The greatest risk is to young children and pregnant women. Amounts of lead that won't hurt adults can slow down normal mental and physical development of growing bodies. Lead in water can be a special problem for infants, whose diets may be mostly liquids, such as baby formulas or concentrated juices mixed with water. Smaller bodies can absorb lead more rapidly than bigger ones. A child's mental and physical growth can be permanently harmed by too much lead. Risk will vary, depending on the individual, the circumstances, and the amount of water consumed.

What can I do to reduce or eliminate lead in my tap water?

Flush your cold-water pipes by running the water for approximately 5 minutes. The longer the water has been sitting in the pipes, the more lead it may contain. You can fill containers for later use, after the flushing process. Use only water from the cold-water tap for drinking, cooking, and especially for making baby formula. Hot water is likely to contain higher levels because it dissolves more lead. You may choose to install a water filter that is NSF-certified for lead removal. If a water filter is installed, replace filters at least as often as recommended by the manufacturer.

Buy a lead-free faucet. The legal definition of "lead-free" still allows brass faucets to contain up to 8 percent lead. However, faucets marked with "NSF 61/9" and/or "California Proposition 65" meet stricter limits. Regularly clean particles from faucet aerators.

Is it safe to take a bath or shower, if my water has high lead levels?

Yes. Bathing and showering should be safe for you and your children, even if the water contains lead over EPA's action level. Human skin does not absorb lead in water. This information applies to most situations and to a large majority of the population, but individual circumstances may vary. Some situations, such as cases involving highly corrosive water, may require additional recommendations or more stringent actions.

Who do I contact for more information?

The local water authority is always your first source for testing and identifying lead contamination in your tap water. You can visit the City of Flint Website at www.cityofflint.com or contact the Flint Water Department at 810-787-6537.

WWW.EPA.GOV

WWW.MDEQ.GOV

Rennaker, Joanne (DEQ)

From: Howard Croft <hcroft@cityofflint.com>
Sent: Monday, September 28, 2015 11:19 AM
To: Aaron Dionne; Amy Hovey; Brennan Elm Park Senior Community Corporation; Carma Lewis; catherine.sheppard; cbruett; Chris Zuwala; City Of Flint; Clarence Pierce; Clayton, Stacie (GOV); connie.russell; crmcclinton; ctoomm; Diana Phillips; dpmgt; flintfreedom_fund; Florisa Stebbins; gla; Jack Stock; Jackie Poplar; James Henry; Jamie Gaskin; Janet Van De Winkle; Jason Caya; jcurtis; jiking155; jmanse; John Waddell; johnsonreid; jwright@co.genesee.mi.us; kboles@valleyaaa.org; Kevin J. Keane; kevin.roach; khamlet; kittle.robert; kroddy; LaMonica Harris; Laura Sullivan; lisa.poma; mcarnevale; mddst; Melissa Mays; Mike Sargent; mmelenbrink; Montel Meniffee; nkopek; Norb Birchmeier; rcarter; Rebecca Fedewa; repphelps@house.mi.gov; revalharris1; rstanley; Russell Hudson; sborrego; sheldonneeley; suptmarshall; Tony Martin; William Hammond; Elizabeth Murphy
Cc: Michael Glasgow; Brent Wright; Robert Bincsik; Jason Lorenz; lytle.darren@epa.gov; schock.michael@epa.gov; Marc Edwards; Prysby, Mike (DEQ)
Subject: Citizen Advisory Team Update

Dear Citizen Advisory Committee,

It has been some time since our last **citizen** advisory team meeting and we wanted to reach out at this time to those of you who were part of this committee and provide you direct information.

It was encouraging for us to successfully install the recommended Granulated Activated Carbon which led to the City being compliant with the Safe Drinking Water Act but we are now facing questions surrounding the amount of lead that is leaching into drinking water through plumbing and service lines in certain homes. A significant aspect of lead in drinking water is the public education that gives everyone a clear and proper understanding of how this occurs and what are the avenues to reduce the risk.

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Please do not hesitate to email this group or me directly if you have any questions

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Howard Croft

Public Works Director

City of Flint

1101 S. Saginaw Street

Flint, MI 48502

PH# 810.766.7135 Ext.2043

hcroft@cityofflint.com

Rennaker, Joanne (DEQ)

From: Pallone, Maggie (DEQ)
Sent: Monday, September 28, 2015 9:48 AM
To: Wurfel, Brad (DEQ); Prysby, Mike (DEQ); Busch, Stephen (DEQ)
Subject: RE: Water Testing

Is someone working on pulling this together? Before you send anything, please make sure Brad or I review it.

Thanks,
Maggie

From: Rep. Sheldon Neeley (District 34) [<mailto:SheldonNeeley@house.mi.gov>]
Sent: Friday, September 25, 2015 11:46 AM
To: Pallone, Maggie (DEQ) ; Wurfel, Brad (DEQ) ; Prysby, Mike (DEQ)
Subject: Water Testing

I am requesting a response to the following questions?

- What elements or factors do you test for in your standard Drinking Water Test?
- Has the test elements or factors changed in the last 10 years?

Thank you.

Rennaker, Joanne (DEQ)

From: Prysby, Mike (DEQ)
Sent: Friday, September 25, 2015 3:08 PM
To: Busch, Stephen (DEQ)
Subject: Fwd: Water Testing

Steve,
Just saw this...

Sent from my iPhone

Begin forwarded message:

From: "Rep. Sheldon Neeley (District 34)" <SheldonNeeley@house.mi.gov>
Date: September 25, 2015 at 11:45:44 AM EDT
To: "PalloneM@michigan.gov" <PalloneM@michigan.gov>, "WurfelB@michigan.gov" <WurfelB@michigan.gov>, "prysbym@michigan.gov" <prysbym@michigan.gov>
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Thank you.

Rennaker, Joanne (DEQ)

From: Rennaker, Joanne (DEQ)
Sent: Friday, September 25, 2015 2:03 PM
To: Prysby, Mike (DEQ); Rosenthal, Adam (DEQ); Devereaux, Tracy Jo (DEQ)
Cc: Busch, Stephen (DEQ)
Subject: FW: FOIA 6526-15 - Corrosion Control in Flint River Water

Steve requested that I e-mail Marc Edwards for clarification on FOIA 6526-15 regarding corrosion in Flint River water. His response is below. We need to gather the information as requested. The due date is September 30, 2015.

Jo Anne Rennaker
 Secretary
 Office of Waste Management and Radiological Protection
 Office of Drinking Water and Municipal Assistance
 517-284-6643

From: Marc Edwards [<mailto:edwardsm@vt.edu>]
Sent: Friday, September 25, 2015 1:46 PM
To: Rennaker, Joanne (DEQ)
Subject: RE: FOIA 6526-15 - Corrosion Control in Flint River Water

At the Flint water treatment plant. Thanks, Marc

From: Rennaker, Joanne (DEQ) [<mailto:RENNAKERJ@michigan.gov>]
Sent: Friday, September 25, 2015 1:34 PM
To: edwardsm@vt.edu
Subject: FOIA 6526-15 - Corrosion Control in Flint River Water

Dear Mr. Edwards,

In regards to your FOIA request of September 7, 2015 (6526-15), could you please clarify if you are looking for information regarding corrosion control in the Flint River, or corrosion control at the Flint Water Treatment Plant.

Thank-you,

Jo Anne Rennaker
 Secretary
 Office of Waste Management and Radiological Protection
 Office of Drinking Water and Municipal Assistance
 517-284-6643

Rennaker, Joanne (DEQ)

From: Howard Croft <hcroft@cityofflint.com>
Sent: Friday, September 25, 2015 12:42 PM
To: Brent Wright; Dayne Walling; donna. cole; edwardsm; Gerald (Jed) Natzke; Howard Croft; James Henry; Jason Lorenz; jmikewright; JoAnne Herman; John O'Brien; Kirk Smith; larry.koehler@mcc.edu; Laura Sullivan; Michael Glasgow; Michael Wright; Mike Lane; Prysby, Mike (DEQ); Natasha Henderson; Norb Birchmeier; Pete Levine; Robert Bincsik; rosejo@msu.edu; Russell Hudson; Samir Matta; schock.michael@epa.gov; Sean Kammer; Warren Green; Busch, Stephen (DEQ); lytle.darren@epa.gov; James Gaskin; Amy Hovey; Andy Leavitt
Subject: Re: Technical Advisory Meeting
Attachments: GCHD Lead in Water Fact Sheet.pdf; Information Plan.pdf; Lead Advisory Release.pdf

Technical Advisory Team,

Today the City of Flint along side of the Genesee County Health Department issued a lead advisory at a well attended press conference. The press conference lasted over an hour and a half with both the Health Department and the City answering numerous questions. I have included the documents that were released at the news conference and will continue to provide everyone with additional information as it becomes available. We will be coordinating closely with the health department to provide consistent information to the public and intend to increase our awareness campaign.

There is growing anticipation of our next Technical Advisory Meeting on October 7th and we are working to determine the best possible venue based on the attention that we expect. Jamie Gaskin, the United Way CEO has joined the team and I have also included Andy Leavitt of State Senator Ananich's office along with Amy Hovey from U.S. Congressman Kildee's team. We are developing a quarterly mailer that we will distribute to all water customers that will look a lot like our annual consumer confidence report and we intend to have input from the TAC team meeting to be included in the report. The mailer will go to the printer within days following our meeting.

Please look for location and agenda items to come next week, please feel free to email the group or me directly if there are any questions,

Thank you,

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Genesee County Health Department

Mark Valacak, M.P.H., Health Officer
Gary K. Johnson, M.D., M.P.H., Medical Director

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WWW.MDEQ.GOV



CITY OF FLINT

DPW - PUBLIC INFORMATION PLAN

September 24th – Press Conference at Hurley Hospital

September 25th – Press Conference at City Hall (Heath Information)

September 30th – DPW Committee Meeting (Water Update)

October 7th – Technical Advisory Meeting

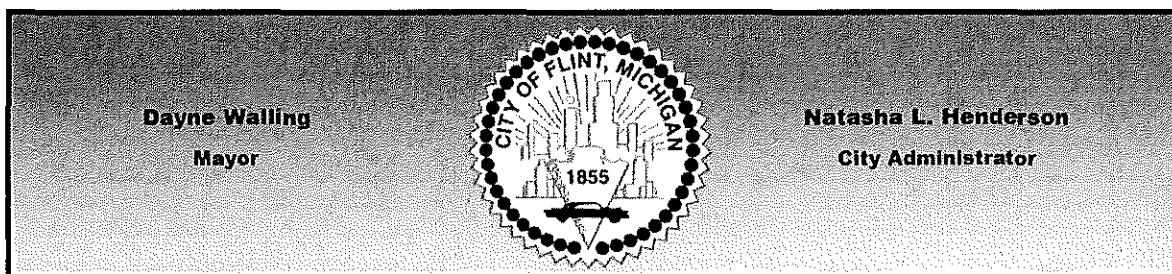
October 9th – Quarterly Water Report

October 13th – Meeting with the Board of Health

November 16th - Technical Advisory Meeting (Tentative)

DPW Director will be available for Radio Interviews and Neighborhood Meetings

*To be scheduled through the City's Public Information Officer



Jason Lorenz
Public Information Officer
Office: (810) 237-2039
Cell: (810) 875-2576
jlorenz@cityofflint.com

For Immediate Release

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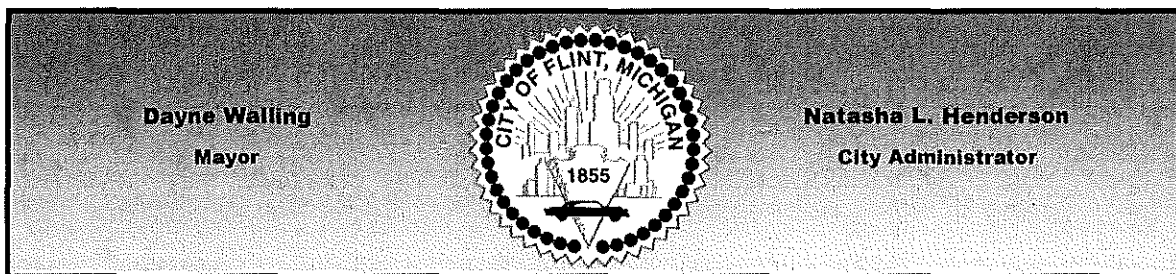
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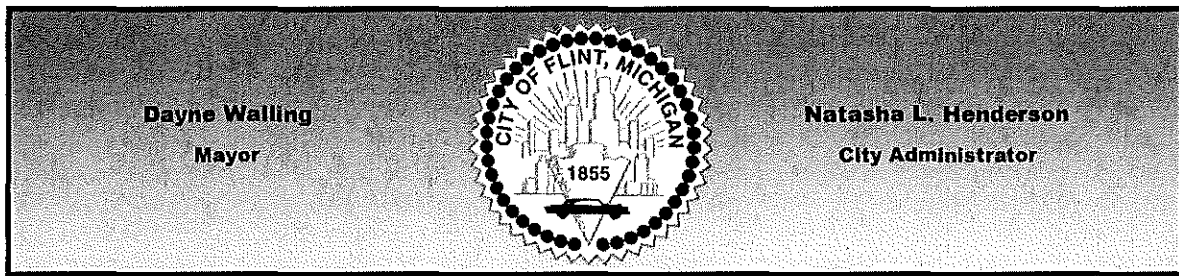
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The City of Flint is working proactively along with the County Health Department, the Michigan Department of Environmental Quality, and the U.S. Environmental Protection Agency to improve the water system throughout the City. An accelerated plan to add a corrosion control agent to our water within 30 to 60 days with expedited approval from the Michigan Department of Environmental Quality is already underway. This will reduce corrosion which can cause lead in old pipes to leach into the water.

This plan is in addition to Mayor Walling's letter requesting \$30 Million in water infrastructure assistance funding from the State of Michigan. \$10 Million of that request would be for the replacement of lead service lines in households to ensure that lead no longer presents a danger to the drinking water of our residents. As the letter states, "It is the City's position that the abatement of lead through the removal of lead containing pipes and fixtures in homes is the best long term solution to keeping our residents' water safe."

Mayor Walling further stated: "I am extremely concerned about the risks around lead with Flint's children and I will be working tirelessly to ensure the water is safe and all of our families have the information they need. I also will continue to pursue funding for infrastructure improvements and a comprehensive healthy homes initiative that addresses lead in paint and pipes. We have to get the lead out of our community to eliminate the threat of childhood lead poisoning."

The City of Flint continues working proactively with the County Health Department, the Michigan Department of Environmental Quality, and the U.S. Environmental Protection Agency to improve the water system throughout the City. The City remains committed to working with all of our partners in the Water Technical Advisory Committee to address all



issues of public health and quality concerns that face the community. Updates on progress made in addressing this issue will be made during regular public meetings including City Council and other scheduled meetings. Information on this and all related matters will continue to be posted on the City of Flint's website, cityofflint.com.

—END—

Rennaker, Joanne (DEQ)

From: Rep. Sheldon Neeley (District 34) <SheldonNeeley@house.mi.gov>
Sent: Friday, September 25, 2015 11:46 AM
To: Pallone, Maggie (DEQ); Wurfel, Brad (DEQ); Prysby, Mike (DEQ)
Subject: Water Testing

I am requesting a response to the following questions?

- What elements or factors do you test for in your standard Drinking Water Test?
- Has the test elements or factors changed in the last 10 years?

Thank you.

Rennaker, Joanne (DEQ)

From: Leeming, Susan (DEQ)
Sent: Friday, September 25, 2015 10:46 AM
To: Krisztian, George (DEQ)
Cc: Wagner, Robert (DEQ); Busch, Stephen (DEQ); Prysby, Mike (DEQ)
Subject: RE: Detroit News article about lead testing

I talked to Richard Benzie. He said that the City of Flint is providing free lead testing. Steve Busch or Mike Prysby might have a phone number or more info that you can pass on.

Sue Leeming, Assistant Chief
 Remediation and Redevelopment Division
 Department of Environmental Quality
 517-897-2839 (cell)
 517-284-5091 (desk)

From: Krisztian, George (DEQ)
Sent: Friday, September 25, 2015 10:33 AM
To: Wagner, Robert (DEQ) <WAGNERR1@michigan.gov>; Leeming, Susan (DEQ) <LeemingS@michigan.gov>
Subject: Detroit News article about lead testing
Importance: High

Hi Bob and Sue,

You may want to read the following article:
<http://www.detroitnews.com/story/news/local/michigan/2015/09/24/flint-plans-advisory-curbing-exposure-lead/72725736/>

The most pertinent part is:

"State regulators insist the water is safe, although they're urging anyone with concerns to have their water tested for free."

As you can imagine we have been getting quite a few calls about the "Free lead testing" that we provide. We have been informing callers that the article got it wrong and that we are a fee based service. People have been irritated with us but there is nothing that we can do about the situation. I just want to give you the heads up in case someone complains to their legislator about the Lab.

Please note that the article does not even mention the DEQ Lab or the Lab that is offering this "free service".

Brad is mentioned in the article and he probably should be made aware of the situation. What is the best way to do that?

George

George L. Krisztian
 Laboratory Director

Michigan Department of Environmental Quality
(517) 335-8812

Rennaker, Joanne (DEQ)

From: Busch, Stephen (DEQ)
Sent: Friday, September 25, 2015 8:27 AM
To: Yanna Lambrinidou
Cc: Benzie, Richard (DEQ); Cook, Pat (DEQ); Prysby, Mike (DEQ); Wurfel, Brad (DEQ); hyde.tinka@epa.gov
Subject: RE: question about optimal WQP ranges for Flint's water
Attachments: DWSD Water Quality Parameters.pdf

Dr. Lambrinidou,

I'm sorry for the delay in my response. As some of your questions relate more to statewide program implementation I have requested assistance with the response from staff within our central program office. However, these staff were attending and participating in an offsite (American Water Works Association Conference Michigan Section) conference last week.

Michigan has implemented an EPA approved modified consecutive system approach to lead and copper monitoring where a wholesale water supply sells water to other community water systems. In addition, while water quality parameter (WQP) monitoring occurs at both the water treatment plant and in the combined distribution system, a WQP range is only required to be established at the water treatment plant tap after the system has demonstrated optimized corrosion control treatment (OCCT).

Thus when the City of Flint was a customer of the Detroit Water and Sewerage Department (DWSD), the City of Flint participated in WQP monitoring of its distribution system, but ranges were established only for the OCCT at DWSD treatment plants. The attached letter from our Department established the minimum levels for pH and phosphate dosage in 2000.

As the City of Flint water treatment plant has not yet installed such treatment or been given the designation of OCCT these plant tap values have not been established.

However, the City of Flint WTP has continued to maintain the minimum pH value requirement previously established for DWSD

As noted in your Working Group Report to the NDWAC, "Corrosion Control Treatment (CCT) involves the addition of chemicals (e.g. orthophosphates or silicate) to create a barrier between the pipes and the drinking water, or to modify drinking water chemistry (such as pH and hardness) to inhibit the potential for corrosion."

Should you consider the Flint WTP softening process to be OCCT, then the City already continues to comply with the OCCT requirements as the City of Flint has never had 10% or more of compliance tap samples exceed the 15 ppb action level. Even prior to DWSD's established OCCT the City of Flint lead compliance monitoring has never exceeded the 15 ppb action level.

If you have additional questions we would appreciate having them routed through the NDWAC and your Working Group. Thanks.

Stephen Busch, P.E.
 MDEQ Lansing District Coordinator
 Office of Drinking Water and Municipal Assistance
 Lansing and Jackson District Supervisor

517-643-2314

buschs@michigan.gov

From: Yanna Lambrinidou [mailto:pnaalternatives@yahoo.com]
Sent: Wednesday, September 16, 2015 7:22 PM
To: Busch, Stephen (DEQ); Wurfel, Brad (DEQ)
Subject: Re: question about optimal WQP ranges for Flint's water

Dear Mr. Busch,

Thank you for your quick response. I appreciate the information at, I am sure, a very busy time for you and MDEQ.

Could you please help me understand the following?

When you say that all previous optimal water quality parameter ranges would have been established for the Detroit water utility (not for the City of Flint), do you mean that MDEQ never set optimal water quality parameter ranges *specifically* for Flint before Flint's switch to Flint River water?

It is my impression, please correct me if I'm wrong, that under the LCR, all large systems -- whether they are consecutive or not -- must have optimal water quality parameter ranges designated by states *specifically for them* (at the time when these systems are deemed to have optimized their treatment). Is there language in the LCR I am missing that allows a utility not to have optimal quality parameter ranges established specifically for it?

My second question is this: If the City of Flint had no optimal water quality parameter ranges established specifically for it in the past, how did it achieve LCR compliance? Isn't it the case that utility-specific optimal water quality parameter ranges (and maintenance of these ranges) are required for all large systems to avoid an LCR violation?

I would appreciate your assistance on this matter, as it will shed light on an issue that seems to be very important for EPA's assessment of and upcoming revisions to the LCR.

Kindly,

Yanna Lambrinidou

Yanna Lambrinidou PhD
 Parents for Nontoxic Alternatives
 PO Box 6283
 Washington DC 20015
 P 202.997.1834
 B www.dawasawatch.blogspot.com

From: "Busch, Stephen (DEQ)" <BUSCHS@michigan.gov>
To: Yanna Lambrinidou <pnaalternatives@yahoo.com>; "Wurfel, Brad (DEQ)" <WurfelB@michigan.gov>
Sent: Monday, September 14, 2015 11:05 AM
Subject: RE: question about optimal WQP ranges for Flint's water

Dr. Lambrinidou,

All previous water quality parameter ranges would have been established for the City of Flint's wholesale finished water supplier, the Detroit Water and Sewerage Department, not the City of Flint itself.

As the City of Flint has not yet established optimized corrosion control treatment, the MDEQ is not yet at the point of regulatory requirements where the range of water quality parameters would be set.

Stephen Busch, P.E.
 MDEQ Lansing District Coordinator

Office of Drinking Water and Municipal Assistance
Lansing and Jackson District Supervisor
517-643-2314
buschs@michigan.gov

From: Yanna Lambrinidou [<mailto:pnalternatives@yahoo.com>]
Sent: Thursday, September 10, 2015 11:11 AM
To: Wurfel, Brad (DEQ); Busch, Stephen (DEQ)
Subject: question about optimal WQP ranges for Flint's water

Good morning Mr. Wurfel and Mr. Busch,

As a member of the EPA National Drinking Water Advisory Council (NDWAC) Lead and Copper Rule (LCR) workgroup that just completed its recommendations to EPA about the agency's upcoming revisions to the LCR, I am watching with great interest and concern the developments in Flint in relation to lead. I am looking for information on the optimal water quality parameter (WQP) ranges that MDEQ has set for Flint's water. Are those posted online? If so, could you send me the link? If not, could you let me know what they are?

Thank you kindly,

Yanna Lambrinidou PhD
Parents for Nontoxic Alternatives
PO Box 6283
Washington DC 20015
P 202.997.1834
B www.dawasawatch.blogspot.com

001 05:43 FAX 313 267 3634

WATER QUALITY

0002

TG copy

STATE OF MICHIGAN



JOHN ENGLER, Governor

DEPARTMENT OF ENVIRONMENTAL QUALITY

"Better Service for a Better Environment"

HOLLISTER BUILDING PO BOX 30473 LANSING MI 48909-7973

INTERNET: www.deq.state.mi.us

RUSSELL J. HARDING, Director

REPLY TO:

DRINKING WATER & RADIOLOGICAL
PROTECTION DIVISION
SOUTHEAST MICHIGAN DISTRICT OFFICE
35980 SEVEN MILE ROAD
LIVONIA, MICHIGAN 48152-1005

March 3, 2000

Mr. Robert Malloch, Water Production Manager
City of Detroit
Water and Sewerage Department
735 Randolph Street
Detroit, Michigan 48826-2830

WSSN: 1880

Dear Mr. Malloch:

SUBJECT: Water Supply - Detroit Water and Sewerage Department (DWSD)
Lead and Copper Water Quality Parameter Limits

This letter is intended to correct errors contained in a previous letter, dated September 27, 1999, acknowledging lead and copper results and establishing water quality parameters.

Results of the January through June 1999, follow-up monitoring required by the Lead and Copper Rule have been mailed separately to Ms. Pamela Turner of DWSD. The 90th percentile action levels for lead and copper are 15 ug/l and 1300 ug/l, respectively. Based on the 104 samples collected, the 90th percentile results for the city of Detroit were 6 ug/l for lead and 47 ug/l for copper. Therefore, the city has met both action levels and public education is not required. In addition, we have received satisfactory results of the water quality parameter monitoring from the distribution tap samples and from the point of entry samples collected at the five (DWSD) owned water treatment plants.

DWSD has demonstrated optimum corrosion control using phosphoric acid. The state must determine water quality parameters that must be maintained to ensure that optimum corrosion control will continue. Based on our review of monthly operation reports and numerous discussions, we have agreed on limits for pH, phosphoric acid dosage and residual, measured at the water treatment plant taps.

Mr. Robert Malloch

Page 2

March 3, 2000

A minimum pH of 7.0 must be maintained at the treatment plant tap with no more than 9 days per six-month period (Jan. through June, July through Dec.) in non-compliance with this established minimum. If more than one pH sample is collected in a day, the results will be a weighted average for the day.

In addition to pH, a lower limit must be maintained for the phosphoric acid dosage and measured residual at the treatment plant taps. Again, based on our review of monthly operation reports and discussions with you, we have agreed on a minimum dosage and residual for phosphoric acid.

A minimum total phosphate dosage of 0.9 mg/l must be maintained at each of the five water treatment plant taps on a daily basis. In addition, a total phosphate residual of 0.8 mg/l must be maintained at each of the water treatment plant taps. If more than one phosphate sample is collected in a day, the results will be a weighted average for the day. Again, no more than 9 days in a six-month period can be in non-compliance with these established limits.

In addition to water treatment plant tap sampling, water quality parameters from the distribution system will continue to be required every six month period (Jan. - June, July - Dec.). Two samples per six-month period are required from each site and the parameters to be analyzed include pH, total phosphate and alkalinity. The numbers of sites to be sampled are reduced from previous monitoring periods.

Water Quality Parameter Monitoring

Service Area	Previous # WQP Sites	New # WQP Sites
Detroit	25	10
Detroit Suburbs	140	70
SOCWA	25	10
Flint	8	8
Genesee County	6	6

01/25/2001 05:43 FAX 313 267 363*

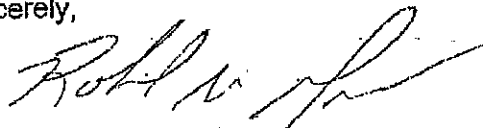
WATER QUALITY

004

Mr. Robert Malloch
Page 3
March 3, 2000

Should you require additional details or further explanation of any of this information, please feel free to contact me.

Sincerely,



Robert A. Green, P.E., Supervisor
Field Operations Section
Drinking Water and Radiological
Protection Division
734-953-1439

RAG:

cc: Ms. Pamela Turner, DWSD
Tucker, Young, Jackson and Tull, Inc.
Wayne County Health Department

Rennaker, Joanne (DEQ)

From: Schock, Michael <Schock.Michael@epa.gov>
Sent: Thursday, September 24, 2015 1:17 PM
To: Howard Croft; Brent Wright; Dayne Walling; donna. cole; edwardsm; Gerald (Jed) Natzke; James Henry; Jason Lorenz; jmikewright; JoAnne Herman; John O'Brien; Kirk Smith; larry.koehler@mcc.edu; Laura Sullivan; lytle.darrin@epa.gov; Michael Glasgow; Wright, Michael; Mike Lane; Prysby, Mike (DEQ); Natasha Henderson; Norb Birchmeier; Pete Levine; Robert Bincsik; rosejo@msu.edu; Russell Hudson; Samir Matta; Sean Kammer; Warren Green; Busch, Stephen (DEQ)
Cc: Lytle, Darren
Subject: RE: Technical Advisory Meeting

Howard;

Thank you for the meeting invitation. However, I am not available to attend the meeting that week. I wish there had been some consultation with Dr. Lytle and myself about our other commitments and our travel availability, before scheduling the meeting. I still will be available to participate overall the advisory process.

I noticed also that the email address for Dr. Lytle appears to have a typographical error in it, but you may have spoken to him on the phone about the meeting. The correct email address is: lytle.darren@epa.gov.

Thank you, again, for the opportunity to participate.

Regards,

Mike

Michael R. Schock
 U.S. Environmental Protection Agency
 ORD, NRMRL, WSWRD, TTEB
 26 West Martin Luther King Drive
 Cincinnati, OH 45220

Phone: 513.569.7412
schock.michael@epa.gov

From: Howard Croft [<mailto:hcroft@cityofflint.com>]

Sent: Wednesday, September 23, 2015 3:52 PM

To: Brent Wright; Dayne Walling; donna. cole; edwardsm; Gerald (Jed) Natzke; Howard Croft; James Henry; Jason Lorenz; jmikewright; JoAnne Herman; John O'Brien; Kirk Smith; larry.koehler@mcc.edu; Laura Sullivan; lytle.darrin@epa.gov; Michael Glasgow; Wright, Michael; Mike Lane; Mike Prysby (DEQ); Natasha Henderson; Norb Birchmeier; Pete Levine; Robert Bincsik; rosejo@msu.edu; Russell Hudson; Samir Matta; Schock, Michael; Sean Kammer; Warren Green; Busch, Stephen (DEQ)

Subject: Technical Advisory Meeting

Technical Advisory Team,

I am writing to inform everyone that we have scheduled the next Technical Advisory Committee meeting to be Wednesday October 7th 2015 from 2:00 – 4:30 pm. We are extending invitations to Marc Edwards of Virginia Tech along with two lead experts from the EPA (Darren Lytle & Michael Schock) to become a part of the technical team and we are hopeful that they will all be present at the upcoming meeting.

At the meeting we will discuss an overview of the City water system, compliance with the Safe Drinking Water Act, lead concerns, corrosion control, water testing, public education, capital improvement plans, the KWA pipeline, and next steps.

I will forward a specific location and agenda in the near future but we are firmly committing to the time and date. As with previous meetings we look forward to this group having positive dialogue that will benefit the community.

Thank you,

--

Howard Croft
Public Works Director
City of Flint
1101 S. Saginaw Street
Flint, MI 48502
PH# 810.766.7135 Ext.2043
hcroft@cityofflint.com

Rennaker, Joanne (DEQ)

From: Howard Croft <hcroft@cityofflint.com>
Sent: Wednesday, September 23, 2015 3:52 PM
To: Brent Wright; Dayne Walling; donna. cole; edwardsm; Gerald (Jed) Natzke; Howard Croft; James Henry; Jason Lorenz; jmikewright; JoAnne Herman; John O'Brien; Kirk Smith; larry.koehler@mcc.edu; Laura Sullivan; lytle.darrin@epa.gov; Michael Glasgow; Michael Wright; Mike Lane; Prysby, Mike (DEQ); Natasha Henderson; Norb Birchmeier; Pete Levine; Robert Bincsik; rosejo@msu.edu; Russell Hudson; Samir Matta; schock.michael@epa.gov; Sean Kammer; Warren Green; Busch, Stephen (DEQ)
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Thank you,

--

Howard Croft
 Public Works Director
 City of Flint
 1101 S. Saginaw Street
 Flint, MI 48502
 PH# 810.766.7135 Ext.2043
hcroft@cityofflint.com

Rennaker, Joanne (DEQ)

From: Benzie, Richard (DEQ)
Sent: Tuesday, September 22, 2015 5:51 PM
To: Prysby, Mike (DEQ); Rosenthal, Adam (DEQ); Busch, Stephen (DEQ)
Cc: Devereaux, Tracy Jo (DEQ); Shekter Smith, Liane (DEQ)
Subject: RE: Flint water questions

We need to get answers Wednesday. Someone needs to contact Flint and determine the validity of these claims without sounding too accusatory.

Did the city mail sampling kits to the same homes in the last two rounds of lead & copper monitoring? If not, why? Do they have a record that these sites have lead services or lead plumbing? If not, why did they certify them as meeting that criteria when they submitted the results? Did they tell Mark Edwards or anyone else that their sampling kits are distributed randomly? Did they mean randomly among lead service line properties?

Those are just the ones I can think up at this time. I'm sure there are others we could ask.

From: Shekter Smith, Liane (DEQ)
Sent: Tuesday, September 22, 2015 2:57 PM
To: Benzie, Richard (DEQ); Prysby, Mike (DEQ); Rosenthal, Adam (DEQ)
Cc: Devereaux, Tracy Jo (DEQ); Busch, Stephen (DEQ)
Subject: FW: Flint water questions
Importance: High

Liane J. Shekter Smith, P.E., Chief
 Office of Drinking Water and Municipal Assistance
 Michigan Department of Environmental Quality
 517-284-6543

From: Wyant, Dan (DEQ)
Sent: Tuesday, September 22, 2015 1:49 PM
To: Pallone, Maggie (DEQ); Shekter Smith, Liane (DEQ); Busch, Stephen (DEQ)
Cc: Wurfel, Brad (DEQ); Tommasulo, Karen (DEQ)
Subject: FW: Flint water questions
Importance: High

FYI

Dan Wyant, Director
 Department of Environmental Quality
 517-284-6700 (New Number)

From: Curt Guyette [<mailto:cguyette@aclumich.org>]
Sent: Tuesday, September 22, 2015 1:33 PM
To: Wurfel, Brad (DEQ)
Cc: Wyant, Dan (DEQ)

Subject: Flint water questions
Importance: High

Mr. Wurfel,

Attached are a few questions regarding the MDEQ's oversight of Flint's Lead and Copper Rule monitoring program.

I would appreciate it if you would provide me answers by the end of the day Thursday, Sept. 24.

Feel free to call me either at work (313-578-6834) or on my cell phone (586-925-0493) if you have questions or need anything clarified.

Sincerely,

Curt Guyette

Rennaker, Joanne (DEQ)

From: Shekter Smith, Liane (DEQ)
Sent: Tuesday, September 22, 2015 2:57 PM
To: Benzie, Richard (DEQ); Prysby, Mike (DEQ); Rosenthal, Adam (DEQ)
Cc: Devereaux, Tracy Jo (DEQ); Busch, Stephen (DEQ)
Subject: FW: Flint water questions
Attachments: MDEQ Questions 9-22-15.docx

Importance: High

Liane J. Shekter Smith, P.E., Chief
Office of Drinking Water and Municipal Assistance
Michigan Department of Environmental Quality
517-284-6543

From: Wyant, Dan (DEQ)
Sent: Tuesday, September 22, 2015 1:49 PM
To: Pallone, Maggie (DEQ); Shekter Smith, Liane (DEQ); Busch, Stephen (DEQ)
Cc: Wurfel, Brad (DEQ); Tommasulo, Karen (DEQ)
Subject: FW: Flint water questions
Importance: High

FYI

Dan Wyant, Director
Department of Environmental Quality
517-284-6700 (New Number)

From: Curt Guyette [<mailto:cguyette@aclumich.org>]
Sent: Tuesday, September 22, 2015 1:33 PM
To: Wurfel, Brad (DEQ)
Cc: Wyant, Dan (DEQ)
Subject: Flint water questions
Importance: High

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I would appreciate it if you would provide me answers by the end of the day Thursday, Sept. 24.

Feel free to call me either at work (313-578-6834) or on my cell phone (586-925-0493) if you have questions or need anything clarified.

Sincerely,

Curt Guyette

Dear Mr. Wurfel,

In a February 27, 2015 email to Jennifer Crooks and Miguel Del Toral of the U.S. EPA, the MDEQ's Stephen Busch wrote that the city of Flint "has an optimized corrosion control program."

According to a recent interview with Flint Public Work's director Howard Croft, there is currently no corrosion control plan in place in Flint, and that it was MDEQ's decision not to use corrosion control additives, as Detroit does, at the time of the changeover to the Flint River in April 2014, and that none have been used since. It appears that Mr. Busch told the EPA something that wasn't true.

I'm writing to ask you to clear up the discrepancy between what Mr. Busch told the EPA, and what Mr. Croft is now saying.

- **What, if any, Optimized Corrosion Control has been in place in Flint since the changeover to the Flint River in April 2014?**
- **If implemented, when did that program begin?**
- **What are the specific details of that optimized corrosion control program, if it did in fact exist? That is to say, what chemicals were used to control corrosion in Flint's water infrastructure?**

In addition, according to my understanding of the law, the city of Flint, operating under the oversight of the MDEQ, was supposed to (a) have had a 120-home sample pool to draw from when choosing homes to sample as part of the EPA's Lead and Copper Rule compliance monitoring and (b) that the city was required by law to re-test those same 100 homes during the second round of testing that took place from Jan. 1 to June 30 2015.

- **Did the city of Flint ever provide the MDEQ with that 120 homes sample pool? Will the MDEQ make that list available if in its possession?**
- **Why did the MDEQ certify that Flint followed proper testing protocol when only 13 of the homes tested during the first round (July 1 to Dec. 31, 2014) were re-tested during the second round?**
- **Why is this not a violation of the federal LCR testing protocols?**
- **Why were all 13 of those homes under the federal action level for lead and copper, while none of the homes over the action level were re-tested during the second round?**

Mr. Del Toral of the EPA specifically said in a communication with MDEQ that a sample from the Walters home at 212 Browning Ave. in Flint should be included in the homes used to determine whether Flint is in compliance with the LCR.

That home was included in the original list of 71 homes the city of Flint provided to MDEQ, but the MDEQ deleted that home from its final report.

It has been asserted that this home had a whole house filter, but according to Lee-Anne Walters she was instructed by Flint officials to disable the filter prior to taking the water sample that showed lead levels to be far above the federal action limit.

- **What is the DEQ's justification for not following the U.S. EPA's specific guidance to include this home in its report showing that Flint is in compliance with federal regulations regarding lead levels in water?**

I would appreciate an answer to these questions by the end of the day Thursday, Sept. 24.

Thank you for your assistance in this important matter.

Sincerely,

Curt Guyette

Investigative reporter

ACLU of Michigan

Work number: 313-578-6834

Cell phone number: 586-925-0493

Rennaker, Joanne (DEQ)

From: Busch, Stephen (DEQ)
Sent: Tuesday, September 15, 2015 12:10 PM
To: Graham, Lois (DEQ); Prysby, Mike (DEQ)
Cc: Benzie, Richard (DEQ); Rosenthal, Adam (DEQ)
Subject: RE: Voice message about Flint - please return the call

I have spoken to Ms. Dotson and answered her questions. She is planning to contact the City as they are in charge of the water system.

Stephen Busch, P.E.
 MDEQ Lansing District Coordinator
 Office of Drinking Water and Municipal Assistance
 Lansing and Jackson District Supervisor
 517-643-2314
buschs@michigan.gov

From: Graham, Lois (DEQ)
Sent: Tuesday, September 15, 2015 8:05 AM
To: Busch, Stephen (DEQ); Prysby, Mike (DEQ)
Cc: Benzie, Richard (DEQ)
Subject: Voice message about Flint - please return the call

I received a voice message overnight and request you return the call.

Delores Dotson, of Flint, pleads there is an emergency about cutting off Detroit water and believes the city needs to get back on the Detroit water system. Her telephone number is 810-785-7335. She seemed upset and was quite firm.

Thanks,

Lois Elliott Graham, R.S., M.S.A.
 Office of Drinking Water & Municipal Assistance
 Field Operations Section
 Contamination Investigation Program
 P.O. Box 30241
 Lansing, Michigan 48909-7741
 Office: 517-284-6530
 Fax: 517-241-1328
grahaml@michigan.gov
 4-South, Pillar N8



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Rennaker, Joanne (DEQ)

From: Graham, Lois (DEQ)
Sent: Tuesday, September 15, 2015 8:05 AM
To: Busch, Stephen (DEQ); Prysby, Mike (DEQ)
Cc: Benzie, Richard (DEQ)
Subject: Voice message about Flint - please return the call

I received a voice message overnight and request you return the call. Delores Dotson, of Flint, pleads there is an emergency about cutting off Detroit water and believes the city needs to get back on the Detroit water system. Her telephone number is 810-785-7335. She seemed upset and was quite firm.

Thanks,

Lois Elliott Graham, R.S., M.S.A.
Office of Drinking Water & Municipal Assistance
Field Operations Section
Contamination Investigation Program
P.O. Box 30241
Lansing, Michigan 48909-7741
Office: 517-284-6530
Fax: 517-241-1328
grahaml@michigan.gov
4-South, Pillar N8



Subscribe to our Environmental Health Email List by clicking on the red envelope

Rennaker, Joanne (DEQ)

From: Crooks, Jennifer <crooks.jennifer@epa.gov>
Sent: Thursday, September 10, 2015 5:58 PM
To: Shekter Smith, Liane (DEQ)
Cc: Benzie, Richard (DEQ); Busch, Stephen (DEQ); Prysby, Mike (DEQ); Poy, Thomas; Porter, Andrea; Devereaux, Tracy Jo (DEQ); Kuefler, Janet; Shoven, Heather; Deltoral, Miguel
Subject: Final Notes from call Tuesday 8/31/15 with MI DEQ RE: Flint

Thank you, Liane, for your edits—I incorporated all of your edits, and further clarified who said what.
 Jennifer

Date: August 31, 2015
Present: Liane Shekter Smith, Richard Benzie, Steve Busch, (2 other MDEQ staff?), Tom Poy, Andrea Porter, Janet Kuefler, Jennifer Crooks

STRATEGIC NEXT STEPS FOR FLINT TO ADDRESS LEAD CORROSION CONCERNS

Tom Poy discussed Marc Edwards' website, "Flint, MI Water Study Updates" (<https://flintwaterstudyupdates.wordpress.com/>). The discussion focused on the lead sampling and analytical results Marc Edwards' team posted to their website. Tom emphasized that EPA is not involved with Marc Edwards' work in Flint. Tom mentioned that the Edwards team's samples may not have been analyzed by a certified lab (which is only required for compliance samples) nor taken from sites that qualify as Tier 1 for LCR compliance sampling, but the results give further evidence that lead levels in Flint are trending upward. (The conclusion that there is an increasing trend of lead concentrations at consumer taps builds upon earlier compliance sampling taken by Flint in 2014 and 2015 that showed the 90th percentile of the 1st 6-month sampling period at 6ppb, then the 90th percentile of the 2nd 6-month sampling period at 11ppb.) Everyone at the meeting agreed that Flint is in compliance with the Safe Drinking water Act action level for lead. However, because the city's population exceeds 50,000 persons, MDEQ stated that Flint needs to additionally optimize their treatment process to reduce lead levels further, if possible.

The "Flint, MI Water Study Updates" website is putting added pressure on MDEQ and EPA to ensure that Flint addresses their lack of optimized corrosion control treatment in an expedited manner in order to protect the residents from exposure to high lead levels. Richard noted that there are numerous systems across the country that have installed corrosion control treatment, have optimized their corrosion control, but did not necessarily reduce their lead levels. We all acknowledged that this is true. MDEQ acknowledged that implementing installation of corrosion control treatment in Flint is prudent to protect public health since there are approximately 15,000 lead service lines within the city. EPA acknowledged that to delay installation of corrosion control treatment in Flint would likely cause even higher levels of lead over time as Flint's many lead service lines are continuously in contact with corrosive water.

Region 5 and MDEQ brainstormed on strategic next steps for Flint to address lead corrosion concerns. These steps included:

1. **Public Education for Flint Residents.** Liane has contacted the Department of Community Health to discuss developing a consumer lead education piece outlining the consumer's options to lower the lead in their drinking water. The Region was glad to hear of a plan to initiate Lead Public Education since this will provide the public immediate actions they can take. The educational material could include steps consumers can take to reduce their exposure to lead in drinking water (flushing their lines after long stagnation periods, using filters certified to remove lead, etc.) as well as longer term fixes to remove lead sources (for example, financing the cost to

remove any part of a lead service line on the owner's property at the same time as Flint is replacing its portion of the lead service line).

2. **Gathering Information on Flint's Future Treatment Plans.** Steve Busch said Flint and their engineering consultants were meeting this week (Sept 1) to discuss conceptually the necessary optimized corrosion control treatment at Flint. Tom Poy shared EPA lead experts' (Mike Schock and Darren Lytle of EPA's Office of Research and Development in Cincinnati) caution against simply adding orthophosphate without first studying the water quality and existing distribution system conditions to ensure that any installed treatment has a good chance of working. EPA lead experts have research and field experience showing the complexity of optimizing corrosion control treatment when water quality is significantly changed, as is the case for Flint.
3. **Offering Flint Free Help from EPA Experts.** Steve Busch has already provided the names of EPA lead experts (Mike Schock and Darren Lytle) to Flint, as has Susan Hedman, R5 Administrator. MDEQ and Region 5 agree that, to successfully control lead corrosion in the distribution system, Flint needs to review this situation holistically, while also addressing the lead issue in an expedited manner.
4. **Laying Groundwork for MDEQ/EPA Collaboration with Flint.** If Flint accepts the offer of technical assistance for optimizing corrosion control, Tom Poy suggested that MDEQ and EPA lead experts (Mike Schock and Darren Lytle) form a partnership to provide such help. EPA experts are able to provide pipe scale analyses, as well as other laboratory support. Although Flint (using their consultant) bears the ultimate responsibility for designing and installing corrosion control, MDEQ and EPA experts are willing and able to provide advice throughout the process.

END

Jennifer

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Rennaker, Joanne (DEQ)

From: Michael Glasgow <mglasgow@cityofflint.com>
Sent: Thursday, September 10, 2015 5:36 PM
To: Prysby, Mike (DEQ)
Subject: August 2015 MOR
Attachments: August 2015 MOR.pdf

Mike,

Here is the August 2015 MOR.

--

Mike Glasgow
Utilities Administrator
City of Flint
1101 S. Saginaw St.
Flint, MI 48502
(810)766-7135 ext. 2602

CITY of FLINT WATER TREATMENT PLANT MONTHLY OPERATION REPORT

SUPPLY NAME: CITY of FLINT WATER PLANTWSSN: 2310Michael Glasgow

Operator-in-Charge

August 2015

Month/Year

F-1R, F-2

Certification of Operator-in-Charge

F-1

Water Plant Classification



Signature of Operator-in-Charge

Genesee

County

Treatment Rate and Filter Data

Maximum Treatment Rate:	<u>20.2</u>	Million Gallons per Day
Rated Plant Capacity:	<u>36</u>	Million Gallons per Day
Average Filter Run:	<u>68</u>	Hours
Average Head Loss:	<u>n/a</u>	Feet *(filter head loss meters not operational)
Average Filtration Rate:	<u>2.2</u>	Gallons Per Square Feet per Minute
Maximum Filtration Rate:	<u>2.9</u>	Gallons Per Square Feet per Minute
Average Wash Water Use:	<u>3.4%</u>	Percent of Treated Water

Chemical Data

Chlorine on hand:	<u>20,000</u> lb.	Est. supply:	<u>24</u> days
Primary Coagulant (Ferric Chloride) on hand:	<u>179,000</u> lb.	Est. supply:	<u>14</u> days
Lime (CaO) on hand:	<u>192</u> tons	Est. supply:	<u>19</u> days
Fluoride on Hand:	<u>18,000</u> lb.	Est. supply:	<u>40</u> days
Cost of All Chemicals per Million Gallons:	<u>n/a</u> dollars		
Total Power Cost per Million Gallons:	<u>n/a</u> dollars		

Remarks

Confluence Point # 1 (N)

Confluence Point # 2 (S)

Number of filter confluence samples > 0.3 NTU:

00

Number of filter confluence samples collected:

213213

Percent of filter confluence samples > 0.3 NTU:

0.0%0.0%

Number of filter confluence samples > 1 NTU

00

Did any individual filter exceed:

1.0 NTU in two consecutive measurements taken 15 minutes apart?

NO

If yes, attach specific filter(s) information and indicate required follow-up status.

0.5 NTU in two consecutive measurements taken 15 minutes apart after 4 hours of operation?

NO

If yes, attach specific filter(s) information and indicate required follow-up status.

1.0 NTU in two consecutive measurements taken 15 minutes apart for 3 consecutive months?

NO

If yes, attach specific filter(s) information and indicate required follow-up status.

2.0 NTU in two consecutive measurements taken 15 minutes apart for 2 consecutive months?

NO

If yes, attach specific filter(s) information and indicate required follow-up status.

Was continuous (every 15 minutes) filter monitoring equipment off-line during the month?

NO

If yes, indicate date(s), duration, and individual filter grab sampling frequency on a separate sheet.

Did POE disinfectant residual fall below 0.2 ppm during the month?

NO

If yes, indicate date(s) and duration on a separate sheet.

Was minimum C*1 credit achieved for the entire month?

YES

If no, indicate on a separate sheet the date(s) not achieved.

Was continuous POE chlorine residual monitoring equipment off-line during the month?

NO

If yes, indicate date(s) and duration on a separate sheet.

Avg.	17.6	4.5	16.0	160.0	4.6	0.83	6	9.1			1.40
Max.	19.8	5.4	19.3	179.7	5.1	0.93	6	16.6	42.3	6.25	2.72
Min.	15.1	4.0	14.0	135.9	1.7	0.08	6	4.7			0.94
Total	547.1										

Filter turbidity

City of Flint Water Treatment Plant

August 2015

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Date	Turbidity, Units												Plant Tap NTU
	Confluence Point. No.1 (N) North						Confluence Point. No.2 (S) South						Point of Entry
	Number of Samples	Avg.	Max	No. of 4 Hr. Compliance periods	No. of 4 Hr. Compliance periods >0.3 NTU	No. of Samples >0.3 NTU	Number of Samples	Avg.	Max	No. of 4 Hr. Compliance periods	No. of 4 Hr. Compliance periods >0.3 NTU	No. of Samples >0.3 NTU	
1	3	0.09	0.11	3	0	0	3	0.08	0.09	3	3	0	0.09
2	7	0.10	0.12	6	0	0	7	0.09	0.10	6	0	0	0.09
3	7	0.07	0.09	6	0	0	7	0.08	0.09	6	0	0	0.11
4	7	0.13	0.26	6	0	0	7	0.10	0.11	6	0	0	0.13
5	7	0.10	0.12	6	0	0	7	0.10	0.11	6	0	0	0.12
6	7	0.11	0.15	6	0	0	7	0.13	0.16	6	0	0	0.13
7	7	0.13	0.14	6	0	0	7	0.12	0.13	6	0	0	0.15
8	7	0.13	0.15	6	0	0	7	0.10	0.12	6	0	0	0.14
9	7	0.14	0.17	6	0	0	7	0.11	0.12	6	0	0	0.15
10	7	0.12	0.13	6	0	0	7	0.10	0.11	6	0	0	0.14
11	7	0.11	0.14	6	0	0	7	0.10	0.11	6	0	0	0.13
12	7	0.10	0.11	6	0	0	7	0.11	0.13	6	0	0	0.14
13	7	0.12	0.14	6	0	0	7	0.11	0.13	6	0	0	0.14
14	7	0.11	0.18	6	0	0	7	0.10	0.11	6	0	0	0.11
15	7	0.11	0.17	6	0	0	7	0.09	0.09	6	0	0	0.10
16	7	0.11	0.12	6	0	0	7	0.09	0.11	6	0	0	0.12
17	7	0.09	0.11	6	0	0	7	0.10	0.12	6	0	0	0.15
18	7	0.10	0.12	6	0	0	7	0.10	0.12	6	0	0	0.12
19	7	0.11	0.16	6	0	0	7	0.09	0.10	6	0	0	0.12
20	7	0.10	0.14	6	0	0	7	0.11	0.12	6	0	0	0.11
21	7	0.10	0.11	6	0	0	7	0.11	0.11	6	0	0	0.10
22	7	0.12	0.14	6	0	0	7	0.10	0.12	6	0	0	0.11
23	7	0.09	0.10	6	0	0	7	0.10	0.12	6	0	0	0.10
24	7	0.10	0.11	6	0	0	7	0.10	0.12	6	0	0	0.11
25	7	0.10	0.13	6	0	0	7	0.10	0.12	6	0	0	0.09
26	7	0.10	0.11	6	0	0	7	0.09	0.11	6	0	0	0.10
27	7	0.09	0.12	6	0	0	7	0.11	0.13	6	0	0	0.09
28	7	0.11	0.11	6	0	0	7	0.10	0.12	6	0	0	0.10
29	7	0.10	0.11	6	0	0	7	0.09	0.09	6	0	0	0.09
30	7	0.10	0.11	6	0	0	7	0.09	0.09	6	0	0	0.09
31	7	0.11	0.17	6	0	0	7	0.10	0.12	6	0	0	0.10
Avg.	7	0.11	0.13	6	0	0	7	0.10	0.11	6	0	0	
Max.	7	0.14	0.26	6	0	0	7	0.13	0.16	6	3	0	0.15
Min.	3	0.07	0.09	3	0	0	3	0.08	0.09	3	0	0	

Fluoridation &
ChlorinationCity of Flint Water Treatment Plant
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Date	Fluoride Applied as F- mg/L	Fluoride Analysis (mg/L)			Chlorine Application (mg/L)			Chlorine Residual (mg/L)					
					Intermediate Chlorine	Post Chlorine	Total Chlorine	Filtered		3 MG Well		Tap	
		Raw	Tap	Dist.				Free	Total	Free	Total	Free	Total
1	0.6	0.18	0.78	0.74	2.2	3.6	5.8	0.4	0.6	2.3	2.6	2.0	2.4
2	0.6	0.19	0.64		2.2	4.6	6.8	0.6	0.9	2.3	2.6	2.1	2.4
3	0.6	0.19	0.84		0.9	5.6	6.5	0.2	0.5	2.6	3.0	2.6	3.0
4	0.6	0.19	0.77		0.0	4.9	4.9	0.0	0.0	2.3	2.9	1.2	1.6
5	0.6	0.20	0.77		0.0	5.4	5.4	0.0	0.0	2.3	2.7	1.8	2.1
6	0.6	0.18	0.78	0.76	0.0	5.6	5.6	0.0	0.0	2.5	3.0	2.4	2.9
7	0.6	0.19	0.76		0.0	5.3	5.3	0.0	0.0	2.5	2.9	2.0	2.5
8	0.5	0.19	0.72		0.0	5.3	5.3	0.0	0.0	2.4	2.8	2.0	2.3
9	0.6	0.19	0.78		0.0	5.7	5.7	0.0	0.0	2.4	2.8	2.0	2.3
10	0.6	0.18	0.75		0.0	5.2	5.2	0.0	0.0	2.2	2.5	1.8	2.2
11	0.5	0.19	0.76		0.0	5.8	5.8	0.0	0.0	2.3	2.7	1.1	1.4
12	0.5	0.20	0.78	0.75	0.0	5.3	5.3	0.0	0.0	1.8	2.4	1.6	1.9
13	0.6	0.20	0.76		0.0	5.5	5.5	0.0	0.0	2.3	3.0	2.2	2.6
14	0.6	0.20	0.73		0.0	5.4	5.4	0.0	0.0	2.4	2.9	2.1	2.4
15	0.6	0.18	0.75		0.0	5.6	5.6	0.0	0.0	2.2	2.4	2.0	2.3
16	0.6	0.20	0.75		0.0	5.1	5.1	0.0	0.0	2.6	2.9	1.7	1.9
17	0.6	0.19	0.76		0.0	5.6	5.6	0.0	0.0	2.1	2.3	2.0	2.3
18	0.6	0.17	0.74		0.0	5.1	5.1	0.0	0.0	2.6	2.9	2.4	2.7
19	0.6	0.20	0.76	0.79	0.0	5.2	5.2	0.0	0.0	2.4	2.7	2.2	2.5
20	0.6	0.19	0.74		0.0	5.7	5.7	0.0	0.0	2.4	2.7	1.7	2.1
21	0.6	0.19	0.71		0.0	5.8	5.8	0.0	0.0	2.0	2.4	1.6	1.9
22	0.5	0.21	0.72		0.0	5.2	5.2	0.0	0.0	2.2	2.5	2.0	2.4
23	0.5	0.20	0.72		0.0	5.0	5.0	0.0	0.0	2.2	2.5	1.3	1.5
24	0.6	0.21	0.76		0.0	4.9	4.9	0.0	0.0	2.4	2.7	2.4	2.7
25	0.5	0.19	0.74		0.0	4.8	4.8	0.0	0.0	2.2	2.5	1.8	2.2
26	0.5	0.21	0.75	0.79	0.0	5.0	5.0	0.0	0.0	2.2	2.5	2.0	2.3
27	0.5	0.20	0.79		0.0	5.1	5.1	0.0	0.0	2.7	2.9	2.3	2.7
28	0.5	0.19	0.67		0.0	5.2	5.2	0.0	0.0	2.3	2.5	1.9	2.3
29	0.6	0.20	0.78		0.0	5.1	5.1	0.0	0.0	2.3	2.6	2.3	2.6
30	0.6	0.20	0.79		0.0	4.7	4.7	0.0	0.0	2.3	2.6	2.3	2.6
31	0.5	0.20	0.70		0.0	4.7	4.7	0.0	0.0	2.2	2.5	1.9	2.3
Avg.	0.57	0.19	0.75	0.76	0.2	5.2	5.4	0.0	0.1	2.3	2.7	2.0	2.3
Max.	0.60	0.21	0.84	0.79	2.2	5.8	6.8	0.6	0.9	2.7	3.0	2.6	3.0
Min.	0.50	0.17	0.64	0.74	0.0	3.6	4.7	0.0	0.0	1.8	2.3	1.1	1.4

Chemical Analyses

City of Flint Water Treatment Plant

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Date	pH (S.U.)		Total Hardness as CaCO ₃ (mg/L)		Total Alkalinity as CaCO ₃ (mg/L)		Non-Carbonate Hardness as CaCO ₃ (mg/L)		Calcium as Ca ²⁺ (mg/L)		Magnesium as Mg ²⁺ (mg/L)		Chloride as Cl ⁻ (mg/L)	
	Raw	Tap	Raw	Tap	Raw	Tap	Raw	Tap	Raw	Tap	Raw	Tap	Raw	Tap
1	8.01	7.48	248	160	212	64	36	96	81.8	57.7	10.7	3.9	44	87
2	8.06	7.45	254	142	210	50	44	92	81.8	48.9	12.2	4.9	42	86
3	8.09	7.28	238	126	208	38	30	88	72.9	40.9	13.6	5.8	45	87
4	8.23	7.24	254	126	212	34	42	92	81.0	43.3	12.6	4.4	43	80
5	8.22	7.26	250	138	208	40	42	98	81.0	44.9	11.7	6.3	44	85
6	8.27	7.38	254	128	208	38	46	90	83.4	42.5	11.2	5.3	43	82
7	8.37	7.24	244	130	206	38	38	92	77.0	37.7	12.6	8.7	46	86
8	8.33	7.38	252	128	216	36	36	92	81.8	41.7	10.2	5.8	43	81
9	8.33	7.53	260	122	216	38	44	84	82.6	40.9	13.1	4.9	42	80
10	8.24	7.25	256	124	222	34	34	90	84.2	41.7	11.2	4.9	41	80
11	8.21	7.17	254	128	218	36	36	92	82.6	46.5	11.7	3.9	44	81
12	8.23	7.26	258	132	224	40	34	92	69.7	38.5	20.4	8.7	44	85
13	8.40	7.27	254	130	214	44	40	86	72.9	36.9	17.5	9.2	45	82
14	8.28	7.42	252	128	216	42	36	86	91.4	47.3	5.8	2.4	45	81
15	8.20	7.44	254	134	210	40	44	94	80.2	43.3	13.1	6.3	42	89
16	8.25	7.30	260	136	216	38	44	98	85.0	45.7	11.7	5.3	43	85
17	8.33	7.32	260	138	218	34	42	104	79.4	44.1	15.1	6.8	44	90
18	8.30	7.40	256	128	220	38	36	90	81.0	39.3	13.1	7.3	44	89
19	8.21	7.33	254	134	222	44	32	90	76.2	38.5	15.6	9.2	46	84
20	8.11	7.42	252	128	216	46	36	82	74.5	43.3	16.0	4.9	51	86
21	8.20	7.40	252	124	218	40	34	84	73.7	40.1	16.5	5.8	45	90
22	8.20	7.37	256	132	212	40	44	92	79.4	38.5	14.1	8.7	45	83
23	8.23	7.34	262	130	214	38	48	92	85.0	41.7	12.2	6.3	44	85
24	8.33	7.39	258	128	222	38	36	90	81.0	41.7	13.6	5.8	45	85
25	8.30	7.43	260	138	222	44	38	94	82.6	50.5	13.1	5.3	46	90
26	8.26	7.21	262	130	218	38	44	92	85.0	42.5	12.2	5.8	45	84
27	8.24	7.33	256	134	226	40	30	94	82.6	44.1	12.2	5.8	47	88
28	8.30	7.38	254	134	214	40	40	94	89.0	48.9	7.8	2.9	44	83
29	8.30	7.19	262	128	218	34	44	94	86.6	40.1	11.2	6.8	44	85
30	8.23	7.41	258	132	214	30	44	102	81.8	44.1	13.1	5.3	45	85
31	8.38	7.41	266	134	228	40	38	94	85.8	45.7	12.6	4.9	43	83
Avg.	8.25	7.34	255	132	216	40	39	92	81.1	43.3	12.8	5.9	44	85
Max.	8.40	7.53	266	160	228	64	48	104	91.4	57.7	20.4	9.2	51	90
Min.	8.01	7.17	238	122	206	30	30	82	69.7	36.9	5.8	2.4	41	80

Bacteriological &
Physical ParametersCity of Flint Water Treatment Plant
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Date	Total Coliform						Standard Plate Count (Simplate MPN)		Conductivity (mS)	Temp. C	Color		Odor	
	Raw (Colilert MPN)		3 MG Well		Plant Tap									
	# Samples	Count	# Samples	# pos	# Samples	# pos	Raw	Tap	Tap	Raw	Raw	Tap	Raw	Tap
1	1	9208	1	0	1	0	1660	< 2	0.46	25.3				
2	1	6896	1	0	1	0	1940	< 2	0.39	25.0				
3	1	24066	1	0	1	0	4960	2	0.41	25.1				
4	1	9222	1	0	1	0	2240	< 2	0.38	25.6				
5	1	7746	1	0	1	0	3320	< 2	0.38	24.2				
6	1	4494	1	0	1	0	2080	2	0.40	24.4				
7	1	6152	1	0	1	0	3900	< 2	0.39	25.0				
8	1	6896	6	0	1	0	3660	< 2	0.38	24.7				
9	1	5510	6	0	1	0	3900	< 2	0.38	24.2				
10	1	9222	6	0	1	0	6220	< 2	0.38	24.7				
11	1	4978	6	0	1	0	5140	< 2	0.37	23.6				
12	1	4128	6	0	1	0	4040	< 2	0.39	23.7				
13	1	3348	6	0	1	0	3660	< 2	0.39	26.6				
14	1	5510	6	0	1	0	5140	< 2	0.40	24.4				
15	1	16328	6	0	1	0	12460	< 2	0.42	24.1				
16	1	6510	6	0	1	0	4960	< 2	0.41	24.9				
17	1	8704	6	0	1	0	3540	< 2	0.41	25.7				
18	1	8212	6	0	1	0	3540	< 2	0.40	25.8				
19	1	8212	6	0	1	0	4180	< 2	0.39	25.9				
20	1	17328	6	0	1	0	4460	< 2	0.41	25.1				
21	1	5526	6	0	1	0	2820	< 2	0.41	25.4				
22	1	6510	6	0	1	0	3540	< 2	0.40	23.7				
23	1	6152	6	0	1	0	3420	< 2	0.40	23.5				
24	1	11588	6	0	1	0	3020	< 2	0.41	23.4				
25	1	5818	6	0	1	0	1480	< 2	0.41	22.3				
26	1	20924	6	0	1	0	3220	< 2	0.39	21.8				
27	1	2548	6	0	1	0	2320	< 2	0.41	21.1				
28	1	2878	6	0	1	0	2080	< 2	0.40	20.4				
29	1	5226	6	0	1	0	4040	< 2	0.39	20.9				
30	1	1808	6	0	1	0	960	< 2	0.38	21.3				
31	1	2500	6	0	1	0	1600	< 2	0.40	21.9				
Avg.									0.40	24.0				
Max.		24066					12460	< 2	0.46	26.6				
Min.									0.37	20.4				

Date	Free Chlorine Residual at Bacteriological Monitoring Stations mg/l										Number of Samples
	1	2	3	4	5	6	7	8	CS	WS	
1											0
2											0
3	0.9	1.4	1.8	0.1	0.1	0.1	0.5	1.8	0.8	2.0	10
4											0
5	0.4	1.2	1.3	0.2	0.1	0.1	0.5	1.1	0.5	1.5	10
6											0
7											0
8											0
9											0
10											0
11	0.9	1.2	1.2	1.0	0.3	0.2	1.0	1.6	1.1	1.5	10
12	0.1	1.4	1.7	1.2	0.6	0.3	0.5	1.7	1.3	1.9	10
13											0
14											0
15											0
16											0
17											0
18	1.0	1.0	1.4	1.0	0.4	0.2	0.8	1.8	1.0	1.9	10
19	0.1	1.0	1.3	0.9	0.2	0.2	0.1	1.2	1.0	1.5	10
20	0.8	1.3	1.4	0.7	0.6	0.2	0.8	1.3	1.1	1.6	10
21											0
22											0
23											0
24											0
25	0.4	1.2	1.5	0.6	0.4	0.3	0.5	1.5	0.7	1.1	10
26	0.1	1.2	1.3	1.0	0.3	0.1	0.5	1.3	1.4	1.8	10
27	0.1	1.3	1.5	1.0	0.4	0.2	0.2	1.5	1.7	2.3	10
28											0
29											0
30											0
31											0

Distribution Sample Summary

Total # of routine distribution samples analyzed	100
Total # of routine distribution samples required	100

Distribution Bacteriological Summary

Total # of positive routine distribution samples	0
Percent of routine distribution samples positive	0%

See page 9 for positive sample information.

Distribution Disinfectant Total Residual Summary

Percentage of samples with a detectable disinfectant residual	100%
Average disinfectant residual this month	0.92

Date	Total Chlorine Residual at Bacteriological Monitoring Stations mg/l										Number of Samples
	1	2	3	4	5	6	7	8	CS	WS	
1											0
2											0
3	1.3	1.8	2.2	0.4	0.3	0.3	0.7	2.2	1.1	2.3	10
4											0
5	0.6	1.5	1.6	0.4	0.2	0.5	0.8	1.4	0.8	1.8	10
6											0
7											0
8											0
9											0
10											0
11	1.2	1.5	1.5	1.3	0.5	0.3	1.3	1.9	1.3	1.8	10
12	0.1	1.6	1.9	1.4	0.8	0.6	0.7	1.9	1.5	2.1	10
13											0
14											0
15											0
16											0
17											0
18	1.3	1.3	1.7	1.3	0.5	0.3	1.1	2.1	1.3	2.2	10
19	0.2	1.3	1.7	1.2	0.4	0.4	0.3	1.5	1.3	1.7	10
20	1.0	1.5	1.7	1.0	0.9	0.3	1.1	1.5	1.4	1.8	10
21											0
22											0
23											0
24											0
25	0.6	1.5	1.8	0.9	0.5	0.4	0.7	1.8	1.0	1.0	10
26	0.2	1.4	1.5	1.3	0.5	0.2	0.7	1.5	1.6	2.0	10
27	0.2	1.5	1.8	1.3	0.5	0.3	0.4	1.8	2.0	2.6	10
28											0
29											0
30											0
31											0

Distribution Disinfectant Total Residual Summary	
Percent samples with a detectable disinfectant residual	100%
Average disinfectant residual this month	1.2

Positive Distribution Samples

[illegible]

Rennaker, Joanne (DEQ)

From: Michael Glasgow <mglasgow@cityofflint.com>
Sent: Thursday, September 10, 2015 10:47 AM
To: Prysby, Mike (DEQ); Busch, Stephen (DEQ)

Steve & Mike,

Good morning, I hope you enjoyed your holiday weekend. I am contacting you on behalf of Howard to request a "quote". Howard is preparing a presentation for the City Council on Monday night in regards to this recent lead & copper news. He would appreciate a statement in regards to why corrosion control was not required by the City at the onset of using the Flint River, and how it took two rounds of lead & copper sampling to determine that "optimization" is required. I have explained to him my understanding, although for the presentation he is looking for a brief statement of a couple sentences to reference or quote one of you.

Thank you,

--

Mike Glasgow
Utilities Administrator
City of Flint
1101 S. Saginaw St.
Flint, MI 48502
(810)766-7135 ext. 2602

Rennaker, Joanne (DEQ)

From: Crooks, Jennifer <crooks.jennifer@epa.gov>
Sent: Thursday, September 10, 2015 9:19 AM
To: Shekter Smith, Liane (DEQ); Benzie, Richard (DEQ); Busch, Stephen (DEQ); Prysby, Mike (DEQ); Cook, Pat (DEQ); Philip, Kris (DEQ)
Subject: FW: Letter from Rep Kildee to MDEQ and EPA on VT Flint Website
Importance: High

From: Shoven, Heather
Sent: Thursday, September 10, 2015 8:03 AM
To: Deltoral, Miguel; Poy, Thomas; Bair, Rita; Damato, Nicholas
Cc: Porter, Andrea; Crooks, Jennifer
Subject: Letter from Rep Kildee to MDEQ and EPA on VT Flint Website

Letter from Representative Kildee to EPA and MDEG on VT Flint Website --
<http://flintwaterstudy.org/wp-content/uploads/2015/09/2015-09-09-Congressman-Kildee-Letter-on-Lead-in-Flint-Water.pdf>

Congressman Dan Kildee (D-MI 5th District) calls on EPA and MDEQ to answer, among other questions, “Is Flint water safe?”

Rennaker, Joanne (DEQ)

From: Busch, Stephen (DEQ)
Sent: Thursday, September 10, 2015 7:58 AM
To: Wurfel, Brad (DEQ); Shekter Smith, Liane (DEQ); Prysby, Mike (DEQ)
Cc: Wyant, Dan (DEQ); Pallone, Maggie (DEQ)
Subject: RE: Congressman Kildee Letter on Lead in Flint Water
Attachments: Congressman Kildee Letter on Lead in Flint Water

I received a copy of Congressman Kildee's letter from Jordan as well. (attached).

Stephen Busch, P.E.
 MDEQ Lansing District Coordinator
 Office of Drinking Water and Municipal Assistance
 Lansing and Jackson District Supervisor
 517-643-2314
buschs@michigan.gov

From: Wurfel, Brad (DEQ)
Sent: Wednesday, September 09, 2015 10:09 PM
To: Shekter Smith, Liane (DEQ); Busch, Stephen (DEQ); Prysby, Mike (DEQ)
Cc: Wyant, Dan (DEQ); Pallone, Maggie (DEQ)
Subject: Fwd: Congressman Kildee Letter on Lead in Flint Water

Liane, need your team's help. We'll need a draft response, and possibly a briefing for the director tomorrow.
 I'll find you in the morning. Thanks!
 b

Sent from my iPhone

Begin forwarded message:

From: "Dickinson, Jordan" <Jordan.Dickinson@mail.house.gov>
Date: September 9, 2015 at 6:54:47 PM EDT
To: "Wurfelb@michigan.gov" <Wurfelb@michigan.gov>
Subject: FW: Congressman Kildee Letter on Lead in Flint Water

Hi Brad,

Can you please make sure the attached letter is passed along to Director Wyant? I will forward along a physical copy in the mail.

Thank you,

Jordan Dickinson
 Legislative Assistant
 Congressman Dan Kildee (MI-05)
 227 Cannon House Office Building
 Washington, D.C. 20515

Phone: (202) 225-3611
www.dankildee.house.gov

Rennaker, Joanne (DEQ)

From: Dickinson, Jordan <Jordan.Dickinson@mail.house.gov>
Sent: Wednesday, September 09, 2015 7:03 PM
To: Busch, Stephen (DEQ)
Subject: Congressman Kildee Letter on Lead in Flint Water
Attachments: 2015-09-09- Congressman Kildee Letter on Lead in Flint Water.pdf

Hi Mr. Busch,

Please see the attached letter from Congressman Kildee that you were cc'd on. I will forward along a physical copy in the mail.

Thank you,

Jordan Dickinson
Legislative Assistant
Congressman Dan Kildee (MI-05)
227 Cannon House Office Building
Washington, D.C. 20515
Phone: (202) 225-3611
www.dankildee.house.gov



[Sign up for Congressman Dan Kildee's e-newsletter](#)

DANIEL T. KILDEE
5TH DISTRICT, MICHIGAN

**COMMITTEE ON
FINANCIAL SERVICES**

**SUBCOMMITTEE ON
HOUSING AND INSURANCE**

**SUBCOMMITTEE ON
MONETARY POLICY AND TRADE**

SENIOR WHIP

**DEMOCRATIC POLICY AND
COMMUNICATIONS COMMITTEE**



Congress of the United States
House of Representatives
Washington, DC 20515
September 9, 2015

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@RepDANKILDEE

Ms. Gina McCarthy
Administrator
Environmental Protection Agency
1200 Pennsylvania Ave. NW
Washington, D.C. 20460

Mr. Dan Wyant
Director
Michigan Department of Environmental Quality
P.O. Box 30473
Lansing, MI 48909

Administrator McCarthy and Director Wyant:

The attached June 24, 2015, memorandum between two Environmental Protection Agency (EPA) employees, Miguel A. Del Toral and Thomas Poy, published recently by the American Civil Liberties Union of Michigan, suggests that there are high lead levels in the city of Flint, Mich., water transmission lines. Furthermore, this document reflects that children consuming this water had levels of lead in their blood in excess of three times what they were prior to the city of Flint switching its source water from the Detroit Water and Sewage Department (DWSD) to the Flint River.

In addition, this memorandum makes recommendations to Mr. Poy, Chief of the Ground Water and Drinking Water Branch of EPA Region 5, to do three things. First, for the EPA to work with the Michigan Department of Environmental Quality (MDEQ) to provide technical assistance to the city of Flint to deal with water quality issues. Second, it suggests the EPA review the compliance status of the city of Flint in respect to its compliance with the Lead and Copper Rule (LCR). Third, the memorandum recommends that the EPA conduct a review of the city of Flint testing procedures to ensure they are compliant with the LCR.

Regarding this memorandum and the surrounding water quality issues in the city of Flint, I have the following questions:

- Was this memorandum actually sent to Mr. Poy?

- Are the findings in the memorandum regarding the lead levels in the city of Flint water accurate?
- If there were in fact high levels of lead in the water in the city of Flint, when did the EPA and/or MDEQ plan to alert the public?
- What, if any, of the recommendations has the EPA followed from the memorandum?
- Given the demonstrated level of lead in the water in Flint, MI, is the water safe?

Regardless, I am very troubled by recent tests suggesting high levels of lead in the city of Flint's water system. As you know, on the EPA's website it says that lead above the "action level" in drinking water can cause a variety of adverse health effects, including delays in physical and mental development in babies and children.

According to the Safe Drinking Water Act, the EPA has the responsibility of enforcing water quality standards. EPA, however, has given the primary responsibility of enforcing water quality standards to the state of Michigan via MDEQ. As such, it is the responsibility of these agencies to ensure that the people of the city of Flint have safe drinking water.

Thank you and I look forward to hearing from you soon.

Sincerely,



Dan Kildee
MEMBER OF CONGRESS

cc:

State Senator Jim Ananich
State Representative Sheldon Neeley
State Representative Phil Phelps
Mayor Dayne Walling, City of Flint
Howard Croft, City of Flint
Susan Hedman, EPA
Thomas Poy, EPA
Michael Schock, EPA-ORD
Darren Lytle, EPA-ORD
Denise Fortin, EPA
Liane Shekter-Smith, MDEQ
Pat Cook, MDEQ
Stephen Busch, MDEQ
Brad Wurfel, MDEQ
Marc Edwards, Virginia Tech

Rennaker, Joanne (DEQ)

From: Benzie, Richard (DEQ)
Sent: Wednesday, September 09, 2015 6:36 PM
To: Wurfel, Brad (DEQ); Busch, Stephen (DEQ); Shekter Smith, Liane (DEQ); Prysby, Mike (DEQ)
Cc: Cook, Pat (DEQ)
Subject: RE: june 24 memorandum

Sorry this reply is so long. I didn't plan to do so, but I wanted to provide you with some information in case you feel the need to reply in part today.

Brad,

Mike Prysby is on annual leave for a couple of weeks, Steve Busch was in his Jackson office today and probably on his way home now, Liane took this afternoon off to attend to personal business in Marshall, and Pat Cook is gone for the day. Do you need an answer today?

Since this memo is based on the unofficial draft report, do we want to comment? We should probably meet to discuss before anyone responds.

As you know, we have agreed to disagree with EPA on a couple of the issues raised by this memo covering an unofficial EPA report.

To begin, when the lead and copper rules (LCR) were first implemented, large systems were allowed to collect two sets of lead and copper samples in consecutive 6 month monitoring periods and if their 90th percentile lead level was within 5 milligrams per liter of the lead level in their source water, they did not have to further "optimize" corrosion control treatment. When Flint changed water sources from the Great Lakes to an inland river and employed water treatment that was significantly different (precipitative softening vs. direct filtration) than that supplied by Detroit, we granted Flint as a "new supply" the same consideration to determine if their treatment already provided optimal corrosion control.

As you know, their first 6 month monitoring results complied with the Action Level for lead and were close to demonstrating optimal corrosion control treatment (OCCT). Since the city would be averaging results from the two consecutive monitoring periods for the purposes of OCCT determination, we awaited their second set of results to see what they would reveal. After getting the second set, it was determined that Flint was again in compliance with the lead and copper Action Level but they did not qualify as already practicing OCCT.

Under the original regulatory schedule for implementing OCCT, a community serving more than 50,000 people was given a year to conduct treatment studies and submit them to DEQ. We then have 6 months to review their studies and designate their OCCT. They then have 2 years to install that treatment. During all that time, no monitoring is required. Our response to the concerns raised in that memo but also more significantly, in formal discussions with Region 5 EPA Managers, was to encourage Flint to not take the time we believe they were entitled to have for this process but to move as quickly as possible to implement some OCCT.

Second, we continue to disagree with EPA on sampling protocols. We have attempted to ensure compliance with EPA guidance (I believe it was provided in the preamble to their lead and copper regulations) that said that household use should be "typical" for a residential customer on the day before sample collection for lead and copper. Early in the implementation of the LCR, we had encountered too many situations where compliance samples had been collected from kitchen and bathroom taps that had not been used in days and in some cases, even weeks, resulting in excessively stagnated water and correspondingly high lead levels that did not represent typical exposure expected after overnight stagnation. Further complicating this issue was the

media spectacle that was arising over EPA's direct implementation of the LCR in Washington, D.C., where lead results were not always being included in compliance calculations and subsequently, invalidation of samples was becoming more difficult. In order to avoid that complicated process, we devised our current recommendations for ensuring appropriate but not excessive stagnation for LCR monitoring.

We continue to believe it is appropriate to flush these taps the day before sample collection to simulate and/or ensure typical household use before the tap is allowed to sit overnight to achieve the expected stagnation time the regulation stipulates (~8 hours) prior to collecting the first draw sample. The LCR does not say the result should represent the "absolute worst case" condition – it talks about sampling the highest risk locations (lead plumbing, lead service lines, high lead content solder piping, etc.) after overnight stagnation and then collecting a first draw sample so as not to flush elevated lead from that tap at that point in time. Until EPA changes this rule, we are satisfied with our sampling protocol.

I am leaving now, so you can use this information as you see fit, or wait until tomorrow to discuss with Steve, Liane, Pat and me. We have an all-day ODWMA managers meeting starting at 9 AM Thursday, although Liane is also attending a meeting first thing in the morning with Jim Sygo, Bob Wagner and Jon Allen.

Richard

From: Wurfel, Brad (DEQ)

Sent: Wednesday, September 09, 2015 4:52 PM

To: Busch, Stephen (DEQ); Benzie, Richard (DEQ); Shekter Smith, Liane (DEQ); Prysby, Mike (DEQ)

Subject: FW: June 24 memorandum

Heads up

b

From: Ronald Fonger [<mailto:RFONGER1@mlive.com>]

Sent: Wednesday, September 09, 2015 1:28 PM

To: Wurfel, Brad (DEQ)

Subject: June 24 memorandum

Brad:

I know you said the state would not comment on unofficial draft reports from U.S. EPA staff, but since the attached June 24 memorandum was sent to four DEQ staff members, can you comment about what – if anything – the state has done in response?

Was the city of Flint notified of the issues raised in the memorandum directly by DEQ?

Was there a written response from DEQ to U.S. EPA to the memo?

Thanks, we are looking further into some of the issues raised in this document.

Ron Fonger

MLive Media Group

Reporter

mobile 810.347.9963

email rfonger1@mlive.com

address 540 S. Saginaw St. #101, Flint MI 48502

Rennaker, Joanne (DEQ)

From: Wurfel, Brad (DEQ)
Sent: Wednesday, September 09, 2015 4:52 PM
To: Busch, Stephen (DEQ); Benzie, Richard (DEQ); Shekter Smith, Liane (DEQ); Prysby, Mike (DEQ)
Subject: FW: june 24 memorandum
Attachments: 4239_001.pdf

Heads up
b

From: Ronald Fonger [<mailto:RFONGER1@mlive.com>]
Sent: Wednesday, September 09, 2015 1:28 PM
To: Wurfel, Brad (DEQ)
Subject: june 24 memorandum

Brad:
I know you said the state would not comment on unofficial draft reports from U.S. EPA staff, but since the attached June 24 memorandum was sent to four DEQ staff members, can you comment about what – if anything – the state has done in response?
Was the city of Flint notified of the issues raised in the memorandum directly by DEQ?
Was there a written response from DEQ to U.S. EPA to the memo?
Thanks, we are looking further into some of the issues raised in this document.

Ron Fonger
MLive Media Group
Reporter

mobile 810.347.9963
email rfonger1@mlive.com
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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
 REGION 5
 77 WEST JACKSON BOULEVARD
 CHICAGO, IL 60604-3590

REPLY TO THE ATTENTION OF:

WG-15J

June 24, 2015

MEMORANDUM

SUBJECT: High Lead Levels in Flint, Michigan -- Interim Report

FROM: Miguel A. Del Toral *WADT*
 Regulations Manager, Ground Water and Drinking Water Branch

TO: Thomas Poy
 Chief, Ground Water and Drinking Water Branch

The purpose of this interim report is to summarize the available information regarding activities conducted to date in response to high lead levels in drinking water reported by a resident in the City of Flint, Michigan. The final report will be submitted once additional analyses have been completed on pipe and water samples.

Following a change in the water source, the City of Flint has experienced a number of water quality issues resulting in violations of National Primary Drinking Water Regulations (NPDWR) including acute and non-acute Coliform Maximum Contaminant Level (MCL) violations and Total Trihalomethanes (TTHM) MCL violations as follows:

Acute Coliform MCL violation in August 2014
 Monthly Coliform MCL violation in August 2014
 Monthly Coliform MCL violation in September 2014
 Average TTHM MCL violation in December 2014
 Average TTHM MCL violation in June 2015

In addition, as of April 30, 2014, when the City of Flint switched from purchasing finished water from the City of Detroit to using the Flint River as their new water source, the City of Flint is no longer providing corrosion control treatment for lead and copper.

A major concern from a public health standpoint is the absence of corrosion control treatment in the City of Flint for mitigating lead and copper levels in the drinking water. Recent drinking water sample results indicate the presence of high lead results

in the drinking water, which is to be expected in a public water system that is not providing corrosion control treatment. ~~The lack of any mitigating treatment for lead is of serious concern for residents that live in homes with lead service lines or partial lead service lines, which are common throughout the City of Flint.~~

In addition, following the switch to using the Flint River, the City of Flint began adding ferric chloride, a coagulant used to improve the removal of organic matter, as part of the strategy to reduce the TTHM levels. Studies have shown that an increase in the chloride-to-sulfate mass ratio in the water can adversely affect lead levels by increasing the galvanic corrosion of lead in the plumbing network.

Prior to April 30, 2014, the City of Flint purchased finished water from the City of Detroit which contained orthophosphate, a treatment chemical used to control lead and copper levels in the drinking water. ~~When the City of Flint switched to the Flint River as their water source on April 30, 2014, the orthophosphate treatment for lead and copper control was not continued.~~ In effect, the City of Flint stopped providing treatment used to mitigate lead and copper levels in the water. In accordance with the Lead and Copper Rule (LCR), all large systems (serving greater than 50,000 persons) are required to install and maintain corrosion control treatment for lead and copper. In the absence of any corrosion control treatment, lead levels in drinking water can be expected to increase.

~~The lack of mitigating treatment is especially concerning as the high lead levels will likely not be reflected in the City of Flint's compliance samples due to the sampling procedures used by the City of Flint for collecting compliance samples.~~ The instructions from the City of Flint to residents direct the residents to 'pre-flush' the taps prior to collecting the compliance samples. A copy of the instructions provided by the City of Flint to residents will be included in the final report.

The practice of pre-flushing before collecting compliance samples has been shown to result in the minimization of lead capture and significant underestimation of lead levels in the drinking water. Although this practice is not specifically prohibited by the LCR, it negates the intent of the rule to collect compliance samples under 'worst-case' conditions, which is necessary for statistical validity given the small number of samples collected for lead and copper under the LCR. This is a serious concern as the compliance sampling results which are reported by the City of Flint to residents could provide a false sense of security to the residents of Flint regarding lead levels in the water and may result in residents not taking necessary precautions to protect their families from lead in the drinking water. Our concern regarding the inclusion of 'pre-flushing' in sampling instructions used by public water systems in Michigan has been raised with the Michigan Department of Environmental Quality (MDEQ). The MDEQ has indicated that this practice is not prohibited by the LCR and continues to retain the 'pre-flushing' recommendation in their lead compliance sampling guidance to public water systems in Michigan. A copy of the MDEQ guidance will be included in the final report.

In the case of the Flint resident that contacted U.S. EPA (Ms. Lee-Anne Walters), the initial results from drinking water samples collected by the City of Flint in her home

for lead were 104 ug/L and 397 ug/L. The level of iron in the water also exceeded the capability of the measurement (>3.3 mg/L). The lead results were especially alarming given that the samples were collected using the sampling procedures described above, which minimize the capture of lead. When contacted by U.S. EPA Region 5, the MDEQ indicated that the lead was coming from the Walters' plumbing. Ms. Walters had previously indicated that all of the plumbing in the home was plastic.

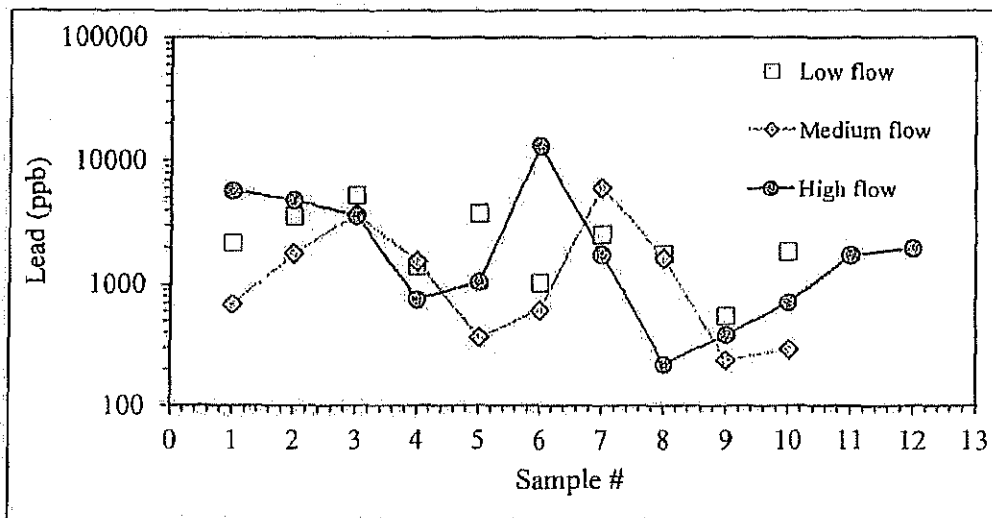
Following the confirmation of the initial high lead results, U.S. EPA Region 5 conducted two visits to the Walters' home on April 27, 2015 and May 6, 2015. Based on an inspection of the plumbing and subsequent sampling conducted at the Walters' residence, it was determined that except for a few minor metallic connectors, all interior plumbing, including the pipes, valves and connectors are made of plastic certified by the National Sanitation Foundation (NSF) for use in drinking water applications. Subsequent sampling showed that the faucets in the home appear to be compliant with the new lead-free requirements and are also not the source for the high lead levels. Our inspection of the interior plumbing and analysis of follow-up sampling results demonstrate that the home plumbing network is not the source of the high lead levels found at the Walters' residence. The photographs and all sampling results will be included in the final report.

Based on the U.S. EPA inspection and documentation of the plastic plumbing at the Walters' residence, it was suspected that the high lead was being introduced into the Walters' home plumbing from outside the home, likely from a lead service line. Three portions of the service line were extracted during a subsequent trip on May 6, 2015 and sent for analysis, when the Walters' service line was replaced. Analyses performed to date indicate that a portion of the service line is made of galvanized iron pipe. Inspection of the remaining portion from the water main to the external shut-off valve confirmed that the portion from the water main to the external shut-off valve is a lead service line.

Ms. Walters has also provided U.S. EPA with medical reports on her child's blood lead testing indicating that the child had a low blood lead level (2 ug/dL) prior to the source water switch and an elevated blood lead level following the switch (6.5 ug/dL). Redacted copies of these reports will also be included in the final report.

Subsequent to the discovery of high lead levels in the Walters' drinking water, the water to the Walters' home was shut off on April 3, 2015. The water was briefly turned back on to collect additional samples on April 28, 2015. Since the water had stagnated for an extended period of time, the kitchen tap was flushed for 25 minutes the night before collecting the samples. Three sets of samples were collected at different flow rates (10 at low flow, 10 at medium flow and 10 at high flow).

The drinking water samples collected from the Walters' residence on April 28, 2015 contained extremely high lead levels, ranging in value from 200 ug/L to 13,200 ug/L (see below).



Sample results and graph are provided courtesy of Virginia Tech

Additional sample results from resident-requested samples have also shown lead levels in excess of the lead action level. As with the samples collected by the City of Flint for compliance, the resident-requested samples are also being collected using the 'pre-flushing', so the lead levels captured in these samples likely do not represent the worst-case lead levels in the water and the actual lead levels at these homes may be much higher.

Pending completion of the final report, my interim recommendations are as follows:

1. The U.S. EPA should follow up with the MDEQ and the City of Flint on the recommendation made by U.S. EPA to MDEQ on June 10, 2015 to offer the City of Flint technical assistance on managing the different water quality issues in Flint, including lead in the drinking water. Although there have been two written assessments regarding water quality and operational issues in Flint at the time of this report, they do not address lead in drinking water. The first is an Operational Evaluation Report (OER) produced in November 2014 by Lockwood, Andrews and Newnam, Inc. to assess the factors contributing to high Total Trihalomethane (TTHM) levels in Flint following the source change. The focus of this report is to identify potential causes and remedial actions for lowering TTHM levels. The second report (Water Quality Report) produced by Veolia for the City of Flint on March 12, 2015, is an assessment of Flint's water quality and operations which provides advice to the City of Flint primarily focused on TTHM control and other operational issues. Both reports were written prior to the recent discovery of high lead results in Flint drinking water. As such, the reports do not take into account the potential effects on lead levels in drinking water.

As previously mentioned, the City of Flint currently has no mitigating treatment for lead and is also planning another source water change in the near future. U.S. EPA's Office of Research and Development in Cincinnati has extensive experience in corrosion and corrosion control treatment and distribution system issues and would be a valuable addition to the drinking water advisory group for the City of Flint. Copies of the qualifications and experience for Michael Schock and Darren Lytle have been forwarded to MDEQ.

2. U.S. EPA should review the compliance status of the City of Flint with respect to whether the system is in violation of the LCR requirement to install and maintain optimal corrosion control and whether the MDEQ is properly implementing the LCR provisions regarding optimal corrosion control treatment requirements for large systems. Pursuant to 40 CFR Section 141.82(i), the EPA Regional Administrator may review treatment determinations made by a State and issue federal treatment determinations consistent with the requirements of the LCR where the Regional Administrator finds: (1) A state has failed to issue a treatment determination by the applicable deadlines; (2) A State has abused its discretion in a substantial number of cases or in cases affecting a substantial population; or (3) The technical aspects of a State's determination would be indefensible in an expected Federal enforcement action taken against a system.
3. The U.S. EPA should review whether relevant resident-requested samples are being included by the City of Flint in calculating the 90th percentile compliance value for lead. Recent drinking water tests conducted at homes in Flint for lead that are not part of the compliance sampling pool have revealed high lead levels in the drinking water. The U.S. EPA memorandum signed on December 23, 2004 provides clarification on compliance determinations and states that customer-requested samples are to be included in the 90th percentile lead compliance calculation where the sampling is conducted during the monitoring period from sites and sampling procedures meeting the LCR criteria. Given the prevalence of lead service lines in the City of Flint, should these sample results be from homes with lead service lines, the sample results would be considered compliance samples under the LCR.

Also attached is a timeline of events for Flint, Michigan. Should you have any questions regarding the information or recommendations provided, please let me know.

cc: Liane Shekter-Smith (MDEQ)
 Pat Cook (MDEQ)
 Stephen Busch (MDEQ)
 Michael Prysby (MDEQ)
 Marc Edwards (Virginia Tech)
 Michael Schock, EPA-ORD
 Darren Lytle, EPA-ORD

Rennaker, Joanne (DEQ)

From: Benzie, Richard (DEQ)
Sent: Wednesday, September 09, 2015 3:22 PM
To: Poy, Thomas (poy.thomas@epa.gov)
Cc: Rosenthal, Adam (DEQ); Prysby, Mike (DEQ); Busch, Stephen (DEQ); Shekter Smith, Liane (DEQ)
Subject: Flint Pb&Cu Results
Attachments: ACLU FOIA - Lab Results for Flint.pdf

Tom,

Here are the scanned analytical results from the latest round of compliance monitoring (January 1 – June 30, 2015) conducted in Flint. They were scanned for the purpose of responding to a Freedom of Information Act request.

I believe you already have a copy of the correspondence from our Lansing District Office notifying the city of Flint of the compliance determination that was based on these results.

If you need more information, contact Adam Rosenthal.

Richard

Richard Benzie, P.E., Chief
Field Operations Section
Office of Drinking Water and Municipal Assistance, MDEQ
517-284-6512

**MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
DRINKING WATER LABORATORY**

USEPA Region V Drinking Water Cert. No. MI00003

P.O. Box 30270

Lansing, MI 48909

TEL: (517) 335-8184

FAX: (517) 335-8562



Sample Number

LF68790

Official Laboratory Report

Report To: **MIKE GLASGOW**
4500 N DORT HWY
FLINT MI 48505

System Name/Owner: **CITY OF FLINT**
Collection Address: **3811 BRENTWOOD DR, FLINT**
Collected By: **REID SANDERS**
Township/Well/Section: **//**
County: **Genesee**
Sample Point: **KITCHEN**
Water System: **Treated Public Distribution System**

WSSN/Pool ID: **2310**
Source: **Single Family Dwelling**
Site Code:
Collector: **Private Citizen**
Date Collected: **06/14/2015 09:35**
Date Received: **06/19/2015 11:02**
Purpose: **Routine Monitoring**

TESTING INFORMATION			REGULATORY INFORMATION			
Analyte Name	Result (mg/L)	Date Tested	RL (mg/L)	MCL/AL (mg/L)	Method	CAS #
Copper:	Not detected	06/22/2015	0.05	1.3	EPA 200.8	7440-50-8
Lead	0.042	06/22/2015	0.001	0.015	EPA 200.8	7439-92-1

The analyses performed by the MDEQ Drinking Water Laboratory were conducted using methods approved by the U.S. Environmental Protection Agency in accordance with the Safe Drinking Water Act, 40 CFR parts 141-143, and other regulatory agencies as appropriate.

Your local health department has detailed information about the quality of drinking water in your area. If you have concerns about the health risks related to the test results of your sample, please contact the Environmental Health Section through the address and telephone number listed below:

Genesee County Health Dept.
630 South Saginaw
Flint, MI 48502-1540
810 257-3603

CAS# : Chemical Abstract Service Registry Number
MCL : Maximum Contaminant Level
AL : Action Level
RL : Reporting Limit

mg/L : milligrams / Liter (ppm)
ppm : parts per million
MPN : Most Probable Number
CFU : Colony Forming Unit

Laboratory Contacts
Drinking Water Unit Mgr: Julia Pleper
Systems Mgmt. Unit Mgr: George Krisztian

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Lansing, MI 48909

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FAX: (517) 335-8562



Sample Number

LF63410

Official Laboratory Report

Report To: **MIKE GLASGOW**
4500 N DORT HWY
FLINT MI 48505

System Name/Owner: **CITY OF FLINT**
Collection Address: **631 ALVORD AVE, FLINT**
Collected By: **JANICE BERRYMAN**
Township/Well#/Section: **//**
County: **Genesee**
Sample Point: **MAIN BATHROOM**
Water System: **Treated Public Distribution System**

WSSN/Pool ID: **2310**
Source: **Single Family Dwelling**
Site Code:
Collector: **Private Citizen**
Date Collected: **05/06/2015 07:00**
Date Received: **05/13/2015 11:26**
Purpose: **Routine Monitoring**

TESTING INFORMATION			REGULATORY INFORMATION			
Analyte Name	Result (mg/L)	Date Tested	RL (mg/L)	MCL/AL (mg/L)	Method	CAS #
Copper	Not detected	05/14/2015	0.05	1.3	EPA 200.8	7440-50-8
Lead	0.042	05/14/2015	0.001	0.015	EPA 200.8	7439-92-1

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630 South Saginaw
Flint, MI 48502-1540
810 257-3603

CAS#: Chemical Abstract Service Registry Number
MCL: Maximum Contaminant Level
AL: Action Level
RL: Reporting Limit

mg/L: milligrams / Liter (ppm)
ppm: parts per million
MPN: Most Probable Number
CFU: Colony Forming Unit

Laboratory Contacts
Drinking Water Unit Mgr: Julia Pieper
Systems Mgmt. Unit Mgr: George Krisztian

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Lansing, MI 48909
TEL: (517) 335-8184
FAX: (517) 335-8562

**Sample Number
LF68793**

Official Laboratory Report

Report To: **MIKE GLASGOW**
4500 N DORT HWY
FLINT MI 48505

System Name/Owner:	CITY OF FLINT	WSSN/Pool ID:	2310
Collection Address:	1150 WOODSIDE DR, FLINT	Source:	Single Family Dwelling
Collected By:	DEBORAH CONRAD	Site Code:	
Township/Well#/Section:	//	Collector:	Private Citizen
County:	Genesee	Date Collected:	06/14/2015 07:30
Sample Point:	KITCHEN	Date Received:	06/19/2015 11:02
Water System:	Treated Public Distribution System	Purpose:	Routine Monitoring

TESTING INFORMATION			REGULATORY INFORMATION			
Analyte Name	Result (mg/L)	Date Tested	RL (mg/L)	MCL/AL (mg/L)	Method	CAS #
Copper	Not detected	06/22/2015	0.05	1.3	EPA 200.8	7440-50-8
Lead	0.029	06/22/2015	0.001	0.015	EPA 200.8	7439-92-1

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Your local health department has detailed information about the quality of drinking water in your area. If you have concerns about the health risks related to the test results of your sample, please contact the Environmental Health Section through the address and telephone number listed below:

Genesee County Health Dept.
630 South Saginaw
Flint, MI 48502-1540
810 257-3603

CAS# : Chemical Abstract Service Registry Number
MCL : Maximum Contaminant Level
AL : Action Level
RL : Reporting Limit

mg/L : milligrams / Liter (ppm)
ppm : parts per million
MPN : Most Probable Number
CFU : Colony Forming Unit

Laboratory Contacts
Drinking Water Unit Mgr: Julia Pleper
Systems Mgmt. Unit Mgr: George Krisztian

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FAX: (517) 335-8562



Sample Number

LF63411

Official Laboratory Report

Report To: **MIKE GLASGOW**
4500 N DORT HWY
FLINT MI 48505

System Name/Owner:	CITY OF FLINT	WSSN/Pool ID:	2310
Collection Address:	216 BROWNING AVE, FLINT	Source:	Single Family Dwelling
Collected By:	DEB	Site Code:	
Township/Well#/Section:	//	Collector:	Private Citizen
County:	Genesee	Date Collected:	05/07/2015 08:00
Sample Point:	KITCHEN	Date Received:	05/13/2015 11:26
Water System:	Treated Public Distribution System	Purpose:	Routine Monitoring

TESTING INFORMATION			REGULATORY INFORMATION			
Analyte Name	Result (mg/L)	Date Tested	RL (mg/L)	MCL/AL (mg/L)	Method	CAS #
Copper	0.31	05/14/2015	0.05	1.3	EPA 200.8	7440-50-8
Lead	0.022	05/14/2015	0.001	0.015	EPA 200.8	7439-92-1

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Genesee County Health Dept.
630 South Saginaw
Flint, MI 48502-1540
810 257-3603

CAS# : Chemical Abstract Service Registry Number
MCL : Maximum Contaminant Level
AL : Action Level
RL : Reporting Limit

mg/L : milligrams / Liter (ppm)
ppm : parts per million
MPN : Most Probable Number
CFU : Colony Forming Unit

Laboratory Contacts
Drinking Water Unit Mgr: Julia Pieper
Systems Mgmt. Unit Mgr: George Krisztian

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Lansing, MI 48909

TEL: (517) 335-8184

FAX: (517) 335-8562



Sample Number

LF68023

Official Laboratory Report

Report To: MIKE GLASGOW
4500 N DORT HWY
FLINT MI 48505

System Name/Owner: CITY OF FLINT
Collection Address: 1807 OREN AVE, FLINT
Collected By: MARK RUSSEL
Township/Well#/Section: //
County: Genesee
Sample Point: BATHROOM
Water System: Treated Public Distribution System

WSSN/Pool ID: 2310
Source: Single Family Dwelling
Site Code:
Collector: Private Citizen
Date Collected: 06/08/2015 07:30
Date Received: 06/16/2015 11:11
Purpose: Routine Monitoring

TESTING INFORMATION			REGULATORY INFORMATION			
Analyte Name	Result (mg/L)	Date Tested	RL (mg/L)	MCL/AL (mg/L)	Method	CAS #
Copper	Not detected	06/17/2015	0.05	1.3	EPA 200.8	7440-50-8
Lead	0.021	06/17/2015	0.001	0.015	EPA 200.8	7439-92-1

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630 South Saginaw
Flint, MI 48502-1540
810 257-3603

CAS# : Chemical Abstract Service Registry Number
MCL : Maximum Contaminant Level
AL : Action Level
RL : Reporting Limit

mg/L : milligrams / Liter (ppm)
ppm : parts per million
MPN : Most Probable Number
CFU : Colony Forming Unit

Laboratory Contacts
Drinking Water Unit Mgr: Julia Pleper
Systems Mgmt. Unit Mgr: George Krisztian

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FAX: (517) 335-8562



Sample Number

LF68794

Official Laboratory Report

Report To: **MIKE GLASGOW**
4500 N DORT HWY
FLINT MI 48505

System Name/Owner: **CITY OF FLINT**
Collection Address: **547 COPEMAN BLVD, FLINT**
Collected By: **LINDA LEE**
Township/Well#/Section: **//**
County: **Genesee**
Sample Point: **KITCHEN**
Water System: **Treated Public Distribution System**

WSSN/Pool ID: **2310**
Source: **Single Family Dwelling**
Site Code:
Collector: **Private Citizen**
Date Collected: **06/14/2015 09:00**
Date Received: **06/19/2015 11:02**
Purpose: **Routine Monitoring**

TESTING INFORMATION			REGULATORY INFORMATION			
Analyte Name	Result (mg/L)	Date Tested	RL (mg/L)	MCL/AL (mg/L)	Method	CAS #
Copper	Not detected	06/22/2015	0.05	1.3	EPA 200.8	7440-50-8
Lead	0.018	06/22/2015	0.001	0.015	EPA 200.8	7439-92-1

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Genesee County Health Dept.
630 South Saginaw
Flint, MI 48502-1540
810 257-3603

CAS#: Chemical Abstract Service Registry Number
MCL: Maximum Contaminant Level
AL: Action Level
RL: Reporting Limit

mg/L: milligrams / Liter (ppm)
ppm: parts per million
MPN: Most Probable Number
CFU: Colony Forming Unit

Laboratory Contacts
Drinking Water Unit Mgr: Julia Pleper
Systems Mgmt. Unit Mgr: George Kriszlan

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FAX: (517) 335-8562



Sample Number

LF57728

Official Laboratory Report

Report To: **MIKE GLASGOW**
4500 N DORT HWY
FLINT MI 48505

System Name/Owner: **CITY OF FLINT**
Collection Address: **1224 DECKER ST, FLINT**
Collected By: **LOU ANNE MALIS**
Township/Well#/Section: **//**
County: **Genesee**
Sample Point: **KITCHEN**
Water System: **Treated Public Distribution System**

WSSN/Pool ID: **2310**
Source: **Single Family Dwelling**
Site Code:
Collector: **Private Citizen**
Date Collected: **03/17/2015 06:00**
Date Received: **03/24/2015 11:05**
Purpose: **Routine Monitoring**

TESTING INFORMATION			REGULATORY INFORMATION			
Analyte Name	Result (mg/L)	Date Tested	RL (mg/L)	MCL/AL (mg/L)	Method	CAS #
Copper	0.10	03/25/2015	0.05	1.3	EPA 200.8	7440-50-8
Lead	0.013	03/25/2015	0.001	0.015	EPA 200.8	7439-92-1

The analyses performed by the MDEQ Drinking Water Laboratory were conducted using methods approved by the U.S. Environmental Protection Agency in accordance with the Safe Drinking Water Act, 40 CFR parts 141-143, and other regulatory agencies as appropriate.

Your local health department has detailed information about the quality of drinking water in your area. If you have concerns about the health risks related to the test results of your sample, please contact the Environmental Health Section through the address and telephone number listed below:

Genesee County Health Dept.
630 South Saginaw
Flint, MI 48502-1540
810 257-3603

CAS# : Chemical Abstract Service Registry Number
MCL : Maximum Contaminant Level
AL : Action Level
RL : Reporting Limit

mg/L : milligrams / Liter (ppm)
ppm : parts per million
MPN : Most Probable Number
CFU : Colony Forming Unit

Laboratory Contacts
Drinking Water Unit Mgr: Julia Pieper
Systems Mgmt. Unit Mgr: George Krisztian

**MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
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P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-8184
FAX: (517) 335-8562

Sample Number
LF70230

Official Laboratory Report

Report To: **MIKE GLASGOW**
4500 N DORT HWY
FLINT MI 48505

System Name/Owner: **CITY OF FLINT**
Collection Address: **1205 BLANCHARD AVE, FLINT**
Collected By: **JOEL ARNOLD**
Township/Well#/Section: **//**
County: **Genesee**
Sample Point: **KITCHEN**
Water System: **Treated Public Distribution System**

WSSN/Pool ID: **2310**
Source: **Single Family Dwelling**
Site Code:
Collector: **Private Citizen**
Date Collected: **06/24/2015 06:30**
Date Received: **06/30/2015 11:14**
Purpose: **Routine Monitoring**

TESTING INFORMATION			REGULATORY INFORMATION			
Analyte Name	Result (mg/L)	Date Tested	RL (mg/L)	MCL/AL (mg/L)	Method	CAS #
Copper	0.05	07/01/2015	0.05	1.3	EPA 200.8	7440-50-8
Lead	0.011	07/01/2015	0.001	0.015	EPA 200.8	7439-92-1

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Your local health department has detailed information about the quality of drinking water in your area. If you have concerns about the health risks related to the test results of your sample, please contact the Environmental Health Section through the address and telephone number listed below:

Genesee County Health Dept.
630 South Saginaw
Flint, MI 48502-1540
810 257-3603

CAS#: Chemical Abstract Service Registry Number
MCL: Maximum Contaminant Level
AL: Action Level
RL: Reporting Limit

mg/L: milligrams / Liter (ppm)
ppm: parts per million
MPN: Most Probable Number
CFU: Colony Forming Unit

Laboratory Contacts
Drinking Water Unit Mgr: Julia Pieper
Systems Mgmt. Unit Mgr: George Krisztian

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FAX: (517) 335-8562



Sample Number
LF70222

Official Laboratory Report

Report To: MIKE GLASGOW
4500 N DORT HWY
FLINT MI 48505

System Name/Owner: CITY OF FLINT
Collection Address: 721 EAST ST APT #2, FLINT
Collected By: MELANIE POISSON
Township/Well#/Section: //
County: Genesee
Sample Point: KITCHEN
Water System: Treated Public Distribution System

WSSN/Pool ID: 2310
Source: Single Family Dwelling
Site Code:
Collector: Private Citizen
Date Collected: 06/25/2015 06:30
Date Received: 06/30/2015 11:14
Purpose: Routine Monitoring

TESTING INFORMATION			REGULATORY INFORMATION			
Analyte Name	Result (mg/L)	Date Tested	RL (mg/L)	MCL/AL (mg/L)	Method	CAS #
Copper	0.16	07/01/2015	0.05	1.3	EPA 200.8	7440-50-8
Lead	0.010	07/01/2015	0.001	0.015	EPA 200.8	7439-92-1

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Genesee County Health Dept.
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Flint, MI 48502-1540
810 257-3603

CAS#: Chemical Abstract Service Registry Number
MCL: Maximum Contaminant Level
AL: Action Level
RL: Reporting Limit

mg/L: milligrams / Liter (ppm)
ppm: parts per million
MPN: Most Probable Number
CFU: Colony Forming Unit

Laboratory Contacts
Drinking Water Unit Mgr: Julie Pieper
Systems Mgmt. Unit Mgr: George Krieszian

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FAX: (517) 335-8562



Sample Number

LF54946

Official Laboratory Report

Report To: **MIKE GLASGOW**
4500 N DORT HWY
FLINT MI 48505

System Name/Owner: **CITY OF FLINT**
Collection Address: **1809 STEVENSON ST, FLINT**
Collected By: **MIKE TAYLOR**
Township/Well#/Section: **//**
County: **Genesee**
Sample Point: **KITCHEN SINK**
Water System: **Treated Public Distribution System**

WSSN/Pool ID: **2310**
Source: **TYPE I**
Site Code:
Collector: **Private Citizen**
Date Collected: **02/10/2015 06:30**
Date Received: **02/19/2015 11:13**
Purpose: **Routine Monitoring**

TESTING INFORMATION			REGULATORY INFORMATION			
Analyte Name	Result (mg/L)	Date Tested	RL (mg/L)	MCL/AL (mg/L)	Method	CAS #
Copper	Not detected	02/20/2015	0.05	1.3	EPA 200.8	7440-50-8
Lead	0.010	02/20/2015	0.001	0.015	EPA 200.8	7439-92-1

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Flint, MI 48502-1540
810 257-3603

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MCL : Maximum Contaminant Level
AL : Action Level
RL : Reporting Limit

mg/L : milligrams / Liter (ppm)
ppm : parts per million
MPN : Most Probable Number
CFU : Colony Forming Unit

Laboratory Contacts
Drinking Water Unit Mgr: Julia Pieper
Systems Mgmt. Unit Mgr: George Krsztian

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FAX: (517) 335-8562



Sample Number

LF56223

Official Laboratory Report

Report To: MIKE GLASGOW
4500 N DORT HWY
FLINT MI 48505

System Name/Owner:	CITY OF FLINT	WSSN/Pool ID:	2310
Collection Address:	4202 CUSTER AVE, FLINT	Source:	Single Family Dwelling
Collected By:	JACQUELINE PEMBERTON	Site Code:	
Township/Well#/Section:	//	Collector:	Private Citizen
County:	Genesee	Date Collected:	03/04/2015 08:00
Sample Point:	KITCHEN	Date Received:	03/06/2015 11:33
Water System:	Treated Public Distribution System	Purpose:	Routine Monitoring

TESTING INFORMATION				REGULATORY INFORMATION		
Analyte Name	Result (mg/L)	Date Tested	RL (mg/L)	MCL/AL (mg/L)	Method	CAS #
Copper	0.27	03/10/2015	0.05	1.3	EPA 200.8	7440-50-8
Lead	0.006	03/10/2015	0.001	0.015	EPA 200.8	7439-92-1

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Flint, MI 48502-1540
810 257-3603

CAS# : Chemical Abstract Service Registry Number
MCL : Maximum Contaminant Level
AL : Action Level
RL : Reporting Limit

mg/L : milligrams / Liter (ppm)
ppm : parts per million
MPN : Most Probable Number
CFU : Colony Forming Unit

Laboratory Contacts
Drinking Water Unit Mgr: Julia Pieper
Systems Mgmt. Unit Mgr: George Krisztian

**MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
DRINKING WATER LABORATORY**

USEPA Region V Drinking Water Cert. No. MI00003

P.O. Box 30270

Lansing, MI 48909

TEL: (517) 335-8184

FAX: (517) 335-8582



Sample Number

LF56225

Official Laboratory Report

Report To: MIKE GLASGOW
4500 N DORT HWY
FLINT MI 48505

System Name/Owner:	CITY OF FLINT	WSSN/Pool ID:	2310
Collection Address:	401 E NEWALL ST, FLINT	Source:	Single Family Dwelling
Collected By:	MARK CROMWELL SR	Site Code:	
Township/Well#/Section:	//	Collector:	Other
County:	Genesee	Date Collected:	03/02/2015 09:30
Sample Point:	KITCHEN	Date Received:	03/08/2015 11:33
Water System:	Treated Public Distribution System	Purpose:	Routine Monitoring

TESTING INFORMATION			REGULATORY INFORMATION			
Analyte Name	Result (mg/L)	Date Tested	RL (mg/L)	MCL/AL (mg/L)	Method	CAS #
Copper	Not detected	03/10/2015	0.05	1.3	EPA 200.8	7440-50-8
Lead	0.005	03/10/2015	0.001	0.015	EPA 200.8	7439-92-1

The analyses performed by the MDEQ Drinking Water Laboratory were conducted using methods approved by the U.S. Environmental Protection Agency in accordance with the Safe Drinking Water Act, 40 CFR parts 141-143, and other regulatory agencies as appropriate.

Your local health department has detailed information about the quality of drinking water in your area. If you have concerns about the health risks related to the test results of your sample, please contact the Environmental Health Section through the address and telephone number listed below:

Genesee County Health Dept.
630 South Saginaw
Flint, MI 48502-1540
810 257-3603

CAS# : Chemical Abstract Service Registry Number
MCL : Maximum Contaminant Level
AL : Action Level
RL : Reporting Limit

mg/L : milligrams / Liter (ppm)
ppm : parts per million
MPN : Most Probable Number
CFU : Colony Forming Unit

Laboratory Contacts
Drinking Water Unit Mgr: Julia Pieper
Systems Mgmt. Unit Mgr: George Kirsztian

**MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
DRINKING WATER LABORATORY**

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Lansing, MI 48909

TEL: (517) 335-8184

FAX: (517) 335-8562



Sample Number

LF56227

Official Laboratory Report

Report To: **MIKE GLASGOW**
4500 N DORT HWY
FLINT MI 48505

System Name/Owner: **CITY OF FLINT**
Collection Address: **2615 TRUMBULL AVE, FLINT**
Collected By: **JENNIFER PEDERSON**
Township/Well#/Section: **//**
County: **Genesee**
Sample Point: **KITCHEN**
Water System: **Treated Public Distribution System**

WSSN/Pool ID: **2310**
Source: **Single Family Dwelling**
Site Code:
Collector: **Private Citizen**
Date Collected: **02/27/2015 10:00**
Date Received: **03/06/2015 11:33**
Purpose: **Routine Monitoring**

TESTING INFORMATION			REGULATORY INFORMATION			
Analyte Name	Result (mg/L)	Date Tested	RL (mg/L)	MCL/AL (mg/L)	Method	CAS #
Copper	Not detected	03/10/2015	0.05	1.3	EPA 200.8	7440-50-8
Lead	0.003	03/10/2015	0.001	0.015	EPA 200.8	7439-92-1

The analyses performed by the MDEQ Drinking Water Laboratory were conducted using methods approved by the U.S. Environmental Protection Agency in accordance with the Safe Drinking Water Act, 40 CFR parts 141-143, and other regulatory agencies as appropriate.

Your local health department has detailed information about the quality of drinking water in your area. If you have concerns about the health risks related to the test results of your sample, please contact the Environmental Health Section through the address and telephone number listed below:

Genesee County Health Dept.
630 South Saginaw
Flint, MI 48502-1540
810 257-3603

CAS#: Chemical Abstract Service Registry Number
MCL: Maximum Contaminant Level
AL: Action Level
RL: Reporting Limit

mg/L: milligrams / Liter (ppm)
ppm: parts per million
MPN: Most Probable Number
CFU: Colony Forming Unit

Laboratory Contacts
Drinking Water Unit Mgr: Julia Pieper
Systems Mgmt. Unit Mgr: George Krisztian

**MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
DRINKING WATER LABORATORY**

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Lansing, MI 48909

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FAX: (517) 335-8562



Sample Number

LF54663

Official Laboratory Report

Report To: MIKE GLASGOW
4500 N DORT HWY
FLINT MI 48505

System Name/Owner:	CITY OF FLINT	WSSN/Pool ID:	2310
Collection Address:	2205 FLUSHING RD, FLINT	Source:	TYPE I
Collected By:	CHRIS BEATENHEAD	Site Code:	
Township/Well#/Section:	//	Collector:	Public Water Supply Operator
County:	Genesee	Date Collected:	02/15/2015 06:00
Sample Point:	KITCHEN	Date Received:	02/17/2015 10:47
Water System:	Treated Public Distribution System	Purpose:	Routine Monitoring

TESTING INFORMATION			REGULATORY INFORMATION			
Analyte Name	Result (mg/L)	Date Tested	RL (mg/L)	MCL/AL (mg/L)	Method	CAS #
Copper	0.13	02/18/2015	0.05	1.3	EPA 200.8	7440-50-8
Lead	Not detected	02/18/2015	0.001	0.015	EPA 200.8	7439-92-1

The analyses performed by the MDEQ Drinking Water Laboratory were conducted using methods approved by the U. S. Environmental Protection Agency in accordance with the Safe Drinking Water Act, 40 CFR parts 141-143, and other regulatory agencies as appropriate.

Your local health department has detailed information about the quality of drinking water in your area. If you have concerns about the health risks related to the test results of your sample, please contact the Environmental Health Section through the address and telephone number listed below:

Genesee County Health Dept.
630 South Saginaw
Flint, MI 48502-1540
810 257-3603

CAS# : Chemical Abstract Service Registry Number
MCL : Maximum Contaminant Level
AL : Action Level
RL : Reporting Limit

mg/L : milligrams / Liter (ppm)
ppm : parts per million
MPN : Most Probable Number
CFU : Colony Forming Unit

Laboratory Contacts
Drinking Water Unit Mgr: Julia Pleper
Systems Mgmt. Unit Mgr: George Krisztian



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USEPA Region V Drinking Water Cert. No. MI00003

P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-8184
FAX: (517) 335-8562

**Sample Number
LF57730**

Official Laboratory Report

Report To: **MIKE GLASGOW**
4500 N DORT HWY
FLINT MI 48505

System Name/Owner: **CITY OF FLINT**
Collection Address: **1220 DECKER ST, FLINT**
Collected By: **CARMEN PULIDO**
Township/Well#/Section: **//**
County: **Genesee**
Sample Point: **KITCHEN**
Water System: **Treated Public Distribution System**

WSSN/Pool ID: **2310**
Source: **Single Family Dwelling**
Site Code:
Collector: **Private Citizen**
Date Collected: **03/17/2015 06:00**
Date Received: **03/24/2015 11:05**
Purpose: **Routine Monitoring**

TESTING INFORMATION			REGULATORY INFORMATION			
Analyte Name	Result (mg/L)	Date Tested	RL (mg/L)	MCL/AL (mg/L)	Method	CAS #
Copper	Not detected	03/25/2015	0.05	1.3	EPA 200.8	7440-50-8
Lead	0.004	03/25/2015	0.001	0.015	EPA 200.8	7439-92-1

The analyses performed by the MDEQ Drinking Water Laboratory were conducted using methods approved by the U.S. Environmental Protection Agency in accordance with the Safe Drinking Water Act, 40 CFR parts 141-143, and other regulatory agencies as appropriate.

Your local health department has detailed information about the quality of drinking water in your area. If you have concerns about the health risks related to the test results of your sample, please contact the Environmental Health Section through the address and telephone number listed below:

Genesee County Health Dept.
630 South Saginaw
Flint, MI 48502-1540
810 257-3603

CAS#: Chemical Abstract Service Registry Number
MCL: Maximum Contaminant Level
AL: Action Level
RL: Reporting Limit

mg/L: milligrams / Liter (ppm)
ppm: parts per million
MPN: Most Probable Number
CFU: Colony Forming Unit

Laboratory Contacts
Drinking Water Unit Mgr: Julia Pleper
Systems Mgmt. Unit Mgr: George Kirsztian

**MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
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Lansing, MI 48909

TEL: (517) 335-8184

FAX: (517) 335-8562



Sample Number

LF57731

Official Laboratory Report

Report To: MIKE GLASGOW
4500 N DORT HWY
FLINT MI 48505

System Name/Owner: CITY OF FLINT
Collection Address: 1379 WASHINGTON, FLINT
Collected By: ROXANNE PUTMAN
Township/Well#/Section: //
County: Genesee
Sample Point: KITCHEN
Water System: Treated Public Distribution System

WSSN/Pool ID: 2310
Source: Single Family Dwelling
Site Code:
Collector: Private Citizen
Date Collected: 03/19/2015 08:30
Date Received: 03/24/2015 11:05
Purpose: Routine Monitoring

TESTING INFORMATION			REGULATORY INFORMATION			
Analyte Name	Result (mg/L)	Date Tested	RL (mg/L)	MCL/AL (mg/L)	Method	CAS #
Copper	Not detected	03/25/2015	0.05	1.3	EPA 200.8	7440-50-8
Lead	0.008	03/25/2015	0.001	0.015	EPA 200.8	7439-92-1

The analyses performed by the MDEQ Drinking Water Laboratory were conducted using methods approved by the U.S. Environmental Protection Agency in accordance with the Safe Drinking Water Act, 40 CFR parts 141-143, and other regulatory agencies as appropriate.

Your local health department has detailed information about the quality of drinking water in your area. If you have concerns about the health risks related to the test results of your sample, please contact the Environmental Health Section through the address and telephone number listed below:

Genesee County Health Dept.
630 South Saginaw
Flint, MI 48502-1540
810 257-3603

CAS# : Chemical Abstract Service Registry Number
MCL : Maximum Contaminant Level
AL : Action Level
RL : Reporting Limit

mg/L : milligrams / Liter (ppm)
ppm : parts per million
MPN : Most Probable Number
CFU : Colony Forming Unit

Laboratory Contacts
Drinking Water Unit Mgr: Julia Pieper
Systems Mgmt. Unit Mgr: George Kriszlan

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P.O. Box 30270

Lansing, MI 48909

TEL: (517) 335-8184

FAX: (517) 335-8562



Sample Number
LF57733

Official Laboratory Report

Report To: MIKE GLASGOW
4500 N DORT HWY
FLINT MI 48505

System Name/Owner: CITY OF FLINT
Collection Address: 1372 WASHINGTON AVE, FLINT
Collected By: ANTHONY PALLADENO JR
Township/Well#/Section: //
County: Genesee
Sample Point: KITCHEN
Water System: Treated Public Distribution System

WSSN/Pool ID: 2310
Source: Single Family Dwelling
Site Code:
Collector: Private Citizen
Date Collected: 03/19/2015 08:00
Date Received: 03/24/2015 11:05
Purpose: Routine Monitoring

TESTING INFORMATION			REGULATORY INFORMATION			
Analyte Name	Result (mg/L)	Date Tested	RL (mg/L)	MCL/AL (mg/L)	Method	CAS #
Copper	0.14	03/25/2015	0.05	1.3	EPA 200.8	7440-50-8
Lead	0.002	03/25/2015	0.001	0.015	EPA 200.8	7439-92-1

The analyses performed by the MDEQ Drinking Water Laboratory were conducted using methods approved by the U.S. Environmental Protection Agency in accordance with the Safe Drinking Water Act, 40 CFR parts 141-143, and other regulatory agencies as appropriate.

Your local health department has detailed information about the quality of drinking water in your area. If you have concerns about the health risks related to the test results of your sample, please contact the Environmental Health Section through the address and telephone number listed below:

Genesee County Health Dept.
630 South Saginaw
Flint, MI 48502-1540
810 257-3603

CAS#: Chemical Abstract Service Registry Number
MCL: Maximum Contaminant Level
AL: Action Level
RL: Reporting Limit

mg/L: milligrams / Liter (ppm)
ppm: parts per million
MPN: Most Probable Number
CFU: Colony Forming Unit

Laboratory Contacts
Drinking Water Unit Mgr: Julia Pieper
Systems Mgmt. Unit Mgr: George Kriszlan

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Lansing, MI 48909

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FAX: (517) 335-8562



Sample Number

LF57734

Official Laboratory Report

Report To: **MIKE GLASGOW**
4500 N DORT HWY
FLINT MI 48505

System Name/Owner: **CITY OF FLINT**
Collection Address: **1383 WASHINGTON AVE, FLINT**
Collected By: **ANTHONY PALLADENO III**
Township/Well#/Section: **//**
County: **Genesee**
Sample Point: **KITCHEN**
Water System: **Treated Public Distribution System**

WSSN/Pool ID: **2310**
Source: **Single Family Dwelling**
Site Code:
Collector: **Private Citizen**
Date Collected: **03/19/2015 08:00**
Date Received: **03/24/2015 11:05**
Purpose: **Routine Monitoring**

TESTING INFORMATION			REGULATORY INFORMATION			
Analyte Name	Result (mg/L)	Date Tested	RL (mg/L)	MCL/AL (mg/L)	Method	CAS #
Copper	0.17	03/25/2015	0.05	1.3	EPA 200.8	7440-50-8
Lead	0.006	03/25/2015	0.001	0.015	EPA 200.8	7439-92-1

The analyses performed by the MDEQ Drinking Water Laboratory were conducted using methods approved by the U.S. Environmental Protection Agency in accordance with the Safe Drinking Water Act, 40 CFR parts 141-143, and other regulatory agencies as appropriate.

Your local health department has detailed information about the quality of drinking water in your area. If you have concerns about the health risks related to the test results of your sample, please contact the Environmental Health Section through the address and telephone number listed below:

**Genesee County Health Dept.
630 South Saginaw
Flint, MI 48502-1540
810 257-3603**

CAS# : Chemical Abstract Service Registry Number
MCL : Maximum Contaminant Level
AL : Action Level
RL : Reporting Limit

mg/L : milligrams / Liter (ppm)
ppm : parts per million
MPN : Most Probable Number
CFU : Colony Forming Unit

Laboratory Contacts
Drinking Water Unit Mgr: Julia Pleper
Systems Mgmt. Unit Mgr: George Krisztian

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Lansing, MI 48909

TEL: (517) 335-8184

FAX: (517) 335-8562



Sample Number

LF57735

Official Laboratory Report

Report To: **MIKE GLASGOW**
4500 N DORT HWY
FLINT MI 48505

System Name/Owner:	CITY OF FLINT	WSSN/Pool ID:	2310
Collection Address:	1367 WASHINGTON AVE, FLINT.	Source:	Single Family Dwelling
Collected By:	LEAH PALLADENO	Site Code:	
Township/Well#/Section:	//	Collector:	Private Citizen
County:	Genesee	Date Collected:	03/17/2015 06:00
Sample Point:	MAIN BATHROOM	Date Received:	03/24/2015 11:05
Water System:	Treated Public Distribution System	Purpose:	Routine Monitoring

TESTING INFORMATION			REGULATORY INFORMATION			
Analyte Name	Result (mg/L)	Date Tested	RL (mg/L)	MCL/AL (mg/L)	Method	CAS #
Copper	Not detected	03/25/2015	0.05	1.3	EPA 200.8	7440-50-8
Lead	0.001	03/25/2015	0.001	0.015	EPA 200.8	7439-92-1

The analyses performed by the MDEQ Drinking Water Laboratory were conducted using methods approved by the U.S. Environmental Protection Agency in accordance with the Safe Drinking Water Act, 40 CFR parts 141-143, and other regulatory agencies as appropriate.

Your local health department has detailed information about the quality of drinking water in your area. If you have concerns about the health risks related to the test results of your sample, please contact the Environmental Health Section through the address and telephone number listed below:

Genesee County Health Dept.
630 South Saginaw
Flint, MI 48502-1540
810 257-3603

CAS# : Chemical Abstract Service Registry Number
MCL : Maximum Contaminant Level
AL : Action Level
RL : Reporting Limit

mg/L : milligrams / Liter (ppm)
ppm : parts per million
MPN : Most Probable Number
CFU : Colony Forming Unit

Laboratory Contacts
Drinking Water Unit Mgr: Julia Pieper
Systems Mgmt. Unit Mgr: George Kriszlian

**MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
DRINKING WATER LABORATORY**

USEPA Region V Drinking Water Cert. No. MI00003

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Lansing, MI 48909

TEL: (517) 335-8184

FAX: (517) 335-8562



Sample Number
LF57736

Official Laboratory Report

Report To: MIKE GLASGOW
4500 N DORT HWY
FLINT MI 48505

System Name/Owner: CITY OF FLINT
Collection Address: 1701 MARQUETTE DR, FLINT
Collected By: CHARMA DOMPHEH
Township/Well/Section: //
County: Genesee
Sample Point: KITCHEN
Water System: Treated Public Distribution System

WSSN/Pool ID: 2310
Source: Single Family Dwelling
Site Code:
Collector: Private Citizen
Date Collected: 03/14/2015 09:40
Date Received: 03/24/2015 11:05
Purpose: Routine Monitoring

TESTING INFORMATION			REGULATORY INFORMATION			
Analyte Name	Result (mg/L)	Date Tested	RL (mg/L)	MCL/AL (mg/L)	Method	CAS #
Copper	0.19	03/25/2015	0.05	1.3	EPA 200.8	7440-50-8
Lead	0.001	03/25/2015	0.001	0.015	EPA 200.8	7439-92-1

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Your local health department has detailed information about the quality of drinking water in your area. If you have concerns about the health risks related to the test results of your sample, please contact the Environmental Health Section through the address and telephone number listed below:

Genesee County Health Dept.
630 South Saginaw
Flint, MI 48502-1540
810 257-3603

CAS#: Chemical Abstract Service Registry Number
MCL: Maximum Contaminant Level
AL: Action Level
RL: Reporting Limit

mg/L: milligrams / Liter (ppm)
ppm: parts per million
MPN: Most Probable Number
CFU: Colony Forming Unit

Laboratory Contacts
Drinking Water Unit Mgr: Julia Pieper
Systems Mgmt. Unit Mgr: George Kriszian

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Lansing, MI 48909

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FAX: (517) 335-8562



Sample Number
LF58413

Official Laboratory Report

Report To: **MIKE GLASGOW**
4500 N DORT HWY
FLINT MI 48505

System Name/Owner: **CITY OF FLINT**
Collection Address: **778 E BUNDY AVE, FLINT**
Collected By: **SANDRA HULL**
Township/Well#/Section: **//**
County: **Genesee**
Sample Point: **MAIN BATHROOM**
Water System: **Treated Public Distribution System**

WSSN/Pool ID: **2310**
Source: **TYPE I**
Site Code:
Collector: **Private Citizen**
Date Collected: **03/24/2015 06:25**
Date Received: **03/31/2015 11:11**
Purpose: **Routine Monitoring**

TESTING INFORMATION			REGULATORY INFORMATION			
Analyte Name	Result (mg/L)	Date Tested	RL (mg/L)	MCL/AL (mg/L)	Method	CAS #
Copper	Not detected	04/01/2015	0.05	1.3	EPA 200.8	7440-50-8
Lead	Not detected	04/01/2015	0.001	0.015	EPA 200.8	7439-92-1

The analyses performed by the MDEQ Drinking Water Laboratory were conducted using methods approved by the U.S. Environmental Protection Agency in accordance with the Safe Drinking Water Act, 40 CFR parts 141-143, and other regulatory agencies as appropriate.

Your local health department has detailed information about the quality of drinking water in your area. If you have concerns about the health risks related to the test results of your sample, please contact the Environmental Health Section through the address and telephone number listed below:

Genesee County Health Dept.
630 South Saginaw
Flint, MI 48502-1540
810 257-3603

CAS# : Chemical Abstract Service Registry Number
MCL : Maximum Contaminant Level
AL : Action Level
RL : Reporting Limit

mg/L : milligrams / Liter (ppm)
ppm : parts per million
MPN : Most Probable Number
CFU : Colony Forming Unit

Laboratory Contacts
Drinking Water Unit Mgr: Julie Pieper
Systems Mgmt. Unit Mgr: George Kriszlan

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FAX: (517) 335-8562



Sample Number

LF58414

Official Laboratory Report

Report To: MIKE GLASGOW
4500 N DORT HWY
FLINT MI 48505

System Name/Owner: CITY OF FLINT
Collection Address: 3714 BEECHER RD, FLINT
Collected By: MELISSA MAYS
Township/Well#/Section: //
County: Genesee
Sample Point: KITCHEN
Water System: Treated Public Distribution System

WSSN/Pool ID: 2310
Source: TYPE I
Site Code:
Collector: Private Citizen
Date Collected: 03/24/2015 06:30
Date Received: 03/31/2015 11:11
Purpose: Routine Monitoring

TESTING INFORMATION			REGULATORY INFORMATION			
Analyte Name	Result (mg/L)	Date Tested	RL (mg/L)	MCL/AL (mg/L)	Method	CAS #
Copper	0.52	04/01/2015	0.05	1.3	EPA 200.8	7440-50-8
Lead	0.002	04/01/2015	0.001	0.015	EPA 200.8	7439-92-1

The analyses performed by the MDEQ Drinking Water Laboratory were conducted using methods approved by the U.S. Environmental Protection Agency in accordance with the Safe Drinking Water Act, 40 CFR parts 141-143, and other regulatory agencies as appropriate.

Your local health department has detailed information about the quality of drinking water in your area. If you have concerns about the health risks related to the test results of your sample, please contact the Environmental Health Section through the address and telephone number listed below:

Genesee County Health Dept.
630 South Saginaw
Flint, MI 48502-1640
810 257-3803

CAS# : Chemical Abstract Service Registry Number
MCL : Maximum Contaminant Level
AL : Action Level
RL : Reporting Limit

mg/L : milligrams / Liter (ppm)
ppm : parts per million
MPN : Most Probable Number
CFU : Colony Forming Unit

Laboratory Contacts
Drinking Water Unit Mgr: Julia Pieper
Systems Mgmt. Unit Mgr: George Krisztian

**MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
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Lansing, MI 48909

TEL: (517) 335-8184

FAX: (517) 335-8562



Sample Number

LF59749

Official Laboratory Report

Report To: **MIKE GLASGOW**
4500 N DORT HWY
FLINT MI 48505

System Name/Owner: **CITY OF FLINT**
Collection Address: **1016 INGLESIDE AVE, FLINT**
Collected By: **JAMES D JARVIS**
Township/Well#/Section: **//**
County: **Genesee**
Sample Point: **KITCHEN**
Water System: **Treated Public Distribution System**

WSSN/Pool ID: **2310**
Source: **Single Family Dwelling**
Site Code:
Collector: **Private Citizen**
Date Collected: **04/09/2015 07:00**
Date Received: **04/14/2015 11:07**
Purpose: **Routine Monitoring**

TESTING INFORMATION			REGULATORY INFORMATION			
Analyte Name	Result (mg/L)	Date Tested	RL (mg/L)	MCL/AL (mg/L)	Method	CAS #
Copper	0.07	04/15/2015	0.05	1.3	EPA 200.8	7440-50-8
Lead	0.007	04/15/2015	0.001	0.015	EPA 200.8	7439-92-1

The analyses performed by the MDEQ Drinking Water Laboratory were conducted using methods approved by the U.S. Environmental Protection Agency in accordance with the Safe Drinking Water Act, 40 CFR parts 141-143, and other regulatory agencies as appropriate.

Your local health department has detailed information about the quality of drinking water in your area. If you have concerns about the health risks related to the test results of your sample, please contact the Environmental Health Section through the address and telephone number listed below:

Genesee County Health Dept.
630 South Saginaw
Flint, MI 48502-1540
810 257-3603

CAS#: Chemical Abstract Service Registry Number
MCL: Maximum Contaminant Level
AL: Action Level
RL: Reporting Limit

mg/L: milligrams / Liter (ppm)
ppm: parts per million
MPN: Most Probable Number
CFU: Colony Forming Unit

Laboratory Contacts
Drinking Water Unit Mgr: Julia Pleper
Systems Mgmt. Unit Mgr: George Krisztian



**MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
DRINKING WATER LABORATORY**

USEPA Region V Drinking Water Cert. No. MI00003

P.O. Box 30270

Lansing, MI 48909

TEL: (517) 335-8184

FAX: (517) 335-8562

Sample Number

LF59750

Official Laboratory Report

Report To: MIKE GLASGOW
4500 N DORT HWY
FLINT MI 48505

System Name/Owner: CITY OF FLINT
Collection Address: 1818 ROCK CREEK LN, FLINT
Collected By: HELEN HUNTER
Township/Well#/Section: //
County: Genesee
Sample Point: MAIN BATHROOM
Water System: Treated Public Distribution System

WSSN/Pool ID: 2310
Source: Single Family Dwelling
Site Code:
Collector: Private Citizen
Date Collected: 04/06/2015 06:50
Date Received: 04/14/2015 11:07
Purpose: Routine Monitoring

TESTING INFORMATION			REGULATORY INFORMATION			
Analyte Name	Result (mg/L)	Date Tested	RL (mg/L)	MCL/AL (mg/L)	Method	CAS #
Copper	0.11	04/15/2015	0.05	1.3	EPA 200.8	7440-50-8
Lead	0.003	04/15/2015	0.001	0.015	EPA 200.8	7439-92-1

The analyses performed by the MDEQ Drinking Water Laboratory were conducted using methods approved by the U.S. Environmental Protection Agency in accordance with the Safe Drinking Water Act, 40 CFR parts 141-143, and other regulatory agencies as appropriate.

Your local health department has detailed information about the quality of drinking water in your area. If you have concerns about the health risks related to the test results of your sample, please contact the Environmental Health Section through the address and telephone number listed below:

Genesee County Health Dept.
630 South Saginaw
Flint, MI 48502-1540
810 257-3603

CAS#: Chemical Abstract Service Registry Number
MCL: Maximum Contaminant Level
AL: Action Level
RL: Reporting Limit

mg/L: milligrams / Liter (ppm)
ppm: parts per million
MPN: Most Probable Number
CFU: Colony Forming Unit

Laboratory Contacts
Drinking Water Unit Mgr: Julia Pieper
Systems Mgmt. Unit Mgr: George Kriesztian

**MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
DRINKING WATER LABORATORY**



USEPA Region V Drinking Water Cert. No. MI00003

P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-8184
FAX: (517) 335-8562

**Sample Number
LF59751**

Official Laboratory Report

Report To: **MIKE GLASGOW**
4500 N DORT HWY
FLINT MI 48505

System Name/Owner: **CITY OF FLINT**
Collection Address: **3010 CHEYENNE ST, FLINT**
Collected By: **GERTRUDE MARSHALL**
Township/Well#/Section: **//**
County: **Genesee**
Sample Point: **KITCHEN**
Water System: **Treated Public Distribution System**

WSSN/Pool ID: **2310**
Source: **Single Family Dwelling**
Site Code:
Collector: **Private Citizen**
Date Collected: **04/03/2015 08:50**
Date Received: **04/14/2015 11:07**
Purpose: **Routine Monitoring**

TESTING INFORMATION			REGULATORY INFORMATION			
Analyte Name	Result (mg/L)	Date Tested	RL (mg/L)	MCL/AL (mg/L)	Method	CAS #
Copper	0.10	04/15/2015	0.05	1.3	EPA 200.8	7440-50-8
Lead	0.005	04/15/2015	0.001	0.015	EPA 200.8	7439-92-1

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Genesee County Health Dept.
630 South Saginaw
Flint, MI 48502-1540
810 257-3603

CAS# : Chemical Abstract Service Registry Number
MCL : Maximum Contaminant Level
AL : Action Level
RL : Reporting Limit

mg/L : milligrams / Liter (ppm)
ppm : parts per million
MPN : Most Probable Number
CFU : Colony Forming Unit

Laboratory Contacts
Drinking Water Unit Mgr: Julia Pieper
Systems Mgmt. Unit Mgr: George Kirsztian

**MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
DRINKING WATER LABORATORY**

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P.O. Box 30270

Lansing, MI 48909

TEL: (517) 335-8184

FAX: (517) 335-8562



Sample Number

LF60546

Official Laboratory Report

Report To: **MIKE GLASGOW**
4500 N DORT HWY
FLINT MI 48505

System Name/Owner: **CITY OF FLINT**
Collection Address: **2608 MOUNTAIN AVE, FLINT**
Collected By: **MARIBETH PEREZ**
Township/Well#/Section: **//**
County: **Genesee**
Sample Point: **KITCHEN**
Water System: **Treated Public Distribution System**

WSSN/Pool ID: **2310**
Source: **Single Family Dwelling**
Site Code:
Collector: **Private Citizen**
Date Collected: **04/15/2015 12:00**
Date Received: **04/21/2015 10:41**
Purpose: **Routine Monitoring**

TESTING INFORMATION			REGULATORY INFORMATION			
Analyte Name	Result (mg/L)	Date Tested	RL (mg/L)	MCL/AL (mg/L)	Method	CAS #
Copper	Not detected	04/22/2015	0.05	1.3	EPA 200.8	7440-50-8
Lead	Not detected	04/22/2015	0.001	0.015	EPA 200.8	7439-92-1

The analyses performed by the MDEQ Drinking Water Laboratory were conducted using methods approved by the U.S. Environmental Protection Agency in accordance with the Safe Drinking Water Act, 40 CFR parts 141-143, and other regulatory agencies as appropriate.

Your local health department has detailed information about the quality of drinking water in your area. If you have concerns about the health risks related to the test results of your sample, please contact the Environmental Health Section through the address and telephone number listed below:

Genesee County Health Dept.
630 South Saginaw
Flint, MI 48502-1540
810 257-3603

CAS# : Chemical Abstract Service Registry Number
MCL : Maximum Contaminant Level
AL : Action Level
RL : Reporting Limit

mg/L : milligrams / Liter (ppm)
ppm : parts per million
MPN : Most Probable Number
CFU : Colony Forming Unit

Laboratory Contacts
Drinking Water Unit Mgr: Julia Pieper
Systems Mgmt. Unit Mgr: George Krisztian

**MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
DRINKING WATER LABORATORY**

USEPA Region V Drinking Water Cert. No. MI00003

P.O. Box 30270

Lansing, MI 48909

TEL: (517) 335-8184

FAX: (517) 335-8562



Sample Number

LF61845

Official Laboratory Report

Report To: MIKE GLASGOW
4500 N DORT HWY
FLINT MI 48505

System Name/Owner: CITY OF FLINT
Collection Address: 2020 CROOKED LN, FLINT
Collected By: TRACY & MIKE SARGENT
Township/Well#/Section: //
County: Genesee
Sample Point: KITCHEN
Water System: Treated Public Distribution System

WSSN/Pool ID: 2310
Source: Single Family Dwelling
Site Code:
Collector: Private Citizen
Date Collected: 04/24/2015 07:00
Date Received: 05/04/2015 10:21
Purpose: Routine Monitoring

TESTING INFORMATION			REGULATORY INFORMATION			
Analyte Name	Result (mg/L)	Date Tested	RL (mg/L)	MCL/AL (mg/L)	Method	CAS #
Copper	0.10	05/05/2015	0.05	1.3	EPA 200.8	7440-50-8
Lead	0.005	05/05/2015	0.001	0.015	EPA 200.8	7439-92-1

The analyses performed by the MDEQ Drinking Water Laboratory were conducted using methods approved by the U.S. Environmental Protection Agency in accordance with the Safe Drinking Water Act, 40 CFR parts 141-143, and other regulatory agencies as appropriate.

Your local health department has detailed information about the quality of drinking water in your area. If you have concerns about the health risks related to the test results of your sample, please contact the Environmental Health Section through the address and telephone number listed below:

**Genesee County Health Dept.
630 South Saginaw
Flint, MI 48502-1540
810 257-3603**

CAS# : Chemical Abstract Service Registry Number
MCL : Maximum Contaminant Level
AL : Action Level
RL : Reporting Limit

mg/L : milligrams / Liter (ppm)
ppm : parts per million
MPN : Most Probable Number
CFU : Colony Forming Unit

Laboratory Contacts
Drinking Water Unit Mgr: Julia Plaper
Systems Mgmt. Unit Mgr: George Krieszlan

**MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
DRINKING WATER LABORATORY**

USEPA Region V Drinking Water Cert. No. MI00003

P.O. Box 30270

Lansing, MI 48909

TEL: (517) 335-8184

FAX: (517) 335-8582



Sample Number

LF61846

Official Laboratory Report

Report To: MIKE GLASGOW
4500 N DORT HWY
FLINT MI 48505

System Name/Owner: CITY OF FLINT
Collection Address: 310 E MOORE ST, FLINT
Collected By: HUSTON BOLDEN
Township/Well#/Section: //
County: Genesee
Sample Point: KITCHEN
Water System: Treated Public Distribution System

WSSN/Pool ID: 2310
Source: Single Family Dwelling
Site Code:
Collector: Private Citizen
Date Collected: 04/22/2015 07:00
Date Received: 05/04/2015 10:21
Purpose: Routine Monitoring

TESTING INFORMATION			REGULATORY INFORMATION			
Analyte Name	Result (mg/L)	Date Tested	RL (mg/L)	MCL/AL (mg/L)	Method	CAS #
Copper	Not detected	05/05/2015	0.05	1.3	EPA 200.8	7440-50-8
Lead	0.005	05/05/2015	0.001	0.015	EPA 200.8	7439-92-1

The analyses performed by the MDEQ Drinking Water Laboratory were conducted using methods approved by the U.S. Environmental Protection Agency in accordance with the Safe Drinking Water Act, 40 CFR parts 141-143, and other regulatory agencies as appropriate.

Your local health department has detailed information about the quality of drinking water in your area. If you have concerns about the health risks related to the test results of your sample, please contact the Environmental Health Section through the address and telephone number listed below:

Genesee County Health Dept.
630 South Saginaw
Flint, MI 48502-1540
810 257-3603

CAS#: Chemical Abstract Service Registry Number
MCL: Maximum Contaminant Level
AL: Action Level
RL: Reporting Limit

mg/L: milligrams / Liter (ppm)
ppm: parts per million
MPN: Most Probable Number
CFU: Colony Forming Unit

Laboratory Contacts
Drinking Water Unit Mgr: Julia Pleper
Systems Mgmt. Unit Mgr: George Krisztian

**MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
DRINKING WATER LABORATORY**

USEPA Region V Drinking Water Cert. No. MI00003

P.O. Box 30270

Lansing, MI 48909

TEL: (517) 335-8184

FAX: (517) 335-8562

Sample Number

LF64283

Official Laboratory Report

Report To: MIKE GLASGOW
4500 N DORT HWY
FLINT MI 48505

System Name/Owner:	CITY OF FLINT	WSSN/Pool ID:	2310
Collection Address:	3714 BEECHER RD, FLINT	Source:	Single Family Dwelling
Collected By:	MELISSA MAYS	Site Code:	
Township/Well#/Section:	//	Collector:	Private Citizen
County:	Genesee	Date Collected:	05/14/2015 06:00
Sample Point:	MAIN BATHROOM	Date Received:	05/20/2015 11:24
Water System:	Treated Public Distribution System	Purpose:	Routine Monitoring

TESTING INFORMATION			REGULATORY INFORMATION			
Analyte Name	Result (mg/L)	Date Tested	RL (mg/L)	MCL/AL (mg/L)	Method	CAS #
Copper	0.15	05/21/2015	0.05	1.3	EPA 200.8	7440-50-8
Lead	0.008	05/21/2015	0.001	0.015	EPA 200.8	7439-92-1

The analyses performed by the MDEQ Drinking Water Laboratory were conducted using methods approved by the U.S. Environmental Protection Agency in accordance with the Safe Drinking Water Act, 40 CFR parts 141-143, and other regulatory agencies as appropriate.

Your local health department has detailed information about the quality of drinking water in your area. If you have concerns about the health risks related to the test results of your sample, please contact the Environmental Health Section through the address and telephone number listed below:

Genesee County Health Dept.
630 South Saginaw
Flint, MI 48502-1540
810 257-3603

CAS# : Chemical Abstract Service Registry Number
MCL : Maximum Contaminant Level
AL : Action Level
RL : Reporting Limit

mg/L : milligrams / Liter (ppm)
ppm : parts per million
MPN : Most Probable Number
CFU : Colony Forming Unit

Laboratory Contacts
Drinking Water Unit Mgr: Julia Pieper
Systems Mgmt. Unit Mgr: George Kriestlan

**MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
DRINKING WATER LABORATORY**

USEPA Region V Drinking Water Cert. No. MI00003

P.O. Box 30270

Lansing, MI 48909

TEL: (517) 335-8184

FAX: (517) 335-8562

Sample Number

LF64285



Official Laboratory Report

Report To: **MIKE GLASGOW**
4500 N DORT HWY
FLINT MI 48505

System Name/Owner: **CITY OF FLINT**
Collection Address: **912 LEXINGTON AVE, FLINT**
Collected By: **LAURA HATT**
Township/Well#/Section: **//**
County: **Genesee**
Sample Point: **MAIN BATHROOM**
Water System: **Treated Public Distribution System**

WSSN/Pool ID: **2310**
Source: **Single Family Dwelling**
Site Code:
Collector: **Private Citizen**
Date Collected: **05/15/2015 09:00**
Date Received: **05/20/2015 11:24**
Purpose: **Routine Monitoring**

TESTING INFORMATION			REGULATORY INFORMATION			
Analyte Name	Result (mg/L)	Date Tested	RL (mg/L)	MCL/AL (mg/L)	Method	CAS #
Copper	Not detected	05/21/2015	0.05	1.3	EPA 200.8	7440-50-8
Lead	0.006	05/21/2015	0.001	0.015	EPA 200.8	7439-92-1

The analyses performed by the MDEQ Drinking Water Laboratory were conducted using methods approved by the U.S. Environmental Protection Agency in accordance with the Safe Drinking Water Act, 40 CFR parts 141-143, and other regulatory agencies as appropriate.

Your local health department has detailed information about the quality of drinking water in your area. If you have concerns about the health risks related to the test results of your sample, please contact the Environmental Health Section through the address and telephone number listed below:

Genesee County Health Dept.
630 South Saginaw
Flint, MI 48502-1540
810 257-3603

CAS# : Chemical Abstract Service Registry Number
MCL : Maximum Contaminant Level
AL : Action Level
RL : Reporting Limit

mg/L : milligrams / Liter (ppm)
ppm : parts per million
MPN : Most Probable Number
CFU : Colony Forming Unit

Laboratory Contacts
Drinking Water Unit Mgr: Julia Plepor
Systems Mgmt. Unit Mgr: George Kriszlan

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P.O. Box 30270

Lansing, MI 48909

TEL: (517) 335-8184

FAX: (517) 335-8562



Sample Number

LF67423

Official Laboratory Report

Report To: **MIKE GLASGOW**
4500 N DORT HWY
FLINT MI 48505

System Name/Owner: **CITY OF FLINT**
Collection Address: **344 ROBBIE LN, FLINT**
Collected By: **CASSANDRA BROWN**
Township/Well#/Section: **//**
County: **Genesee**
Sample Point: **BATHROOM**
Water System: **Treated Public Distribution System**

WSSN/Pool ID: **2310**
Source: **Single Family Dwelling**
Site Code:
Collector: **Private Citizen**
Date Collected: **05/31/2015 08:15**
Date Received: **06/11/2015 10:51**
Purpose: **Routine Monitoring**

TESTING INFORMATION			REGULATORY INFORMATION			
Analyte Name	Result (mg/L)	Date Tested	RL (mg/L)	MCL/AL (mg/L)	Method	CAS #
Copper	0.11	06/12/2015	0.05	1.3	EPA 200.8	7440-50-8
Lead	0.004	06/12/2015	0.001	0.015	EPA 200.8	7439-92-1

The analyses performed by the MDEQ Drinking Water Laboratory were conducted using methods approved by the U.S. Environmental Protection Agency in accordance with the Safe Drinking Water Act, 40 CFR parts 141-143, and other regulatory agencies as appropriate.

Your local health department has detailed information about the quality of drinking water in your area. If you have concerns about the health risks related to the test results of your sample, please contact the Environmental Health Section through the address and telephone number listed below:

Genesee County Health Dept.
830 South Saginaw
Flint, MI 48502-1540
810 257-3603

CAS# : Chemical Abstract Service Registry Number
MCL : Maximum Contaminant Level
AL : Action Level
RL : Reporting Limit

mg/L : milligrams / Liter (ppm)
ppm : parts per million
MPN : Most Probable Number
CFU : Colony Forming Unit

Laboratory Contacts
Drinking Water Unit Mgr: Julia Pieper
Systems Mgmt. Unit Mgr: Georgo Krisztian



**MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
DRINKING WATER LABORATORY**

USEPA Region V Drinking Water Cert. No. MI000003

P.O. Box 30270

Lansing, MI 48909

TEL: (517) 335-8184

FAX: (517) 335-8562

Sample Number

LF67424

Official Laboratory Report

Report To: **MIKE GLASGOW**
4500 N DORT HWY
FLINT MI 48505

System Name/Owner: **CITY OF FLINT**
Collection Address: **357 ROBBIE LN, FLINT**
Collected By: **FRANK EVANS**
Township/Well#/Section: **//**
County: **Genesee**
Sample Point: **KITCHEN**
Water System: **Treated Public Distribution System**

WSSN/Pool ID: **2310**
Source: **Single Family Dwelling**
Site Code:
Collector: **Private Citizen**
Date Collected: **05/31/2015 08:00**
Date Received: **06/11/2015 10:51**
Purpose: **Routine Monitoring**

TESTING INFORMATION			REGULATORY INFORMATION			
Analyte Name	Result (mg/L)	Date Tested	RL (mg/L)	MCL/AL (mg/L)	Method	CAS #
Copper	0.20	06/12/2015	0.05	1.3	EPA 200.8	7440-50-8
Lead	0.003	06/12/2015	0.001	0.015	EPA 200.8	7439-92-1

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Genesee County Health Dept.
630 South Saginaw
Flint, MI 48502-1540
810 257-3603

CAS# : Chemical Abstract Service Registry Number
MCL : Maximum Contaminant Level
AL : Action Level
RL : Reporting Limit

mg/L : milligrams / Liter (ppm)
ppm : parts per million
MPN : Most Probable Number
CFU : Colony Forming Unit

Laboratory Contacts
Drinking Water Unit Mgr: Julia Pieper
Systems Mgmt. Unit Mgr: George Krisztian



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USEPA Region V Drinking Water Cert. No. MI00003

P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-8184
FAX: (517) 335-8562

Sample Number
LF67425

Official Laboratory Report

Report To: **MIKE GLASGOW**
4500 N DORT HWY
FLINT MI 48505

System Name/Owner: **CITY OF FLINT**
Collection Address: **328 ROBBIE LN, FLINT**
Collected By: **WILLIE TURNER**
Township/Well#/Section: **//**
County: **Genesee**
Sample Point: **KITCHEN**
Water System: **Treated Public Distribution System**

WSSN/Pool ID: **2310**
Source: **Single Family Dwelling**
Site Code:
Collector: **Private Citizen**
Date Collected: **06/30/2015 06:00**
Date Received: **06/11/2015 10:51**
Purpose: **Routine Monitoring**

TESTING INFORMATION			REGULATORY INFORMATION			
Analyte Name	Result (mg/L)	Date Tested	RL (mg/L)	MCL/AL (mg/L)	Method	CAS #
Copper	0.09	06/12/2015	0.05	1.3	EPA 200.8	7440-50-8
Lead	0.002	06/12/2015	0.001	0.015	EPA 200.8	7439-92-1

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Genesee County Health Dept.
630 South Saginaw
Flint, MI 48502-1540
810 257-3603

CAS# : Chemical Abstract Service Registry Number
MCL : Maximum Contaminant Level
AL : Action Level
RL : Reporting Limit

mg/L : milligrams / Liter (ppm)
ppm : parts per million
MPN : Most Probable Number
CFU : Colony Forming Unit

Laboratory Contacts
Drinking Water Unit Mgr: Julia Pieper
Systems Mgmt. Unit Mgr: George Krisztian

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DRINKING WATER LABORATORY**

USEPA Region V Drinking Water Cert. No. MI00003

P.O. Box 30270

Lansing, MI 48909

TEL: (517) 335-8184

FAX: (517) 335-8562



Sample Number

LF67427

Official Laboratory Report

Report To: MIKE GLASGOW
4500 N DORT HWY
FLINT MI 48505

System Name/Owner: CITY OF FLINT
Collection Address: 353 ROBBIE LN, FLINT
Collected By: ZETAN EVANS
Township/Well#/Section: //
County: Genesee
Sample Point: BATHROOM
Water System: Treated Public Distribution System

WSSN/Pool ID: 2310
Source: Single Family Dwelling
Site Code:
Collector: Private Citizen
Date Collected: 05/30/2015 06:45
Date Received: 06/11/2015 10:51
Purpose: Routine Monitoring

TESTING INFORMATION			REGULATORY INFORMATION			
Analyte Name	Result (mg/L)	Date Tested	RL (mg/L)	MCL/AL (mg/L)	Method	CAS #
Copper	0.11	06/12/2015	0.05	1.3	EPA 200.8	7440-50-8
Lead	0.005	06/12/2015	0.001	0.015	EPA 200.8	7439-92-1

The analyses performed by the MDEQ Drinking Water Laboratory were conducted using methods approved by the U.S. Environmental Protection Agency in accordance with the Safe Drinking Water Act, 40 CFR parts 141-143, and other regulatory agencies as appropriate.

Your local health department has detailed information about the quality of drinking water in your area. If you have concerns about the health risks related to the test results of your sample, please contact the Environmental Health Section through the address and telephone number listed below:

Genesee County Health Dept.
630 South Saginaw
Flint, MI 48502-1540
810 257-3603

CAS#: Chemical Abstract Service Registry Number
MCL: Maximum Contaminant Level
AL: Action Level
RL: Reporting Limit

mg/L: milligrams / Liter (ppm)
ppm: parts per million
MPN: Most Probable Number
CFU: Colony Forming Unit

Laboratory Contacts
Drinking Water Unit Mgr: Julia Pieper
Systems Mgmt. Unit Mgr: George Kriszlian



**MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
DRINKING WATER LABORATORY**

USEPA Region V Drinking Water Cert. No. MI00003

P.O. Box 30270

Lansing, MI 48909

TEL: (517) 335-8184

FAX: (517) 335-8562

Sample Number

LF67428

Official Laboratory Report

Report To: **MIKE GLASGOW**
4500 N DORT HWY
FLINT MI 48505

System Name/Owner: **CITY OF FLINT**
Collection Address: **349 ROBBIE LN, FLINT**
Collected By: **DORIS NUNN**
Township/Well#/Section: **//**
County: **Genesee**
Sample Point: **KITCHEN**
Water System: **Treated Public Distribution System**

WSSN/Pool ID: **2310**
Source: **Single Family Dwelling**
Site Code:
Collector: **Private Citizen**
Date Collected: **05/31/2015 08:00**
Date Received: **06/11/2015 10:51**
Purpose: **Routine Monitoring**

TESTING INFORMATION			REGULATORY INFORMATION			
Analyte Name	Result (mg/L)	Date Tested	RL (mg/L)	MCL/AL (mg/L)	Method	CAS #
Copper	Not detected	06/12/2015	0.05	1.3	EPA 200.8	7440-50-8
Lead	0.002	06/12/2015	0.001	0.015	EPA 200.8	7439-92-1

The analyses performed by the MDEQ Drinking Water Laboratory were conducted using methods approved by the U.S. Environmental Protection Agency in accordance with the Safe Drinking Water Act, 40 CFR parts 141-143, and other regulatory agencies as appropriate.

Your local health department has detailed information about the quality of drinking water in your area. If you have concerns about the health risks related to the test results of your sample, please contact the Environmental Health Section through the address and telephone number listed below:

Genesee County Health Dept.
630 South Saginaw
Flint, MI 48502-1540
810 257-3803

CAS# : Chemical Abstract Service Registry Number
MCL : Maximum Contaminant Level
AL : Action Level
RL : Reporting Limit

mg/L : milligrams / Liter (ppm)
ppm : parts per million
MPN : Most Probable Number
CFU : Colony Forming Unit

Laboratory Contacts
Drinking Water Unit Mgr: Julia Pleper
Systems Mgmt. Unit Mgr: George Krisztlan

**MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
DRINKING WATER LABORATORY**

USEPA Region V Drinking Water Cert. No. MI00003

P.O. Box 30270

Lansing, MI 48909

TEL: (517) 335-8184

FAX: (517) 335-8562



Sample Number
LF68792

Official Laboratory Report

Report To: MIKE GLASGOW
4500 N DORT HWY
FLINT MI 48505

System Name/Owner: CITY OF FLINT
Collection Address: 853 E 7TH ST, FLINT
Collected By: LAURA STUDACHER
Township/Well#/Section: //
County: Genesee
Sample Point: BATHROOM
Water System: Treated Public Distribution System

WSSN/Pool ID: 2310
Source: Single Family Dwelling
Site Code:
Collector: Private Citizen
Date Collected: 06/12/2015 06:30
Date Received: 06/19/2015 11:02
Purpose: Routine Monitoring

TESTING INFORMATION			REGULATORY INFORMATION			
Analyte Name	Result (mg/L)	Date Tested	RL (mg/L)	MCL/AL (mg/L)	Method	CAS #
Copper	0.07	06/22/2015	0.05	1.3	EPA 200.8	7440-50-8
Lead	0.007	06/22/2015	0.001	0.015	EPA 200.8	7439-92-1

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Your local health department has detailed information about the quality of drinking water in your area. If you have concerns about the health risks related to the test results of your sample, please contact the Environmental Health Section through the address and telephone number listed below:

Genesee County Health Dept.
630 South Saginaw
Flint, MI 48502-1540
810 257-3603

CAS# : Chemical Abstract Service Registry Number
MCL : Maximum Contaminant Level
AL : Action Level
RL : Reporting Limit

mg/L : milligrams / Liter (ppm)
ppm : parts per million
MPN : Most Probable Number
CFU : Colony Forming Unit

Laboratory Contacts
Drinking Water Unit Mgr: Julia Pleper
Systems Mgmt. Unit Mgr: George Krisztian

**MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
DRINKING WATER LABORATORY**

USEPA Region V Drinking Water Cert. No. MI00003

P.O. Box 30270

Lansing, MI 48909

TEL: (517) 335-8184

FAX: (517) 335-8562



Sample Number

LF68791

Official Laboratory Report

Report To: MIKE GLASGOW
4500 N DORT HWY
FLINT MI 48505

System Name/Owner: CITY OF FLINT
Collection Address: 1815 S FRANKLIN AVE, FLINT
Collected By: VIVAN GRIER
Township/Well#/Section: //
County: Genesee
Sample Point: KITCHEN
Water System: Treated Public Distribution System

WSSN/Pool ID: 2310
Source: Single Family Dwelling
Site Code:
Collector: Private Citizen
Date Collected: 06/14/2015 09:45
Date Received: 06/19/2015 11:02
Purpose: Routine Monitoring

TESTING INFORMATION			REGULATORY INFORMATION			
Analyte Name	Result (mg/L)	Date Tested	RL (mg/L)	MCL/AL (mg/L)	Method	CAS #
Copper	Not detected	06/22/2015	0.05	1.3	EPA 200.8	7440-50-8
Lead	Not detected	06/22/2015	0.001	0.015	EPA 200.8	7439-92-1

The analyses performed by the MDEQ Drinking Water Laboratory were conducted using methods approved by the U.S. Environmental Protection Agency in accordance with the Safe Drinking Water Act, 40 CFR parts 141-143, and other regulatory agencies as appropriate.

Your local health department has detailed information about the quality of drinking water in your area. If you have concerns about the health risks related to the test results of your sample, please contact the Environmental Health Section through the address and telephone number listed below:

Genesee County Health Dept.
630 South Saginaw
Flint, MI 48502-1540
810 257-3603

CAS# : Chemical Abstract Service Registry Number
MCL : Maximum Contaminant Level
AL : Action Level
RL : Reporting Limit

mg/L : milligrams / Liter (ppm)
ppm : parts per million
MPN : Most Probable Number
CFU : Colony Forming Unit

Laboratory Contacts
Drinking Water Unit Mgr: Julia Pieper
Systems Mgmt. Unit Mgr: George Kriszlan



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Lansing, MI 48909

TEL: (517) 335-8184

FAX: (517) 335-8562

Sample Number

LF68788

Official Laboratory Report

Report To: MIKE GLASGOW
4500 N DORT HWY
FLINT MI 48505

System Name/Owner: CITY OF FLINT
Collection Address: 421 LYON ST, FLINT
Collected By: SAMUEL J CONDE
Township/Well#/Section: //
County: Genesee
Sample Point: KITCHEN
Water System: Treated Public Distribution System

WSSN/Pool ID: 2310
Source: Single Family Dwelling
Site Code:
Collector: Private Citizen
Date Collected: 06/14/2015 08:34
Date Received: 06/19/2015 11:02
Purpose: Routine Monitoring

TESTING INFORMATION			REGULATORY INFORMATION			
Analyte Name	Result (mg/L)	Date Tested	RL (mg/L)	MCL/AL (mg/L)	Method	CAS #
Copper	0.14	06/22/2015	0.05	1.3	EPA 200.8	7440-50-8
Lead	0.007	06/22/2015	0.001	0.015	EPA 200.8	7439-92-1

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Flint, MI 48502-1540
810 257-3603

CAS# : Chemical Abstract Service Registry Number
MCL : Maximum Contaminant Level
AL : Action Level
RL : Reporting Limit

mg/L : milligrams / Liter (ppm)
ppm : parts per million
MPN : Most Probable Number
CFU : Colony Forming Unit

Laboratory Contacts
Drinking Water Unit Mgr: Julia Pieper
Systems Mgmt. Unit Mgr: George Kriszlan

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Lansing, MI 48909

TEL: (517) 335-8184

FAX: (517) 335-8562



Sample Number

LF68789

Official Laboratory Report

Report To: MIKE GLASGOW
4500 N DORT HWY
FLINT MI 48505

System Name/Owner: CITY OF FLINT
Collection Address: 1528 DELAWARE AVE, FLINT
Collected By: CAROL PARKER
Township/Well#/Section: //
County: Genesee
Sample Point: KITCHEN
Water System: Treated Public Distribution System

WSSN/Pool ID: 2310
Source: Single Family Dwelling
Site Code:
Collector: Private Citizen
Date Collected: 06/12/2015 05:23
Date Received: 06/19/2015 11:02
Purpose: Routine Monitoring

TESTING INFORMATION			REGULATORY INFORMATION			
Analyte Name	Result (mg/L)	Date Tested	RL (mg/L)	MCL/AL (mg/L)	Method	CAS #
Copper	Not detected	06/22/2015	0.05	1.3	EPA 200.8	7440-50-8
Lead	0.003	06/22/2015	0.001	0.015	EPA 200.8	7439-92-1

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630 South Saginaw
Flint, MI 48502-1540
810 257-3603

CAS# : Chemical Abstract Service Registry Number
MCL : Maximum Contaminant Level
AL : Action Level
RL : Reporting Limit

mg/L : milligrams / Liter (ppm)
ppm : parts per million
MPN : Most Probable Number
CFU : Colony Forming Unit

Laboratory Contacts
Drinking Water Unit Mgr: Julia Pieper
Systems Mgmt. Unit Mgr: George Krisztian

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P.O. Box 30270

Lansing, MI 48909

TEL: (517) 335-8184

FAX: (517) 335-8562

Sample Number

LF69622

Official Laboratory Report

Report To: **MIKE GLASGOW**
4500 N DORT HWY
FLINT MI 48505

System Name/Owner: **CITY OF FLINT**
Collection Address: **920 STOCKER AVE, FLINT**
Collected By: **MICHAEL TAYLOR**
Township/Well#/Section: **//**
County: **Genesee**
Sample Point: **KITCHEN**
Water System: **Treated Public Distribution System**

WSSN/Pool ID: **2310**
Source: **Single Family Dwelling**
Site Code:
Collector: **Private Citizen**
Date Collected: **06/21/2015 10:30**
Date Received: **06/25/2015 11:52**
Purpose: **Routine Monitoring**

TESTING INFORMATION			REGULATORY INFORMATION			
Analyte Name	Result (mg/L)	Date Tested	RL (mg/L)	MCL/AL (mg/L)	Method	CAS #
Copper	Not detected	06/26/2015	0.05	1.3	EPA 200.8	7440-50-8
Lead	0.001	06/26/2015	0.001	0.015	EPA 200.8	7439-92-1

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Genesee County Health Dept.
630 South Saginaw
Flint, MI 48502-1540
810 257-3603

CAS# : Chemical Abstract Service Registry Number
MCL : Maximum Contaminant Level
AL : Action Level
RL : Reporting Limit

mg/L : milligrams / Liter (ppm)
ppm : parts per million
MPN : Most Probable Number
CFU : Colony Forming Unit

Laboratory Contacts
Drinking Water Unit Mgr: Julia Pleper
Systems Mgmt. Unit Mgr: George Krisztian

**MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
DRINKING WATER LABORATORY**



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P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-8184
FAX: (517) 335-8562

Sample Number
LF69623

Official Laboratory Report

Report To: **MIKE GLASGOW**
4500 N DORT HWY
FLINT MI 48505

System Name/Owner: **CITY OF FLINT**
Collection Address: **742 LINCOLN AVE, FLINT**
Collected By: **DANA STIF**
Township/Well#/Section: **//**
County: **Genesee**
Sample Point: **KITCHEN**
Water System: **Treated Public Distribution System**

WSSN/Pool ID: **2310**
Source: **Single Family Dwelling**
Site Code:
Collector: **Private Citizen**
Date Collected: **06/19/2015 07:00**
Date Received: **06/25/2015 11:52**
Purpose: **Routine Monitoring**

TESTING INFORMATION			REGULATORY INFORMATION			
Analyte Name	Result (mg/L)	Date Tested	RL (mg/L)	MCL/AL (mg/L)	Method	CAS #
Copper	Not detected	06/26/2015	0.05	1.3	EPA 200.8	7440-50-8
Lead	0.002	06/26/2015	0.001	0.015	EPA 200.8	7439-92-1

The analyses performed by the MDEQ Drinking Water Laboratory were conducted using methods approved by the U.S. Environmental Protection Agency in accordance with the Safe Drinking Water Act, 40 CFR parts 141-143, and other regulatory agencies as appropriate.

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Genesee County Health Dept.
630 South Saginaw
Flint, MI 48502-1540
810 257-3603

CAS#: Chemical Abstract Service Registry Number
MCL: Maximum Contaminant Level
AL: Action Level
RL: Reporting Limit

mg/L: milligrams / Liter (ppm)
ppm: parts per million
MPN: Most Probable Number
CFU: Colony Forming Unit

Laboratory Contacts
Drinking Water Unit Mgr: Julia Pieper
Systems Mgmt. Unit Mgr: George Krisztian



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DRINKING WATER LABORATORY**

USEPA Region V Drinking Water Cert. No. MI00003

P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-8184
FAX: (517) 335-8562

Sample Number
LF69624

Official Laboratory Report

Report To: MIKE GLASGOW
4500 N DORT HWY
FLINT MI 48505

System Name/Owner: CITY OF FLINT
Collection Address: 3517 BENNETT AVE, FLINT
Collected By: RANDOLPH FREEMAN
Township/Well#/Section: //
County: Genesee
Sample Point: KITCHEN
Water System: Treated Public Distribution System

WSSN/Pool ID: 2310
Source: Single Family Dwelling
Site Code:
Collector: Private Citizen
Date Collected: 06/24/2015 05:05
Date Received: 06/25/2015 11:52
Purpose: Routine Monitoring

TESTING INFORMATION			REGULATORY INFORMATION			
Analyte Name	Result (mg/L)	Date Tested	RL (mg/L)	MCL/AL (mg/L)	Method	CAS #
Copper	0.06	06/26/2015	0.05	1.3	EPA 200.8	7440-50-8
Lead	0.003	06/26/2015	0.001	0.015	EPA 200.8	7439-92-1

The analyses performed by the MDEQ Drinking Water Laboratory were conducted using methods approved by the U.S. Environmental Protection Agency in accordance with the Safe Drinking Water Act, 40 CFR parts 141-143, and other regulatory agencies as appropriate.

Your local health department has detailed information about the quality of drinking water in your area. If you have concerns about the health risks related to the test results of your sample, please contact the Environmental Health Section through the address and telephone number listed below:

Genesee County Health Dept.
630 South Saginaw
Flint, MI 48502-1540
810 257-3603

CAS#: Chemical Abstract Service Registry Number
MCL: Maximum Contaminant Level
AL: Action Level
RL: Reporting Limit

mg/L: milligrams / Liter (ppm)
ppm: parts per million
MPN: Most Probable Number
CFU: Colony Forming Unit

Laboratory Contacts
Drinking Water Unit Mgr: Julla Pieper
Systems Mgmt. Unit Mgr: George Krsztian

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Lansing, MI 48909

TEL: (517) 335-8184

FAX: (517) 335-8562

Sample Number

LF69625

Official Laboratory Report

Report To: **MIKE GLASGOW**
4500 N DORT HWY
FLINT MI 48505

System Name/Owner: **CITY OF FLINT**
Collection Address: **1730 OVERHILL DR, FLINT**
Collected By: **PETER M BADE**
Township/Well#/Section: **//**
County: **Genesee**
Sample Point: **KITCHEN**
Water System: **Treated Public Distribution System**

WSSN/Pool ID: **2310**
Source: **Single Family Dwelling**
Site Code:
Collector: **Private Citizen**
Date Collected: **08/22/2015 05:30**
Date Received: **08/25/2015 11:52**
Purpose: **Routine Monitoring**

TESTING INFORMATION			REGULATORY INFORMATION			
Analyte Name	Result (mg/L)	Date Tested	RL (mg/L)	MCL/AL (mg/L)	Method	CAS #
Copper	0.08	06/26/2015	0.05	1.3	EPA 200.8	7440-50-8
Lead	0.001	06/26/2015	0.001	0.015	EPA 200.8	7439-92-1

The analyses performed by the MDEQ Drinking Water Laboratory were conducted using methods approved by the U.S. Environmental Protection Agency in accordance with the Safe Drinking Water Act, 40 CFR parts 141-143, and other regulatory agencies as appropriate.

Your local health department has detailed information about the quality of drinking water in your area. If you have concerns about the health risks related to the test results of your sample, please contact the Environmental Health Section through the address and telephone number listed below:

Genesee County Health Dept.
630 South Saginaw
Flint, MI 48502-1540
810 257-3603

CAS# : Chemical Abstract Service Registry Number
MCL : Maximum Contaminant Level
AL : Action Level
RL : Reporting Limit

mg/L : milligrams / Liter (ppm)
ppm : parts per million
MPN : Most Probable Number
CFU : Colony Forming Unit

Laboratory Contacts
Drinking Water Unit Mgr: Julia Pieper
Systems Mgmt. Unit Mgr: George Kriszlan

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DRINKING WATER LABORATORY**

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P.O. Box 30270

Lansing, MI 48909

TEL: (517) 335-8184

FAX: (517) 335-8562

Sample Number

LF69626

Official Laboratory Report

Report To: **MIKE GLASGOW**
4500 N DORT HWY
FLINT MI 48505

System Name/Owner: **CITY OF FLINT**
Collection Address: **2117 STANFORD AVE, FLINT**
Collected By: **CHIMENE HILL**
Township/Well/Section: **//**
County: **Genesee**
Sample Point: **MAIN BATHROOM**
Water System: **Treated Public Distribution System**

WSSN/Pool ID: **2310**
Source: **Single Family Dwelling**
Site Code:
Collector: **Private Citizen**
Date Collected: **06/23/2015 08:20**
Date Received: **06/25/2015 11:52**
Purpose: **Routine Monitoring**

TESTING INFORMATION			REGULATORY INFORMATION			
Analyte Name	Result (mg/L)	Date Tested	RL (mg/L)	MCL/AL (mg/L)	Method	CAS #
Copper	0.08	06/26/2015	0.05	1.3	EPA 200.8	7440-50-8
Lead	0.005	06/26/2015	0.001	0.015	EPA 200.8	7439-92-1

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Genesee County Health Dept.
630 South Saginaw
Flint, MI 48502-1540
810 257-3603

CAS# : Chemical Abstract Service Registry Number
MCL : Maximum Contaminant Level
AL : Action Level
RL : Reporting Limit

mg/L : milligrams / Liter (ppm)
ppm : parts per million
MPN : Most Probable Number
CFU : Colony Forming Unit

Laboratory Contacts
Drinking Water Unit Mgr: Julia Pleper
Systems Mgmt. Unit Mgr: George Krisztian

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Lansing, MI 48909

TEL: (517) 335-8184

FAX: (517) 335-8562

Sample Number

LF69627



Official Laboratory Report

Report To: MIKE GLASGOW
4500 N DORT HWY
FLINT MI 48505

System Name/Owner:	CITY OF FLINT	WSSN/Pool ID:	2310
Collection Address:	2432 BETA LN, FLINT	Source:	Single Family Dwelling
Collected By:	JON KINGEN	Site Code:	
Township/Well#/Section:	//	Collector:	Private Citizen
County:	Genesee	Date Collected:	06/21/2015 07:00
Sample Point:	KITCHEN	Date Received:	06/25/2015 11:52
Water System:	Treated Public Distribution System	Purpose:	Routine Monitoring

TESTING INFORMATION			REGULATORY INFORMATION			
Analyte Name	Result (mg/L)	Date Tested	RL (mg/L)	MCL/AL (mg/L)	Method	CAS #
Copper	Not detected	06/26/2015	0.05	1.3	EPA 200.8	7440-50-8
Lead	Not detected	06/26/2015	0.001	0.015	EPA 200.8	7439-92-1

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Genesee County Health Dept.
630 South Saginaw
Flint, MI 48502-1540
810 257-3603

CAS# : Chemical Abstract Service Registry Number
MCL : Maximum Contaminant Level
AL : Action Level
RL : Reporting Limit

mg/L : milligrams / Liter (ppm)
ppm : parts per million
MPN : Most Probable Number
CFU : Colony Forming Unit

Laboratory Contacts
Drinking Water Unit Mgr: Julia Pieper
Systems Mgmt. Unit Mgr: George Krisztian

**MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
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USEPA Region V Drinking Water Cert. No. MI00003

P.O. Box 30270

Lansing, MI 48909

TEL: (517) 335-8184

FAX: (517) 335-8562

Sample Number

LF69628



Official Laboratory Report

Report To: **MIKE GLASGOW**
4500 N DORT HWY
FLINT MI 48505

System Name/Owner: **CITY OF FLINT**
Collection Address: **2023 MILLER RD, FLINT**
Collected By: **CAROLA HIGGINS**
Township/Well#/Section: **//**
County: **Genesee**
Sample Point: **KITCHEN**
Water System: **Treated Public Distribution System**

WSSN/Pool ID: **2310**
Source: **Single Family Dwelling**
Site Code:
Collector: **Private Citizen**
Date Collected: **06/21/2015 11:00**
Date Received: **06/25/2015 11:52**
Purpose: **Routine Monitoring**

TESTING INFORMATION			REGULATORY INFORMATION			
Analyte Name	Result (mg/L)	Date Tested	RL (mg/L)	MCL/AL (mg/L)	Method	CAS #
Copper	0.06	06/26/2015	0.05	1.3	EPA 200.8	7440-50-8
Lead	0.003	06/26/2015	0.001	0.015	EPA 200.8	7439-92-1

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630 South Saginaw
Flint, MI 48502-1540
810 257-3603

CAS# : Chemical Abstract Service Registry Number
MCL : Maximum Contaminant Level
AL : Action Level
RL : Reporting Limit

mg/L : milligrams / Liter (ppm)
ppm : parts per million
MPN : Most Probable Number
CFU : Colony Forming Unit

Laboratory Contacts
Drinking Water Unit Mgr: Julia Pieper
Systems Mgmt. Unit Mgr: George Krisztfian

**MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
DRINKING WATER LABORATORY**



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P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-8184
FAX: (517) 335-8562

**Sample Number
LF70223**

Official Laboratory Report

Report To: MIKE GLASGOW
4500 N DORT HWY
FLINT MI 48505

System Name/Owner:	CITY OF FLINT	WSSN/Pool ID:	2310
Collection Address:	3814 WHITTIER, FLINT	Source:	Single Family Dwelling
Collected By:	BRIAN URCH	Site Code:	
Township/Well#/Section:	//	Collector:	Private Citizen
County:	Genesee	Date Collected:	06/25/2015 07:33
Sample Point:	BATHROOM	Date Received:	06/30/2015 11:14
Water System:	Treated Public Distribution System	Purpose:	Routine Monitoring

TESTING INFORMATION			REGULATORY INFORMATION			
Analyte Name	Result (mg/L)	Date Tested	RL (mg/L)	MCL/AL (mg/L)	Method	CAS #
Copper	Not detected	07/01/2015	0.05	1.3	EPA 200.8	7440-50-8
Lead	0.002	07/01/2015	0.001	0.015	EPA 200.8	7439-92-1

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Genesee County Health Dept.
630 South Saginaw
Flint, MI 48502-1540
810 257-3603

CAS# : Chemical Abstract Service Registry Number
MCL : Maximum Contaminant Level
AL : Action Level
RL : Reporting Limit

mg/L : milligrams / Liter (ppm)
ppm : parts per million
MPN : Most Probable Number
CFU : Colony Forming Unit

Laboratory Contacts
Drinking Water Unit Mgr: Julia Pleper
Systems Mgmt. Unit Mgr: George Krisztian

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USEPA Region V Drinking Water Cert. No. MI00003

P.O. Box 30270

Lansing, MI 48909

TEL: (517) 335-8184

FAX: (517) 335-8562

Sample Number

LF70224

Official Laboratory Report

Report To: MIKE GLASGOW
4500 N DORT HWY
FLINT MI 48505

System Name/Owner: CITY OF FLINT
Collection Address: 3120 NORWOOD DR, FLINT
Collected By: TOM HUTCHINGS
Township/Well/Section: //
County: Genesee
Sample Point: BATHROOM
Water System: Treated Public Distribution System

WSSN/Pool ID: 2310
Source: Single Family Dwelling
Site Code:
Collector: Private Citizen
Date Collected: 06/24/2015 08:20
Date Received: 06/30/2015 11:14
Purpose: Routine Monitoring

TESTING INFORMATION			REGULATORY INFORMATION			
Analyte Name	Result (mg/L)	Date Tested	RL (mg/L)	MCL/AL (mg/L)	Method	CAS #
Copper	Not detected	07/01/2015	0.05	1.3	EPA 200.8	7440-50-8
Lead	0.005	07/01/2015	0.001	0.015	EPA 200.8	7439-92-1

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Genesee County Health Dept.
630 South Saginaw
Flint, MI 48502-1540
810 257-3603

CAS# : Chemical Abstract Service Registry Number
MCL : Maximum Contaminant Level
AL : Action Level
RL : Reporting Limit

mg/L : milligrams / Liter (ppm)
ppm : parts per million
MPN : Most Probable Number
CFU : Colony Forming Unit

Laboratory Contacts
Drinking Water Unit Mgr: Julia Pieper
Systems Mgmt. Unit Mgr: George Kriszlian

**MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
DRINKING WATER LABORATORY**



USEPA Region V Drinking Water Cert. No. MI00003

P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-8184
FAX: (517) 335-8562

Sample Number
LF70225

Official Laboratory Report

Report To: MIKE GLASGOW
4500 N DORT HWY
FLINT MI 48505

System Name/Owner: CITY OF FLINT
Collection Address: 2122 PIERCE ST, FLINT
Collected By: KATHLEEN REID
Township/Well#/Section: //
County: Genesee
Sample Point: KITCHEN
Water System: Treated Public Distribution System

WSSN/Pool ID: 2310
Source: Single Family Dwelling
Site Code:
Collector: Private Citizen
Date Collected: 08/21/2015 07:00
Date Received: 06/30/2015 11:14
Purpose: Routine Monitoring

TESTING INFORMATION			REGULATORY INFORMATION			
Analyte Name	Result (mg/L)	Date Tested	RL (mg/L)	MCL/AL (mg/L)	Method	CAS #
Copper	Not detected	07/01/2015	0.05	1.3	EPA 200.8	7440-50-8
Lead	0.002	07/01/2015	0.001	0.015	EPA 200.8	7439-92-1

The analyses performed by the MDEQ Drinking Water Laboratory were conducted using methods approved by the U.S. Environmental Protection Agency in accordance with the Safe Drinking Water Act, 40 CFR parts 141-143, and other regulatory agencies as appropriate.

Your local health department has detailed information about the quality of drinking water in your area. If you have concerns about the health risks related to the test results of your sample, please contact the Environmental Health Section through the address and telephone number listed below:

Genesee County Health Dept.
830 South Saginaw
Flint, MI 48502-1540
810 257-3603

CAS#: Chemical Abstract Service Registry Number
MCL: Maximum Contaminant Level
AL: Action Level
RL: Reporting Limit

mg/L: milligrams / Liter (ppm)
ppm: parts per million
MPN: Most Probable Number
CFU: Colony Forming Unit

Laboratory Contacts
Drinking Water Unit Mgr: Julia Pieper
Systems Mgmt. Unit Mgr: George Krisztian

**MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
DRINKING WATER LABORATORY**

USEPA Region V Drinking Water Cert. No. MI00003

P.O. Box 30270

Lansing, MI 48909

TEL: (517) 335-8184

FAX: (517) 335-8562

Sample Number

LF70226



Official Laboratory Report

Report To: MIKE GLASGOW
4500 N DORT HWY
FLINT MI 48505

System Name/Owner: CITY OF FLINT
Collection Address: 3521 BENNETT AVE, FLINT
Collected By: BRENT WRIGHT
Township/Well#/Section: //
County: Genesee
Sample Point: KITCHEN
Water System: Treated Public Distribution System

WSSN/Pool ID: 2310
Source: Single Family Dwelling
Site Code:
Collector: Private Citizen
Date Collected: 06/25/2015 06:35
Date Received: 06/30/2015 11:14
Purpose: Routine Monitoring

TESTING INFORMATION			REGULATORY INFORMATION			
Analyte Name	Result (mg/L)	Date Tested	RL (mg/L)	MCL/AL (mg/L)	Method	CAS #
Copper	Not detected	07/01/2015	0.05	1.3	EPA 200.8	7440-50-8
Lead	0.003	07/01/2015	0.001	0.015	EPA 200.8	7439-92-1

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Genesee County Health Dept.
630 South Saginaw
Flint, MI 48502-1540
810 257-3603

CAS#: Chemical Abstract Service Registry Number
MCL: Maximum Contaminant Level
AL: Action Level
RL: Reporting Limit

mg/L: milligrams / Liter (ppm)
ppm: parts per million
MPN: Most Probable Number
CFU: Colony Forming Unit

Laboratory Contacts
Drinking Water Unit Mgr: Julia Pieper
Systems Mgmt. Unit Mgr: George Krisztian

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DRINKING WATER LABORATORY**



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Lansing, MI 48909
TEL: (517) 335-8184
FAX: (517) 335-8562

Sample Number
LF70227

Official Laboratory Report

Report To: MIKE GLASGOW
4500 N DORT HWY
FLINT MI 48606

System Name/Owner: CITY OF FLINT
Collection Address: 1602 RASPBERRY LN, FLINT
Collected By: BRAD FARRAR
Township/Well#/Section: //
County: Genesee
Sample Point: KITCHEN
Water System: Treated Public Distribution System

WSSN/Pool ID: 2310
Source: Single Family Dwelling
Site Code:
Collector: Private Citizen
Date Collected: 06/24/2015 07:15
Date Received: 06/30/2015 11:14
Purpose: Routine Monitoring

TESTING INFORMATION			REGULATORY INFORMATION			
Analyte Name	Result (mg/L)	Date Tested	RL (mg/L)	MCL/AL (mg/L)	Method	CAS #
Copper	Not detected	07/01/2015	0.05	1.3	EPA 200.8	7440-50-8
Lead	Not detected	07/01/2015	0.001	0.015	EPA 200.8	7439-92-1

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Genesee County Health Dept.
630 South Saginaw
Flint, MI 48602-1540
810 257-3603

CAS#: Chemical Abstract Service Registry Number
MCL: Maximum Contaminant Level
AL: Action Level
RL: Reporting Limit

mg/L: milligrams / Liter (ppm)
ppm: parts per million
MPN: Most Probable Number
CFU: Colony Forming Unit

Laboratory Contacts
Drinking Water Unit Mgr: Julia Pieper
Systems Mgmt. Unit Mgr: George Krisztian

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DRINKING WATER LABORATORY**

USEPA Region V Drinking Water Cert. No. MI00003

P.O. Box 30270

Lansing, MI 48909

TEL: (517) 335-8184

FAX: (517) 335-8562

Sample Number

LF70228



Official Laboratory Report

Report To: MIKE GLASGOW
4500 N DORT HWY
FLINT MI 48505

System Name/Owner: CITY OF FLINT
Collection Address: 1809 LYNBROOK, FLINT
Collected By: DAWN STEELE
Township/Well#/Section: //
County: Genesee
Sample Point: KITCHEN
Water System: Treated Public Distribution System

WSSN/Pool ID: 2310
Source: Single Family Dwelling
Site Code:
Collector: Private Citizen
Date Collected: 06/26/2015 04:35
Date Received: 06/30/2015 11:14
Purpose: Routine Monitoring

TESTING INFORMATION			REGULATORY INFORMATION			
Analyte Name	Result (mg/L)	Date Tested	RL (mg/L)	MCL/AL (mg/L)	Method	CAS #
Copper	Not detected	07/01/2015	0.05	1.3	EPA 200.8	7440-50-8
Lead	0.003	07/01/2015	0.001	0.015	EPA 200.8	7439-92-1

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Flint, MI 48502-1540
810 257-3603

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MCL: Maximum Contaminant Level
AL: Action Level
RL: Reporting Limit

mg/L: milligrams / Liter (ppm)
ppm: parts per million
MPN: Most Probable Number
CFU: Colony Forming Unit

Laboratory Contacts
Drinking Water Unit Mgr: Julia Pieper
Systems Mgmt. Unit Mgr: George Krisztian

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P.O. Box 30270

Lansing, MI 48909

TEL: (517) 335-8184

FAX: (517) 335-8562

Sample Number

LF70229



Official Laboratory Report

Report To: **MIKE GLASGOW**
4500 N DORT HWY
FLINT MI 48505

System Name/Owner:	CITY OF FLINT	WSSN/Pool ID:	2310
Collection Address:	2112 SHERFF, FLINT	Source:	Single Family Dwelling
Collected By:	KAREN EATON	Site Code:	
Township/Well#/Section:	//	Collector:	Private Citizen
County:	Genesee	Date Collected:	06/24/2015 09:30
Sample Point:	KITCHEN	Date Received:	06/30/2015 11:14
Water System:	Treated Public Distribution System	Purpose:	Routine Monitoring

TESTING INFORMATION			REGULATORY INFORMATION			
Analyte Name	Result (mg/L)	Date Tested	RL (mg/L)	MCL/AL (mg/L)	Method	CAS #
Copper	0.06	07/01/2015	0.05	1.3	EPA 200.8	7440-50-8
Lead	0.009	07/01/2015	0.001	0.015	EPA 200.8	7439-92-1

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630 South Saginaw
Flint, MI 48502-1540
810 257-3603

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MCL : Maximum Contaminant Level
AL : Action Level
RL : Reporting Limit

mg/L : milligrams / Liter (ppm)
ppm : parts per million
MPN : Most Probable Number
CFU : Colony Forming Unit

Laboratory Contacts
Drinking Water Unit Mgr: Julia Pieper
Systems Mgmt. Unit Mgr: George Kriszlian

**MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
DRINKING WATER LABORATORY**



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P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-8184
FAX: (517) 335-8562

Sample Number
LF70231

Official Laboratory Report

Report To: **MIKE GLASGOW**
4500 N DORT HWY
FLINT MI 48505

System Name/Owner:	CITY OF FLINT	WSSN/Pool ID:	2310
Collection Address:	860 SCHAFER ST, FLINT	Source:	Single Family Dwelling
Collected By:	DERRICK JONES	Site Code:	
Township/Well#/Section:	//	Collector:	Private Citizen
County:	Genesee	Date Collected:	06/26/2015 05:27
Sample Point:	KITCHEN	Date Received:	06/30/2015 11:14
Water System:	Treated Public Distribution System	Purpose:	Routine Monitoring

TESTING INFORMATION			REGULATORY INFORMATION			
Analyte Name	Result (mg/L)	Date Tested	RL (mg/L)	MCL/AL (mg/L)	Method	CAS #
Copper	0.06	07/01/2015	0.05	1.3	EPA 200.8	7440-50-8
Lead	Not detected	07/01/2015	0.001	0.015	EPA 200.8	7439-92-1

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Genesee County Health Dept.
630 South Saginaw
Flint, MI 48602-1540
810 267-3603

CAS# : Chemical Abstract Service Registry Number
MCL : Maximum Contaminant Level
AL : Action Level
RL : Reporting Limit

mg/L : milligrams / Liter (ppm)
ppm : parts per million
MPN : Most Probable Number
CFU : Colony Forming Unit

Laboratory Contacts
Drinking Water Unit Mgr: Julia Pieper
Systems Mgmt. Unit Mgr: George Krisztian

**MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
DRINKING WATER LABORATORY**



USEPA Region V Drinking Water Cert. No. MI00003

P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-8184
FAX: (517) 335-8562

Sample Number
LF71158

Official Laboratory Report

Report To: MIKE GLASGOW
4500 N DORT HWY
FLINT MI 48505

System Name/Owner: CITY OF FLINT
Collection Address: 2110 FLUSHING RD, FLINT
Collected By: SHELLY SANETRIK
Township/Well#/Section: //
County: Genesee
Sample Point: KITCHEN
Water System: Treated Public Distribution System

WSSN/Pool ID: 2310
Source: Single Family Dwelling
Site Code:
Collector: Private Citizen
Date Collected: 06/30/2015 08:34
Date Received: 07/07/2015 11:34
Purpose: Routine Monitoring

TESTING INFORMATION			REGULATORY INFORMATION			
Analyte Name	Result (mg/L)	Date Tested	RL (mg/L)	MCL/AL (mg/L)	Method	CAS #
Copper	0.10	07/08/2015	0.05	1.3	EPA 200.8	7440-50-8
Lead	Not detected	07/08/2015	0.001	0.015	EPA 200.8	7439-92-1

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Genesee County Health Dept.
630 South Saginaw
Flint, MI 48502-1540
810 257-3603

CAS# : Chemical Abstract Service Registry Number
MCL : Maximum Contaminant Level
AL : Action Level
RL : Reporting Limit

mg/L : milligrams / Liter (ppm)
ppm : parts per million
MPN : Most Probable Number
CFU : Colony Forming Unit

Laboratory Contacts
Drinking Water Unit Mgr: Julia Pieper
Systems Mgmt. Unit Mgr: George Krisztian

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P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-8184
FAX: (517) 335-8562

Sample Number
LF71159

Official Laboratory Report

Report To: MIKE GLASGOW
4500 N DORT HWY
FLINT MI 48505

System Name/Owner:	CITY OF FLINT	WSSN/Pool ID:	2310
Collection Address:	2300 FLUSHING RD, FLINT	Source:	Single Family Dwelling
Collected By:	CONSTANCE VAUGHN	Site Code:	
Township/Well#/Section:	//	Collector:	Private Citizen
County:	Genesee	Date Collected:	06/29/2015 09:30
Sample Point:	BATHROOM	Date Received:	07/07/2015 11:34
Water System:	Treated Public Distribution System	Purpose:	Routine Monitoring

TESTING INFORMATION			REGULATORY INFORMATION			
Analyte Name	Result (mg/L)	Date Tested	RL (mg/L)	MCL/AL (mg/L)	Method	CAS #
Copper	0.28	07/08/2015	0.05	1.3	EPA 200.8	7440-50-8
Lead	0.003	07/08/2015	0.001	0.015	EPA 200.8	7439-92-1

The analyses performed by the MDEQ Drinking Water Laboratory were conducted using methods approved by the U.S. Environmental Protection Agency in accordance with the Safe Drinking Water Act, 40 CFR parts 141-143, and other regulatory agencies as appropriate.

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Genesee County Health Dept.
630 South Saginaw
Flint, MI 48502-1540
810 257-3603

CAS# : Chemical Abstract Service Registry Number
MCL : Maximum Contaminant Level
AL : Action Level
RL : Reporting Limit

mg/L : milligrams / Liter (ppm)
ppm : parts per million
MPN : Most Probable Number
CFU : Colony Forming Unit

Laboratory Contacts
Drinking Water Unit Mgr: Julia Pieper
Systems Mgmt. Unit Mgr: George Krisztian

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DRINKING WATER LABORATORY**



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P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-8184
FAX: (517) 335-8562

Sample Number
LF71160

Official Laboratory Report

Report To: MIKE GLASGOW
4500 N DORT HWY
FLINT MI 48505

System Name/Owner:	CITY OF FLINT	WSSN/Pool ID:	2310
Collection Address:	2130 FLUSHING RD, FLINT	Source:	Single Family Dwelling
Collected By:	ROSARIO	Site Code:	
Township/Well#/Section:	//	Collector:	Private Citizen
County:	Genesee	Date Collected:	06/28/2015 17:46
Sample Point:	BASEMENT	Date Received:	07/07/2015 11:34
Water System:	Treated Public Distribution System	Purpose:	Routine Monitoring

TESTING INFORMATION			REGULATORY INFORMATION			
Analyte Name	Result (mg/L)	Date Tested	RL (mg/L)	MCL/AL (mg/L)	Method	CAS #
Copper	0.05	07/08/2015	0.05	1.3	EPA 200.8	7440-50-8
Lead	0.006	07/08/2015	0.001	0.015	EPA 200.8	7439-92-1

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Genesee County Health Dept.
830 South Saginaw
Flint, MI 48502-1540
810 257-3603

CAS# : Chemical Abstract Service Registry Number
MCL : Maximum Contaminant Level
AL : Action Level
RL : Reporting Limit

mg/L : milligrams / Liter (ppm)
ppm : parts per million
MPN : Most Probable Number
CFU : Colony Forming Unit

Laboratory Contacts
Drinking Water Unit Mgr: Julia Pieper
Systems Mgmt. Unit Mgr: George Krisztian

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DRINKING WATER LABORATORY**

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P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-8184
FAX: (517) 335-8562

Sample Number
LF71162

Official Laboratory Report

Report To: MIKE GLASGOW
4500 N DORT HWY
FLINT MI 48505

System Name/Owner: CITY OF FLINT
Collection Address: 2202 FLUSHING RD, FLINT
Collected By: BARBARA NELSON
Township/Well#/Section: //
County: Genesee
Sample Point: KITCHEN
Water System: Treated Public Distribution System

WSSN/Pool ID: 2310
Source: Single Family Dwelling
Site Code:
Collector: Private Citizen
Date Collected: 06/29/2015 06:30
Date Received: 07/07/2015 11:34
Purpose: Routine Monitoring

TESTING INFORMATION			REGULATORY INFORMATION			
Analyte Name	Result (mg/L)	Date Tested	RL (mg/L)	MCL/AL (mg/L)	Method	CAS #
Copper	0.06	07/08/2015	0.05	1.3	EPA 200.8	7440-50-8
Lead	0.002	07/08/2015	0.001	0.015	EPA 200.8	7439-92-1

The analyses performed by the MDEQ Drinking Water Laboratory were conducted using methods approved by the U.S. Environmental Protection Agency in accordance with the Safe Drinking Water Act, 40 CFR parts 141-143, and other regulatory agencies as appropriate.

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Genesee County Health Dept.
630 South Saginaw
Flint, MI 48502-1540
810 257-3603

CAS#: Chemical Abstract Service Registry Number
MCL : Maximum Contaminant Level
AL: Action Level
RL: Reporting Limit

mg/L : milligrams / Liter (ppm)
ppm : parts per million
MPN : Most Probable Number
CFU : Colony Forming Unit

Laboratory Contacts
Drinking Water Unit Mgr: Julia Pieper
Systems Mgmt. Unit Mgr: George Krisztian



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Lansing, MI 48909
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FAX: (517) 335-8562

**Sample Number
LF71163**

Official Laboratory Report

Report To: MIKE GLASGOW
4500 N DORT HWY
FLINT MI 48505

System Name/Owner: CITY OF FLINT
Collection Address: 2429 FLUSHING RD, FLINT
Collected By: ROLAND WATSON
Township/Well#/Section: //
County: Genesee
Sample Point: KITCHEN
Water System: Treated Public Distribution System

WSSN/Pool ID: 2310
Source: Single Family Dwelling
Site Code:
Collector: Private Citizen
Date Collected: 06/30/2015 08:00
Date Received: 07/07/2015 11:34
Purpose: Routine Monitoring

TESTING INFORMATION			REGULATORY INFORMATION			
Analyte Name	Result (mg/L)	Date Tested	RL (mg/L)	MCL/AL (mg/L)	Method	CAS #
Copper	0.06	07/08/2015	0.05	1.3	EPA 200.8	7440-50-8
Lead	Not detected	07/08/2015	0.001	0.015	EPA 200.8	7439-92-1

The analyses performed by the MDEQ Drinking Water Laboratory were conducted using methods approved by the U.S. Environmental Protection Agency in accordance with the Safe Drinking Water Act, 40 CFR parts 141-143, and other regulatory agencies as appropriate.

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**Genesee County Health Dept.
630 South Saginaw
Flint, MI 48502-1540
810 257-3603**

CAS# : Chemical Abstract Service Registry Number
MCL : Maximum Contaminant Level
AL : Action Level
RL : Reporting Limit

mg/L : milligrams / Liter (ppm)
ppm : parts per million
MPN : Most Probable Number
CFU : Colony Forming Unit

Laboratory Contacts
Drinking Water Unit Mgr: Julia Pieper
Systems Mgmt. Unit Mgr: George Krisztian

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USEPA Region V Drinking Water Cert. No. MI00003
P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-8184
FAX: (517) 335-8562

**Sample Number
LF71165**

Official Laboratory Report

Report To: MIKE GLASGOW
4600 N DORT HWY
FLINT MI 48505

System Name/Owner:	CITY OF FLINT	WSSN/Pool ID:	2310
Collection Address:	4013 BROWNELL BLVD, FLINT	Source:	Single Family Dwelling
Collected By:	ADRIAN AND PHYLLIS JONES	Site Code:	
Township/Well#/Section:	//	Collector:	Private Citizen
County:	Genesee	Date Collected:	08/29/2015 08:30
Sample Point:	KITCHEN	Date Received:	07/07/2015 11:34
Water System:	Treated Public Distribution System	Purpose:	Routine Monitoring

TESTING INFORMATION			REGULATORY INFORMATION			
Analyte Name	Result (mg/L)	Date Tested	RL (mg/L)	MCL/AL (mg/L)	Method	CAS #
Copper	0.08	07/08/2015	0.05	1.3	EPA 200.8	7440-50-8
Lead	0.002	07/08/2015	0.001	0.015	EPA 200.8	7439-92-1

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Flint, MI 48502-1540
810 257-3603

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MCL : Maximum Contaminant Level
AL : Action Level
RL : Reporting Limit

mg/L : milligrams / Liter (ppm)
ppm : parts per million
MPN : Most Probable Number
CFU : Colony Forming Unit

Laboratory Contacts
Drinking Water Unit Mgr: Julia Pieper
Systems Mgmt. Unit Mgr: George Krisztian

**MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
DRINKING WATER LABORATORY**



USEPA Region V Drinking Water Cert. No. MI00003

P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-8184
FAX: (517) 335-8562

Sample Number
LF71166

Official Laboratory Report

Report To: **MIKE GLASGOW**
4500 N DORT HWY
FLINT MI 48505

System Name/Owner:	CITY OF FLINT	WSSN/Pool ID:	2310
Collection Address:	2414 FLUSHING RD, FLINT	Source:	Single Family Dwelling
Collected By:	MICHELLE AND MICHAEL REED	Site Code:	
Township/Well#/Section:	//	Collector:	Private Citizen
County:	Genesee	Date Collected:	06/30/2015 07:30
Sample Point:	KITCHEN	Date Received:	07/07/2015 11:34
Water System:	Treated Public Distribution System	Purpose:	Routine Monitoring

TESTING INFORMATION			REGULATORY INFORMATION			
Analyte Name	Result (mg/L)	Date Tested	RL (mg/L)	MCL/AL (mg/L)	Method	CAS #
Copper	Not detected	07/08/2015	0.05	1.3	EPA 200.8	7440-50-8
Lead	Not detected	07/08/2015	0.001	0.015	EPA 200.8	7439-92-1

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Genesee County Health Dept.
630 South Saginaw
Flint, MI 48502-1540
810 257-3603

CAS# : Chemical Abstract Service Registry Number
MCL : Maximum Contaminant Level
AL : Action Level
RL : Reporting Limit

mg/L : milligrams / Liter (ppm)
ppm : parts per million
MPN : Most Probable Number
CFU : Colony Forming Unit

Laboratory Contacts
Drinking Water Unit Mgr: Julia Pieper
Systems Mgmt. Unit Mgr: George Krisztian

**MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
DRINKING WATER LABORATORY**

USEPA Region V Drinking Water Cert. No. MI00003

P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-8184
FAX: (517) 335-8562

Sample Number
LF71167



Official Laboratory Report

Report To: MIKE GLASGOW
4500 N DORT HWY
FLINT MI 48505

System Name/Owner: CITY OF FLINT
Collection Address: 1914 PENBROOK LN, FLINT
Collected By: KARL ADKINS
Township/Well/Section: //
County: Genesee
Sample Point: KITCHEN
Water System: Treated Public Distribution System

WSSN/Pool ID: 2310
Source: Single Family Dwelling
Site Code:
Collector: Private Citizen
Date Collected: 06/29/2015 06:00
Date Received: 07/07/2015 11:34
Purpose: Routine Monitoring

TESTING INFORMATION			REGULATORY INFORMATION			
Analyte Name	Result (mg/L)	Date Tested	RL (mg/L)	MCL/AL (mg/L)	Method	CAS #
Copper	Not detected	07/08/2015	0.05	1.3	EPA 200.8	7440-50-8
Lead	0.002	07/08/2015	0.001	0.015	EPA 200.8	7439-92-1

The analyses performed by the MDEQ Drinking Water Laboratory were conducted using methods approved by the U.S. Environmental Protection Agency in accordance with the Safe Drinking Water Act, 40 CFR parts 141-143, and other regulatory agencies as appropriate.

Your local health department has detailed information about the quality of drinking water in your area. If you have concerns about the health risks related to the test results of your sample, please contact the Environmental Health Section through the address and telephone number listed below:

Genesee County Health Dept.
630 South Saginaw
Flint, MI 48502-1540
810 257-3603

CAS# : Chemical Abstract Service Registry Number
MCL : Maximum Contaminant Level
AL : Action Level
RL : Reporting Limit

mg/L : milligrams / Liter (ppm)
ppm : parts per million
MPN : Most Probable Number
CFU : Colony Forming Unit

Laboratory Contacts
Drinking Water Unit Mgr: Julia Pieper
Systems Mgmt. Unit Mgr: George Krisztian



**MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
DRINKING WATER LABORATORY**

USEPA Region V Drinking Water Cert. No. MI00003

P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-8184
FAX: (517) 335-8562

Sample Number
LF71168

Official Laboratory Report

Report To: MIKE GLASGOW
4500 N DORT HWY
FLINT MI 48505

System Name/Owner: CITY OF FLINT
Collection Address: 3901 LEERDA ST, FLINT
Collected By: CARNETTA CARTER
Township/Well#/Section: //
County: Genesee
Sample Point: KITCHEN
Water System: Treated Public Distribution System

WSSN/Pool ID: 2310
Source: Single Family Dwelling
Site Code:
Collector: Private Citizen
Date Collected: 06/26/2015 08:25
Date Received: 07/07/2015 11:34
Purpose: Routine Monitoring

TESTING INFORMATION			REGULATORY INFORMATION			
Analyte Name	Result (mg/L)	Date Tested	RL (mg/L)	MCL/AL (mg/L)	Method	CAS #
Copper	Not detected	07/08/2015	0.05	1.3	EPA 200.8	7440-50-8
Lead	Not detected	07/08/2015	0.001	0.015	EPA 200.8	7439-92-1

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Flint, MI 48502-1540
810 257-3603

CAS# : Chemical Abstract Service Registry Number
MCL : Maximum Contaminant Level
AL : Action Level
RL : Reporting Limit

mg/L : milligrams / Liter (ppm)
ppm : parts per million
MPN : Most Probable Number
CFU : Colony Forming Unit

Laboratory Contacts
Drinking Water Unit Mgr: Julia Pieper
Systems Mgmt. Unit Mgr: George Kriszlian

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DRINKING WATER LABORATORY**

USEPA Region V Drinking Water Cert. No. MI00003



P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-8184
FAX: (517) 335-8562

Sample Number
LF71169

Official Laboratory Report

Report To: MIKE GLASGOW
4500 N DORT HWY
FLINT MI 48505

System Name/Owner: CITY OF FLINT
Collection Address: 3142 MCCLURE, FLINT
Collected By: BOB FARRAR
Township/Well#/Section: //
County: Genesee
Sample Point: KITCHEN
Water System: Treated Public Distribution System

WSSN/Pool ID: 2310
Source: Single Family Dwelling
Site Code:
Collector: Private Citizen
Date Collected: 06/26/2015 06:20
Date Received: 07/07/2015 11:34
Purpose: Routine Monitoring

TESTING INFORMATION			REGULATORY INFORMATION			
Analyte Name	Result (mg/L)	Date Tested	RL (mg/L)	MCL/AL (mg/L)	Method	CAS #
Copper	Not detected	07/08/2015	0.05	1.3	EPA 200.8	7440-50-8
Lead	0.003	07/08/2015	0.001	0.015	EPA 200.8	7439-92-1

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Genesee County Health Dept.
630 South Saginaw
Flint, MI 48502-1540
810 257-3603

CAS# : Chemical Abstract Service Registry Number
MCL : Maximum Contaminant Level
AL : Action Level
RL : Reporting Limit

mg/L : milligrams / Liter (ppm)
ppm : parts per million
MPN : Most Probable Number
CFU : Colony Forming Unit

Laboratory Contacts
Drinking Water Unit Mgr: Julia Pieper
Systems Mgmt. Unit Mgr: George Krizstian

**MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
DRINKING WATER LABORATORY**



USEPA Region V Drinking Water Cert. No. MI00003

P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-8184
FAX: (517) 335-8562

Sample Number
LF71170

Official Laboratory Report

Report To: MIKE GLASGOW
4500 N DORT HWY
FLINT MI 48505

System Name/Owner: CITY OF FLINT
Collection Address: 2114 FLUSHING RD, FLINT
Collected By: DAVID PAVLOVICH
Township/Well#/Section: //
County: Genesee
Sample Point: KITCHEN
Water System: Treated Public Distribution System

WSSN/Pool ID: 2310
Source: Single Family Dwelling
Site Code:
Collector: Private Citizen
Date Collected: 06/29/2015 08:00
Date Received: 07/07/2015 11:34
Purpose: Routine Monitoring

TESTING INFORMATION			REGULATORY INFORMATION			
Analyte Name	Result (mg/L)	Date Tested	RL (mg/L)	MCL/AL (mg/L)	Method	CAS #
Copper	0.05	07/08/2015	0.05	1.3	EPA 200.8	7440-50-8
Lead	0.005	07/08/2015	0.001	0.015	EPA 200.8	7439-92-1

The analyses performed by the MDEQ Drinking Water Laboratory were conducted using methods approved by the U.S. Environmental Protection Agency in accordance with the Safe Drinking Water Act, 40 CFR parts 141-143, and other regulatory agencies as appropriate.

Your local health department has detailed information about the quality of drinking water in your area. If you have concerns about the health risks related to the test results of your sample, please contact the Environmental Health Section through the address and telephone number listed below:

Genesee County Health Dept.
630 South Saginaw
Flint, MI 48502-1540
810 257-3603

CAS#: Chemical Abstract Service Registry Number
MCL: Maximum Contaminant Level
AL: Action Level
RL: Reporting Limit

mg/L: milligrams / Liter (ppm)
ppm: parts per million
MPN: Most Probable Number
CFU: Colony Forming Unit

Laboratory Contacts
Drinking Water Unit Mgr: Julia Pieper
Systems Mgmt. Unit Mgr: George Krisztian

**MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
DRINKING WATER LABORATORY**

USEPA Region V Drinking Water Cert. No. MI00003

P.O. Box 30270

Lansing, MI 48909

TEL: (517) 335-8184

FAX: (517) 335-8562

Sample Number

LF72033

Official Laboratory Report

Report To: **MIKE GLASGOW**
4500 N DORT HWY
FLINT MI 48505

System Name/Owner: **CITY OF FLINT**
Collection Address: **709 FROST ST, FLINT**
Collected By: **MAURCICA GUYNN**
Township/Well#/Section: **//**
County: **Genesee**
Sample Point: **BATHROOM**
Water System: **Treated Public Distribution System**

WSSN/Pool ID: **2310**
Source: **Single Family Dwelling**
Site Code:
Collector: **Private Citizen**
Date Collected: **06/30/2015 08:15**
Date Received: **07/10/2015 10:36**
Purpose: **Routine Monitoring**

TESTING INFORMATION			REGULATORY INFORMATION			
Analyte Name	Result (mg/L)	Date Tested	RL (mg/L)	MCL/AL (mg/L)	Method	CAS #
Copper	Not detected	07/13/2015	0.05	1.3	EPA 200.8	7440-50-8
Lead	0.002	07/13/2015	0.001	0.015	EPA 200.8	7439-92-1

The analyses performed by the MDEQ Drinking Water Laboratory were conducted using methods approved by the U.S. Environmental Protection Agency in accordance with the Safe Drinking Water Act, 40 CFR parts 141-143, and other regulatory agencies as appropriate.

Your local health department has detailed information about the quality of drinking water in your area. If you have concerns about the health risks related to the test results of your sample, please contact the Environmental Health Section through the address and telephone number listed below:

Genesee County Health Dept.
630 South Saginaw
Flint, MI 48502-1540
810 257-3603

CAS# : Chemical Abstract Service Registry Number
MCL : Maximum Contaminant Level
AL : Action Level
RL : Reporting Limit

mg/L : milligrams / Liter (ppm)
ppm : parts per million
MPN : Most Probable Number
CFU : Colony Forming Unit

Laboratory Contacts
Drinking Water Unit Mgr: Julia Pieper
Systems Mgmt. Unit Mgr: George Krisztian



Michigan Department of Environmental Quality

***Replicate Laboratory Report for
Lansing Drinking Water Laboratory***

Owner/Location Information:CITY OF FLINT
341 ROBBIE LN
FLINT MI 48505Sample Number: LLF67426

Sample/Collection Information:WSSN:
County: Genesee
Township:
Section:
Well #:
Collection Date: 5/31/2015 6:00:00 AM
Arrival Date: 6/11/2015 10:51:10 AMSite Code:
Water Source: Single Family Dwelling
Sample Reason: Routine Monitoring
Sample Point: Treated Public Distribution System
Point Description: KITCHEN
Collector: Private Citizen
Collected By: FLORISSA STEBBINS

<u>CasNo</u>	<u>Analyte</u>	<u>Result</u>	<u>Detect</u>	<u>Units</u>	<u>Method</u>
7440-50-8	COPPER (RECOVERABLE)	0.05	0.05	mg/L	EPA 200.8
7439-92-1	LEAD (TOTAL)	0.003	0.001	mg/L	EPA 200.8

Laboratory Comments:

By authority of PA 368 of 1978 as amended.

Print Date: Tue Aug 4 14:23:55 EDT
2015



Michigan Department of Environmental Quality

***Replicate Laboratory Report for
Lansing Drinking Water Laboratory***

Owner/Location Information:

CITY OF FLINT
215 BROWNING AVE
FLINT MI 48607

Sample Number: LLF56226

Sample/Collection Information:

WSSN: 02310
County: Genesee
Township:
Section:
Well #:
Collection Date: 3/2/2015 6:30:00 AM
Arrival Date: 3/6/2015 11:33:07 AM

Site Code:
Water Source: Single Family Dwelling
Sample Reason: Routine Monitoring
Sample Point: Treated Public Distribution System
Point Description: KITCHEN
Collector: Private Citizen
Collected By: KEVIN & JENNIFER STARNES

<u>CasNo</u>	<u>Analyte</u>	<u>Result</u>	<u>Detect</u>	<u>Units</u>	<u>Method</u>
7440-50-8	COPPER (RECOVERABLE)	0.16	0.05	mg/L	EPA 200.8
7439-92-1	LEAD (TOTAL)	ND	0.001	mg/L	EPA 200.8

Laboratory Comments:

By authority of PA 368 of 1978 as amended.

Print Date: Tue Aug 4 14:17:25 EDT
2015



Michigan Department of Environmental Quality

***Replicate Laboratory Report for
Lansing Drinking Water Laboratory***

Owner/Location Information:

CITY OF FLINT
201 BROWNING AVE
FLINT MI 48607

Sample Number: LLF56228

Sample/Collection Information:

WSSN: 02310
County: Genesee
Township:
Section:
Well #:
Collection Date: 3/5/2015 9:30:00 AM
Arrival Date: 3/6/2015 11:33:08 AM

Site Code:
Water Source: Single Family Dwelling
Sample Reason: Routine Monitoring
Sample Point: Treated Public Distribution System
Point Description: KITCHEN
Collector: Private Citizen
Collected By: FLOYD BELL

<u>CasNo</u>	<u>Analyte</u>	<u>Result</u>	<u>Detect</u>	<u>Units</u>	<u>Method</u>
7440-50-8	COPPER (RECOVERABLE)	ND	0.05	mg/L	EPA 200.8
7439-92-1	LEAD (TOTAL)	ND	0.001	mg/L	EPA 200.8

Laboratory Comments:

By authority of PA 368 of 1978 as amended.

Print Date: Tue Aug 4 14:17:49 EDT
2015