

**Feuerstein, Heather (DEQ)**

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**From:** Wurfel, Brad (DEQ)  
**Sent:** Monday, September 28, 2015 3:31 PM  
**To:** Feuerstein, Heather (DEQ)  
**Subject:** FW: Call from ACLU reporter about Flint

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**From:** Tommasulo, Karen (DEQ)  
**Sent:** Tuesday, July 07, 2015 10:29 AM  
**To:** Wurfel, Brad (DEQ)  
**Subject:** Call from ACLU reporter about Flint

I got a weird call from a "reporter" with the ACLU asking about Flint drinking water. His name is Curt Guyette, and I'm 98 percent sure it's the same guy who used to work at the Metro Times.

He said he heard from someone at EPA that we use a "flawed methodology" to collect our water samples. We apparently tell people to flush the water from their pipes, let it sit overnight, and then take the sample in the morning. He claims this doesn't measure what's in the main pipes, only in the pipes leading directly to their house. Consequently, he claims, we vastly underestimate lead. Apparently the EPA and Virginia Tech sampled a house using a different methodology and found 13,000 ppb lead.

Additionally, he claimed Flint is not adding corrosion control to their water, and said a city of their size should be doing so by law. But apparently we told Flint they didn't have to.

I didn't offer any comment, just took the message from him. Do you want to talk to him, or does this one need to go to Liane's shop? He's hoping to get ahold of someone today.

586-925-0493

Karen Tommasulo  
Public Information Officer  
Michigan Department of Environmental Quality  
517-284-6716 | 517-599-5733  
[tommasulok@michigan.gov](mailto:tommasulok@michigan.gov)

**Feuerstein, Heather (DEQ)**

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**From:** Wurfel, Brad (DEQ)  
**Sent:** Monday, September 28, 2015 3:31 PM  
**To:** Feuerstein, Heather (DEQ)  
**Subject:** FW: Flint water

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**From:** Tommasulo, Karen (DEQ)  
**Sent:** Wednesday, July 08, 2015 1:47 PM  
**To:** Wurfel, Brad (DEQ)  
**Subject:** FW: Flint water

ACLU guy is back today.

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**From:** Curt Guyette [<mailto:cguyette@aclumich.org>]  
**Sent:** Wednesday, July 08, 2015 1:20 PM  
**To:** Tommasulo, Karen (DEQ)  
**Subject:** Flint water

Hello,

I'm following up on my phone call and email from yesterday about water testing and corrosion control questions regarding Flint.

I'm in my office this afternoon and really need to get a response this afternoon, if that is at all within your power to make happen.

My office number is 313-578-6834.

Thanks for any help you can provide.

Curt Guyette

**Feuerstein, Heather (DEQ)**

**From:** Wurfel, Brad (DEQ)  
**Sent:** Monday, September 28, 2015 3:38 PM  
**To:** Feuerstein, Heather (DEQ)  
**Subject:** FW: Need upate on lead / copper tests for Flint  
**Attachments:** DWSD-CorrosionControlStudy.pdf; Flint lead history.pdf; DWSD-Flint-1993-Lead-Letter.pdf

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**From:** Busch, Stephen (DEQ)  
**Sent:** Friday, July 24, 2015 3:46 PM  
**To:** Wurfel, Brad (DEQ)  
**Cc:** Shekter Smith, Liane (DEQ); Wyant, Dan (DEQ); Pallone, Maggie (DEQ); Prysby, Mike (DEQ); Benzle, Richard (DEQ)  
**Subject:** RE: Need upate on lead / copper tests for Flint

Brad,

As we discussed, the City has completed the last round of monitoring (Jan 1 – June 30, 2015). The last samples came in about a week ago. We have made the compliance determination that the 90<sup>th</sup> percentile level is 11 parts per billion, which is below the Action Level Standard of 15 parts per billion (there is no Lead maximum contaminant level standard). The federal rule requires measuring lead levels in water from household plumbing materials to determine the corrosivity of the City's water in order to limit exposure.

I have provided a summary of Flint's lead compliance monitoring from the last 20+ years since this regulation started in 1991. The City of Flint itself has never had a 90<sup>th</sup> percentile level exceed the 15 part per billion action level. Sampling requirements look at the worst case plumbing materials. Samples must be collected in accordance with the regulatory requirements and criteria in order to be used for compliance determinations.

Because the City of Flint serves a population of over 50,000 they are required to have Fully Optimized Corrosion Control. While it is possible to meet the fully optimized requirement without additional treatment, based on their two rounds of sampling since switching to the Flint River, we have determined they did not meet the eligibility for this per the regulation. They now have to complete a study (within 18 months) and are then allowed a period of additional time (2 additional years) to install the selected treatment for Fully Optimized Corrosion Control in accordance with the regulatory requirements. This is what DWSD was required to do back in 1993 – 1997 (see attached letter and study). We are planning to suggest the City directly submit a treatment process to shorten the timeline to achieve full optimization. This letter is currently being drafted but won't be ready to mail out for another week.

Liane and I had a conference call with EPA region V in Chicago on Tuesday to go over all of this and they are in support of these next steps with the City.

The matter will be potentially further complicated when the City switches over to water from the Karegnondi Water Authority next year to re-evaluate the continuing requirement to fully optimize corrosion control.

The DEQ recognizes that there is has been no level of lead exposure determined to be safe, but again the regulation was developed to optimize water corrosivity to limit exposure and the City is following the regulatory requirements.

Lead is not coming from the Flint River or the City's Water Treatment Plant or the public distribution system. It is from lead service lines into homes and from plumbing materials and fixtures within the private property of the household.

As watermain is replaced within the City lead services associated with that section of watermain would be replaced in order to reconnect to City water. This would also place burden on the homeowner to pay for having the service line re-plumbed. However, since 2000 only 16 miles of the City's 500 miles of watermain have been replaced as they did not have the financial means to do so.

Let us know if there are questions or you need any additional information.

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](mailto:buschs@michigan.gov)

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**From:** Wurfel, Brad (DEQ)  
**Sent:** Friday, July 24, 2015 12:09 PM  
**To:** Busch, Stephen (DEQ); Prysby, Mike (DEQ)  
**Cc:** Shekter Smith, Liane (DEQ); Wyant, Dan (DEQ); Pallone, Maggie (DEQ)  
**Subject:** Need update on lead / copper tests for Flint

Guys, the Flint Ministers met with the Governor's office again last week. They also brought along some folks from the community – a college prof and a GM engineer – who imparted that 80 water tests in Flint have shown high lead levels.

Could use an update on the January / June testing results, as well as recap of the December testing numbers, and any overview you can offer to edify this conversation.

Call me or email today if possible. Thanks!

b

Brad Wurfel  
Communications Director  
Michigan Department of Environmental Quality  
517-284-6713

PPI cell



CITY OF DETROIT  
WATER AND SEWERAGE DEPARTMENT  
WATER BOARD BUILDING

*N. H. Flint #2310*  
735 RANDOLPH STREET  
DETROIT, MICHIGAN 48226-2830  
PHONE 313 • 224 • 4800/224 • 4801  
FAX 313 • 224 • 6067

June 10, 1994

To: DWSD Wholesale Customers

RE: EXECUTIVE SUMMARY OF DETROIT'S CORROSION CONTROL STUDY

Enclosed is a copy of the Executive Summary prepared by our consultant, Tucker, Young, Jackson & Hull, detailing work to date on the Corrosion Control Study performed for Detroit and Detroit's wholesale customers.

The EPA required large utilities to test water samples in highest risk homes for lead and copper content in 1992 to determine if the action levels of 15 micrograms per liter and 1.3 milligrams per liter respectively were exceeded. Detroit complied with this requirement and determined that the action level for lead was exceeded in many communities. Therefore, DWSD conducted and continues to conduct a public education program designed to inform consumers how to reduce their exposure to lead.

The EPA further required large water suppliers to determine if their lead could be less corrosive and, if so, the utility was mandated by the Lead and Copper Rule to determine ways the water could be made less corrosive and report their recommendations to the primary agency. For DWSD, the primary agency is the Michigan Department of Public Health (MDPH).

After several years of study, DWSD is forwarding the complete study findings to the MDPH for their consideration. It was concluded that DWSD could reduce the corrosivity of the water in the most cost effective and efficient manner by the addition of ortho-phosphate, specifically in the form of phosphoric acid. The Executive Summary of these findings is being forwarded to you for your information. The MDPH has until the end of December 1994 to consider DWSD's recommendation. In the interim, DWSD plans on conducting a demonstration test of the corrosion control treatment in our distribution system to further assist the MDPH and to further safeguard public health.

Very truly yours,

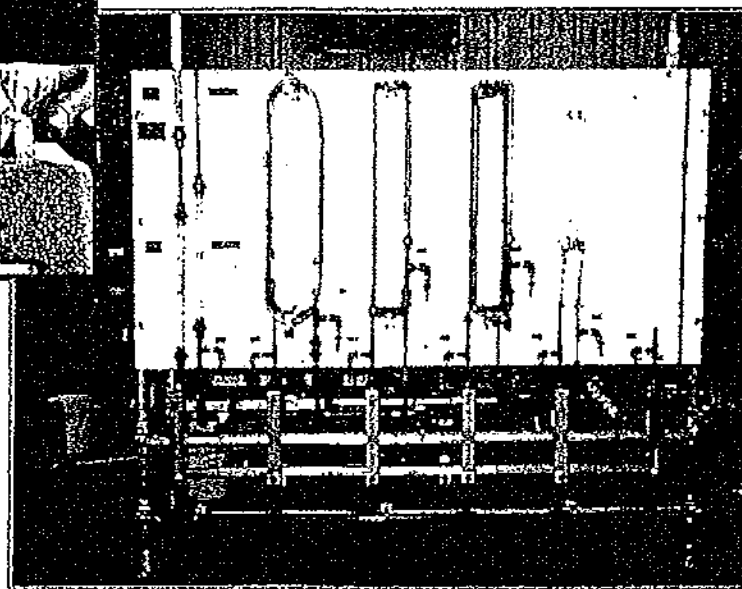
*Judith Huddleston for*  
Irving M. Schuraytz, P.E.  
Assistant Director, Water Supply Operations  
*Kathleen Leavey*  
Kathleen Leavey  
Deputy Director

KL/IMS/JH/cs

DENNIS W. ARCHER, MAYOR

## Executive Summary

# Lead and Copper Corrosion Control Optimization Study



prepared by

Tucker, Young, Jackson, Till, Inc., in association with  
CH2M HILL, INC., and Economic and Engineering Services, Inc.

May 1994



## Detroit Water and Sewerage Department

## Introduction

As a result of the Safe Drinking Water Act (SDWA) Amendments of 1986, the U.S. Environmental Protection Agency (EPA) published final drinking water regulations for lead and copper in the June 7, 1991, *Federal Register*. Those regulations, known as the Lead and Copper Rule (LCR), require:

- Tap water monitoring, which is a new approach for water utilities
- Treatment optimization for lead and copper corrosion control
- Public education and lead service line removal if utilities exceed preset lead or copper levels

Large utilities, serving populations greater than 50,000, are required to conduct corrosion control studies to demonstrate that they are either already providing optimal treatment or to determine optimal treatment for their system.

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### **DWSD made necessary public notices and embarked on studies to develop optimal treatment solutions.**

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In response to the regulations, the Detroit Water and Sewerage Department (DWSD) conducted two rounds of monitoring at home water taps for lead and copper and throughout the distribution systems for other water quality parameters. Monitoring was a cooperative effort between the DWSD, wholesale water customers, and the Michigan Department of Public Health (MDPH). Copper levels were well below EPA limits. Lead levels, however, exceeded EPA action levels

(ALs) and DWSD made necessary public notices and embarked on studies to develop optimal treatment solutions.

Lead exposure sources for humans include air, food, dust, paint, and drinking water. Elevated lead levels in blood have been associated with adverse health effects in humans. Federal health authorities have many programs to reduce lead exposure including low-lead gasoline and reduced lead content in paint. Although drinking water may not be the major source of lead, reducing lead levels in drinking water will have a positive health benefit. An additional benefit of corrosion control is prolonged life for water distribution pipes and home plumbing. This results in lower costs for water utilities and their customers.

In March 1992, the DWSD contracted with Tucker, Young, Jackson, Tull, Inc. (TYJT), in association with CH2M HILL, INC., and Economic and Engineering Services, Inc. (EES), to perform a lead and copper corrosion control study. The purpose of the study was to determine the optimal approach for reducing lead and copper concentrations in DWSD drinking water without adversely affecting other water quality characteristics. Major tasks in this study were to:

- Evaluate existing water quality data, existing distribution system pipe materials and the results of lead and copper sampling
- Identify and analyze feasible and practical treatment methods to reduce lead and copper corrosion (desktop analysis)
- Design and construct a pipe-loop testing apparatus to evaluate treatment alternatives identified in the desktop analysis

- Operate the pipe loops for 1 year to evaluate selected corrosion control treatments on different pipe materials
- Evaluate the effectiveness and feasibility of the tested treatment alternatives in reducing lead and copper concentrations
- Recommend an optimum lead corrosion control treatment
- Develop an implementation plan for full-scale corrosion control facilities

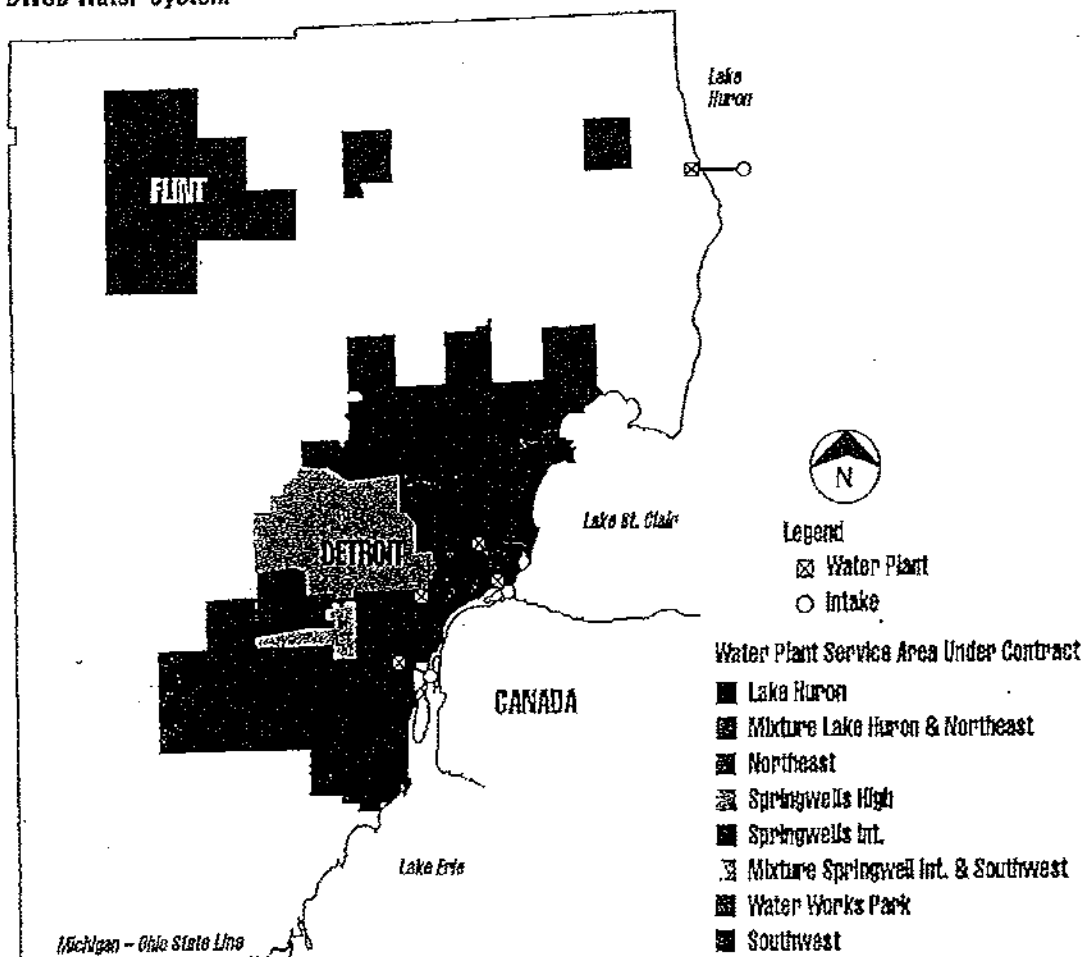
This report presents the results of the DWSD Lead and Copper Corrosion Control Optimization Study.

## Existing Conditions

The DWSD obtains water from three intakes. Two of these, the Belle Isle and the Fighting Island Intakes, take water from the Detroit River. The third intake is on Lake Huron. Water is treated at five water treatment plants (WTPs) including the Water Works Park, Southwest, Springwells, Northeast, and Lake Huron WTPs. The water system is shown in Figure ES-1. Treated water from the 5 WTPs is distributed to the City of Detroit and 119 wholesale water customer systems. The DWSD water system serves about 4 million people.

Water leaving the WTPs is of good quality and considered moderately

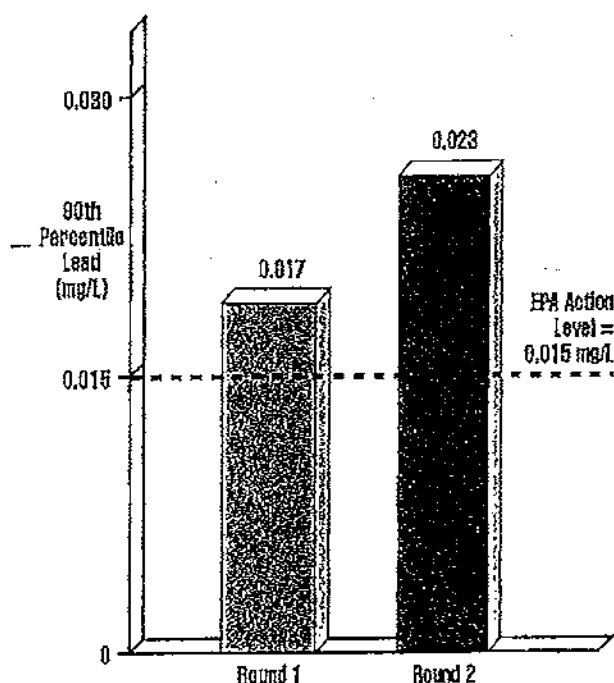
Figure ES-1  
DWSD Water System



corrosive. For example, pH from the five WTPs averages 7.4, alkalinity averages 76 mg/L ( $\text{CaCO}_3$ ), and hardness averages 100 mg/L ( $\text{CaCO}_3$ ). Nevertheless, some increase in lead and copper is resulting from the corrosive action of the water, primarily on service pipe and household plumbing. The main sources of lead are 50:50 lead/tin solder, brass containing lead used in faucets, and lead service lines and plumbing.

The regulation lead AL is 0.015 mg/L at the 90th percentile in home water taps. During the LCR Compliance Monitoring conducted in 1992, DWSD's 90th percentile lead concentration was 0.017 mg/L in the first round and 0.023 mg/L in the second round of sampling (Figure ES-2). Looking at the data in a slightly different manner, 35 to 37 percent of the 119 purveyor water systems exceeded the AL for lead.

**Figure ES-2**  
**LCR Compliance Monitoring Results for Lead**



For copper, the 90th percentile concentrations were 0.34 and 0.19 mg/L for two rounds of sampling—well below the copper AL of 1.3 mg/L (Figure ES-3). Lead uptake, therefore, is the major concern within the DWSD water system.

Determining the optimal lead control treatment is essential; it is the objective of conducting this corrosion control study. Further, there are an estimated 200,000 lead service lines (LSLs) in DWSD's direct service area and possibly more in areas served by wholesale customers. After corrosion treatment is optimized, the possibility exists that lead ALs may still be over 0.015 mg/L at the 90th percentile. Should this occur, the DWSD would need to embark on a removal program for LSLs, which could cost between \$300 and \$800 million.

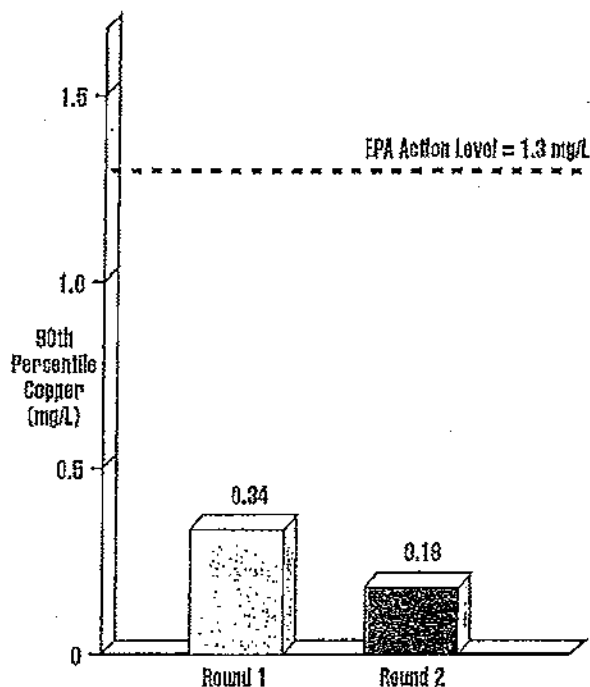
## Desktop Analysis

To reduce the number of chemicals for long-term testing, a screening analysis was performed using desktop techniques recommended by U.S. EPA. Lead corrosion control treatment methods examined for their applicability to DWSD are as follows:

- Polyphosphates
- Orthophosphates
- Zinc orthophosphate
- Polyphosphate/orthophosphate blends
- Silicates
- pH adjustment
- Alkalinity adjustment
- Calcium adjustment

The main criteria for selecting a lead corrosion control method is performance for lead uptake reduction. Lead corrosion control methods were also evaluated

Figure ES-3  
LCR Compliance Monitoring Results for Copper



based on effects on other drinking water regulations, industrial water users, wastewater treatment, water quality, water treatment operations, consecutive water systems, and multiple sources of supply and treatment.

Based on this evaluation, the following chemical treatments were eliminated from consideration for pipe-loop testing.

- **Polyphosphates.** These products are primarily used to sequester iron, calcium, and manganese and may actually do more to promote lead corrosion than to prevent it.
- **Polyphosphate/Orthophosphate Blends.** These products have not been proven to be more effective than orthophosphates alone for lead reduction, and their proprietary chemical composition makes selection of the optimum product difficult.

- **Silicates.** Sodium silicate inhibitors require a high dosage for lead control and, based on a survey of major industries, would have significant adverse effects on industrial water users.
- **Alkalinity Adjustment.** This technique would have marginal performance for lead reduction based on DWSD water quality and would be impractical for a system the size of DWSD.
- **Calcium Adjustment to Deposit a Calcium Carbonate Layer.** This technique is not a proven method for lead reduction, and would be difficult to produce a uniform layer throughout a distribution system the size of DWSD. Calcium carbonate deposition, however, can occur when pH is raised for lead reduction. This situation is addressed under the pH adjustment alternative.

Lead corrosion control treatment methods applicable for DWSD water are as follows:

- **Orthophosphates.** These products have been shown to be an effective means of lead reduction for water similar to that of the DWSD.
- **Zinc Orthophosphate.** These products are also a proven method of lead reduction, although there is concern about zinc in industrial water and wastewater.
- **pH adjustment.** This technique is also a proven method of reducing lead solubility, although higher pHs affect some industrial users and can increase calcium carbonate deposition.

A survey of 16 Great Lakes area water utilities using water of similar quality to that of DWSD demonstrated the effectiveness of orthophosphate, zinc orthophosphate, and pH adjustment in reducing lead concentrations at the consumers' taps. Those treatment methods, therefore, were retained for further testing in the pipe-loop apparatus.

### Pipe-Loop Testing

Based on the desktop analysis, it was concluded that the following treatments would be tested in the pipe loops:

- Adjusting pH to 8.1 using sodium hydroxide
- Adjusting pH to 8.7 using sodium hydroxide
- Adding zinc orthophosphate at doses of 0.4 mg/L for zinc and phosphorous (as P)
- Adding orthophosphate using phosphoric acid at a dose of 0.4 mg/L as P

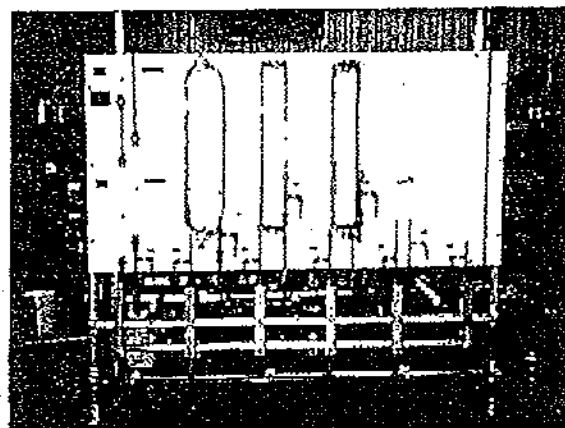
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**Pipe-loop testing produces information on the corrosion control treatment most likely to effectively reduce lead levels.**

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It is important to understand that pipe-loop testing is conducted to provide information on the relative effectiveness of corrosion control treatments. The results cannot be used to predict actual lead levels that may occur at customers' taps in the water system. Pipe-loop testing, however, produces information on the corrosion control treatment most likely to effectively reduce lead levels and is an approved optimization technique.

**Figure ES-4**  
**Typical Testing Apparatus**



A pilot-scale testing apparatus was designed and constructed to test each of the treatment techniques on different pipe materials. Five pipe-loop racks were constructed: one for each of the four methods and another for control (no treatment provided). Each pipe-loop rack included one new lead pipe loop, two identical copper pipe loops with lead soldered joints, one brass tester, and one section of old lead pipe. Three weight loss testers were also included for measuring corrosion rates of steel, galvanized steel, and copper. A typical testing apparatus is shown in Figure ES-4.

The pipe-loop facility was installed in the lower level of the Water Works Park High Service Pump Station and operated from January to November, 1993. After an initial period of passivation, water samples were collected on a weekly basis and analyzed for lead, copper, and zinc. The 1-liter water samples were taken after the water had been in contact with the pipe loop materials for 8 hours. This was done to represent the first-draw sampling required by the LCR. Additional sampling included daily monitoring for pH, chemical doses, and temperature. Disinfection

by-products (DBPs) and pipe insert weight loss were done quarterly. Flavor profile analyses to assess any changes in tastes or odors were run monthly.

Results of pilot testing indicated:

- The inhibitor treatments, zinc orthophosphate, and phosphoric acid are statistically better than the untreated control for both old and new lead piping (Figure ES-5).
- For lead solder and copper piping, the median lead levels were lowest in the water with inhibitors (zinc

orthophosphate and phosphoric acid), but only the phosphoric acid results were statistically better than the other loops (Figure ES-6).

- For brass, the results indicated that the treatments were no better than the control; however, lead levels were near the detection limit in the brass testers (Figure ES-6).
- Zinc orthophosphate and phosphoric acid were also found to be the most effective treatments in reducing copper (Figure ES-7).

Figure ES-5  
Relative Lead Levels from Lead Pipe

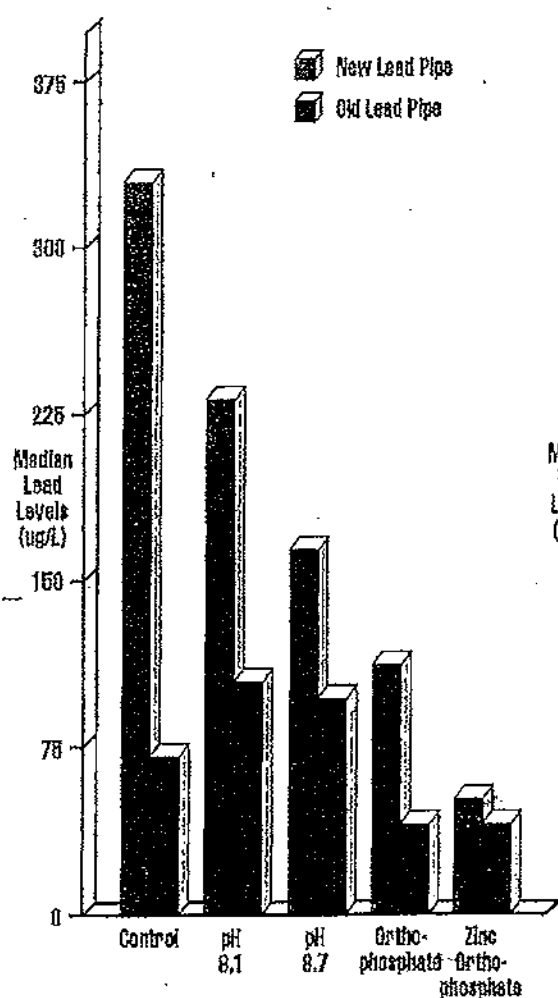


Figure ES-6  
Relative Lead Levels from Soldered Copper and Brass

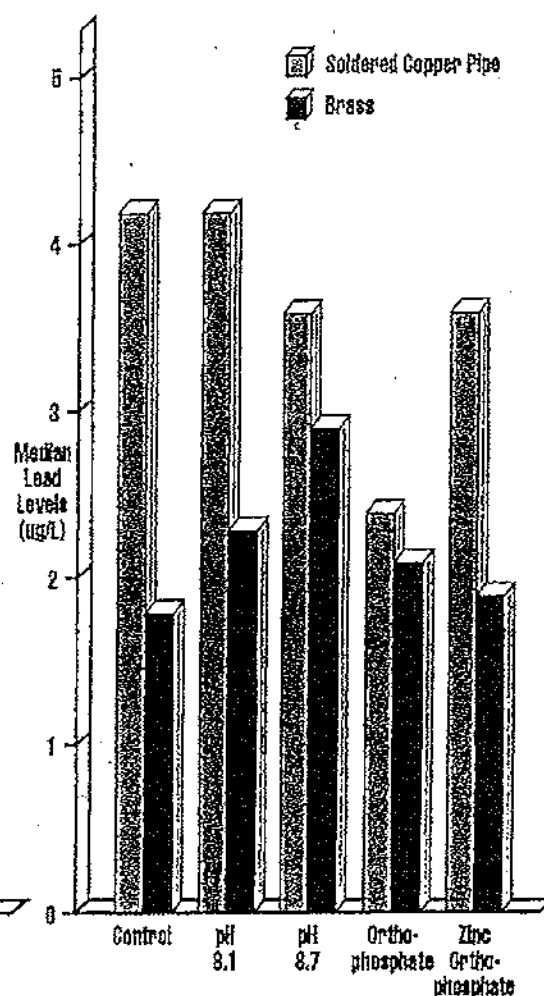
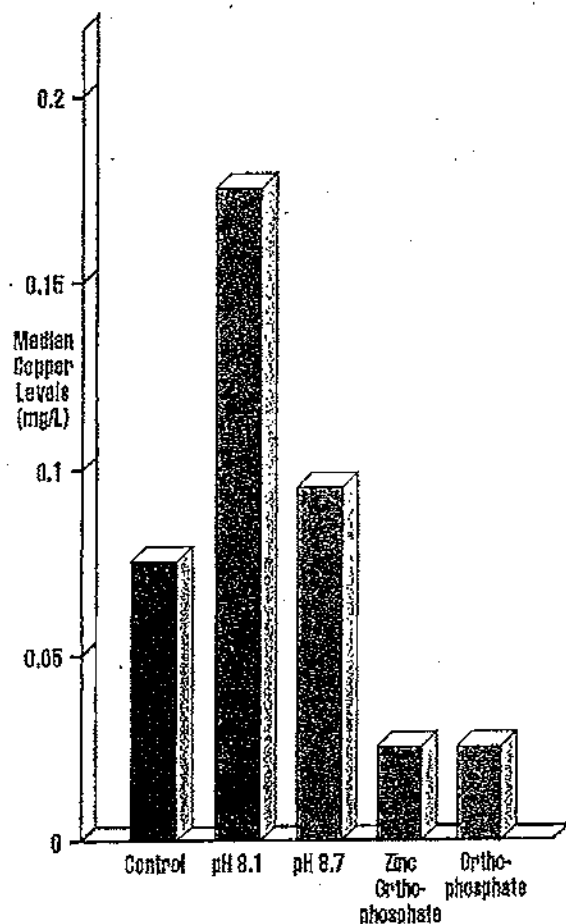


Figure ES-7  
Relative Copper Levels from Copper Pipe



- DPBs were increased for the pH adjustment treatments as expected. The DPBs formed as a result of this increase, however, did not exceed EPA-proposed limits. The orthophosphate and zinc orthophosphate did not increase DPBs.
- None of the corrosion control treatments had an adverse effect on the taste and odor of the water produced.

## Evaluating Corrosion Control Treatment

The four corrosion control treatments tested in the pipe loops were evaluated based on the following criteria:

- Performance for lead uptake reduction
- Feasibility of implementation within regulatory and functional constraints
- Reliability in terms of operational consistency and continuous corrosion control protection
- Cost

Pipe-loop data analyses indicated orthophosphate and zinc orthophosphate are most likely to yield the best results for lead reduction. pH adjustment was not as effective for lead control. Orthophosphate and zinc orthophosphate were effective at reducing copper levels.

A feasibility analysis indicated that industrial water users would be affected adversely by zinc or a higher water pH. Wastewater operations would be adversely affected by zinc and orthophosphates loadings. There were no major effects of corrosion control treatment on drinking water regulations. pH adjustment could, however, decrease disinfection effectiveness and increase DBP formation.

The reliability of zinc orthophosphate and sodium hydroxide chemicals is less than would be expected for orthophosphates. Zinc orthophosphate is a proprietary chemical with price and supply constraints. Sodium hydroxide availability and price depend on market conditions. Orthophosphate (phosphoric acid) is available as a generic chemical and is commonly used in the food and beverage

age industry; therefore, price and availability are more stable. From a WTP-operations standpoint, pH adjustment is less reliable because pH can change with raw water quality and treatment conditions.

The chemical cost of each treatment alternative is shown in Figure ES-8. Phosphoric acid addition is less than half the cost of pH adjustment to 8.1, the next lowest chemical cost. This represents an

average cost savings of about \$2,400 per day. Phosphoric acid could save the DWSD about \$10 million in present worth in the next 20 years compared to the next lowest cost alternative.

## Selecting Corrosion Control Treatment

The relative ranking of alternatives for the four criteria (performance, feasibility, reliability, cost) is summarized in Figure ES-9. Values of 1 through 4 were assigned for each treatment alternative in each criteria category (1 was best; 4 worst). Because performance for lead reduction was the main criteria, it was given a weight of 2. Each of the other criteria was given a weight of 1.

Orthophosphates were ranked highest overall. Zinc orthophosphate was second, mainly because of its adverse effects on industry, wastewater plant operations, and higher costs. pH adjustment was ranked lowest because it is less effective for lead reduction, less reliable, and demonstrates more adverse effects on industry and drinking water regulatory compliance.

### Orthophosphates were selected as the optimal treatment alternative for full-scale lead corrosion control.

Based on corrosion control theory, comparison with analogous water systems, and the extensive pilot plant studies, orthophosphates were selected as the optimal treatment alternative for full-scale lead corrosion control.

Figure ES-8  
Treatment Alternatives Costs

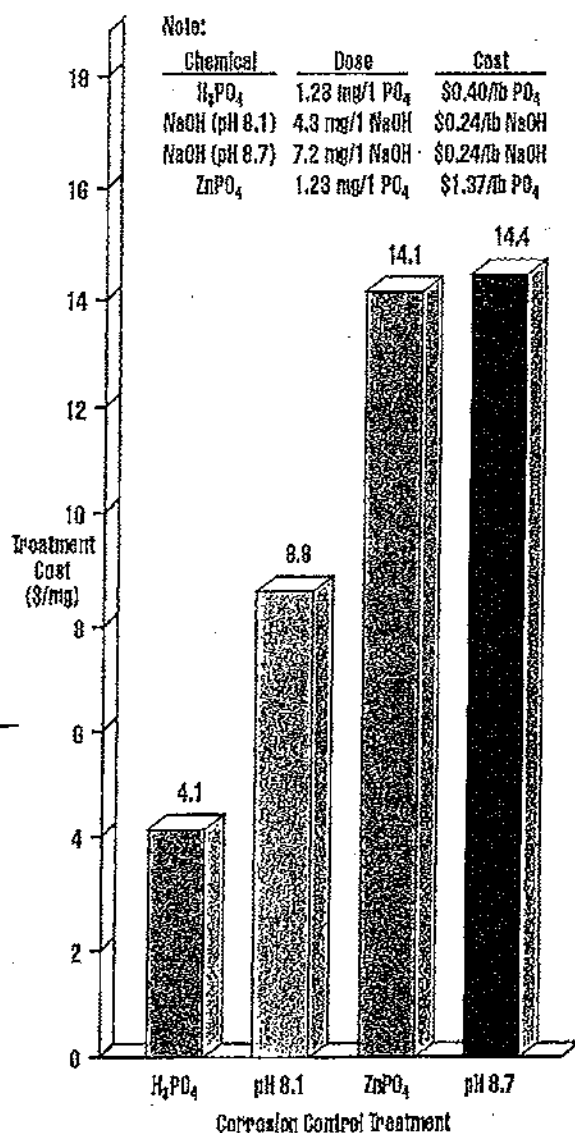


Figure ES-9  
Alternatives Ranking  
by Criteria

| Treatment           | Evaluation Criteria   |                       |                       |                | Weighted |
|---------------------|-----------------------|-----------------------|-----------------------|----------------|----------|
|                     | Performance<br>wt.= 2 | Feasibility<br>wt.= 1 | Reliability<br>wt.= 1 | Cost<br>wt.= 1 |          |
| Phosphoric Acid     | 2                     | 1                     | 1                     | 1              | 7        |
| Zinc Orthophosphate | 1                     | 4                     | 2                     | 3              | 11       |
| pH 8.1              | 4                     | 2                     | 3                     | 2              | 15       |
| pH 8.7              | 3                     | 3                     | 4                     | 4              | 17       |

Legend: 1 = Best; 4 = Worst

Phosphoric acid is the recommended form of adding orthophosphate. It is a generic chemical and can be bid competitively. It does not add sodium to the water and costs less than any other form of orthophosphate. In addition, the finished water pH is already in the optimal range for lead solubility reduction by phosphates, so pH adjustment is not required.

The recommended dose of phosphoric acid is 1.2 mg/L as P for initial passivation and a sustained dose of 0.4 mg/L as P for maintaining control of lead uptake. Values may be adjusted based on full-scale results.

### Full-Scale Implementation

The LCR requires optimal corrosion control treatment installation by January 1, 1997. To meet this deadline, the implementation schedule in Figure ES-10 is proposed. The first element of implementation is to conduct full-scale demonstration testing in the distribution system served

by one of the WTPs before installing chemical feed facilities in the other four plants. Operation of lead corrosion control facilities at all plants is planned for May 1996. This will provide additional time to optimize the system before lead monitoring is required in 1997.

The chemical equipment required for each WTP is summarized in Table ES-1. A schematic of a typical liquid chemical system is shown in Figure ES-11.

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**The cost of lead corrosion control chemicals is estimated to be about \$0.87 per year per household.**

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The estimated capital cost for corrosion control facilities at the five WTPs is \$3,740,000. The estimated cost of chemicals is \$868,000 per year. The cost of lead corrosion control chemicals is estimated to be about \$0.87 per year per household.

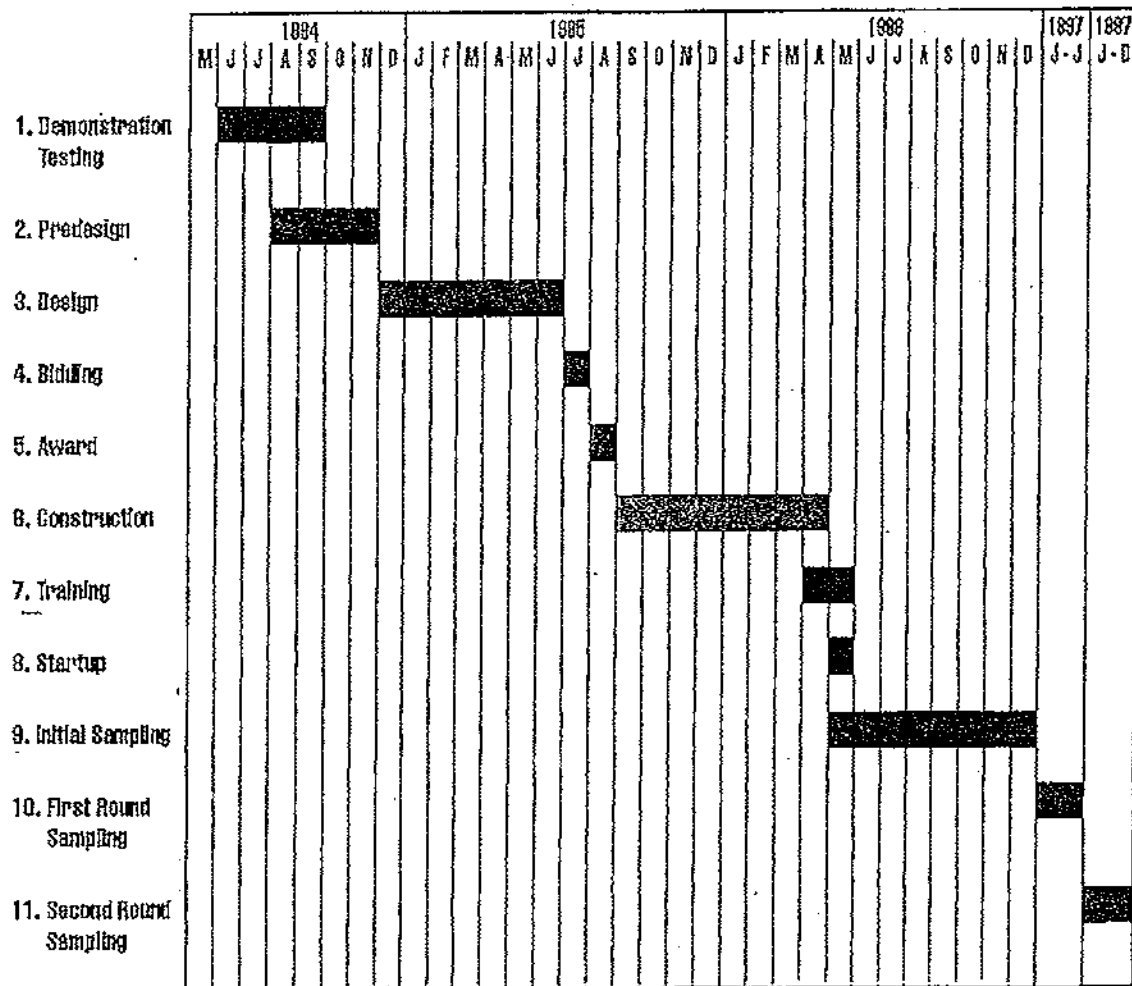
A monitoring program will be established before and after corrosion control treatment is implemented to determine performance for lead reduction and effects on other water quality parameters. If lead is reduced to below the EPA AL of 0.015 mg/L for two consecutive 6-month monitoring periods, other methods

of lead reduction, such as removing lead service lines, will not be required.

If the lead AL is still exceeded after optimization and stabilization, a program for lead service line removal should be developed in addition to an ongoing public education program.

**Operation of lead corrosion control facilities at all plants is planned for May 1996.**

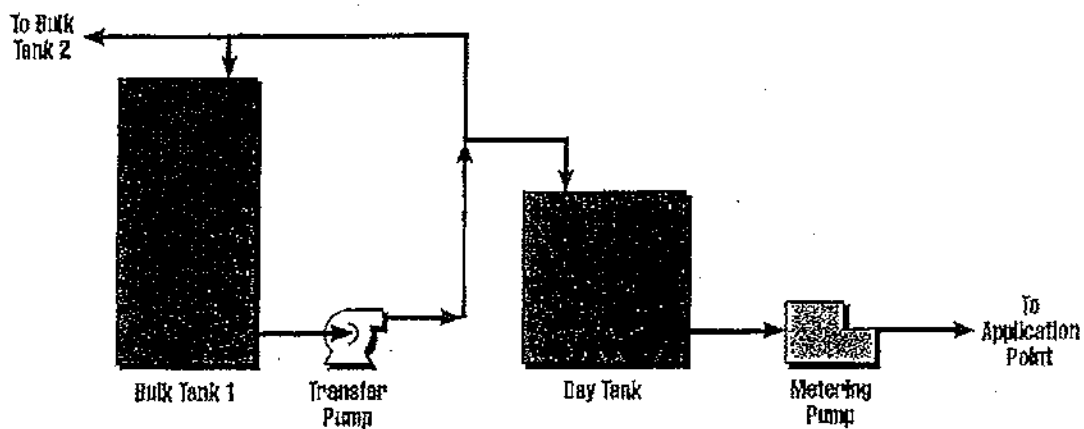
**Figure ES-10  
Implementation Schedule**



**Table ES-1**  
**Chemical Equipment Summary**

|                                      | Southwest<br>Water Plant | Water Works<br>Park Water<br>Plant | Northeast<br>Water Plant | Springville<br>Water Plant | Lake Huron<br>Water Plant |
|--------------------------------------|--------------------------|------------------------------------|--------------------------|----------------------------|---------------------------|
| Number of bulk tanks                 | 2                        | 2                                  | 2                        | 2                          | 2                         |
| Bulk tank capacity, each (gal)       | 4,000                    | 4,000                              | 4,000                    | 6,000                      | 4,000                     |
| Number of day tanks                  | 1                        | 1                                  | 1                        | 1                          | 1                         |
| Day tank capacity (gal)              | 200                      | 200                                | 200                      | 400                        | 200                       |
| Number of feeders                    | 3                        | 3                                  | 3                        | 3                          | 3                         |
| Feeder capacity, each (gpd)          | 1 @ 200<br>2 @ 650       | 1 @ 300<br>2 @ 650                 | 1 @ 250<br>2 @ 800       | 1 @ 600<br>2 @ 1,500       | 1 @ 350<br>2 @ 650        |
| Number of transfer pumps             | 2                        | 2                                  | 2                        | 2                          | 2                         |
| Transfer pump capacity<br>each (gpm) | 15                       | 15                                 | 15                       | 30                         | 15                        |

**Figure ES-11**  
**Liquid Chemical System Schematic**



| City of Flint Lead and Copper Rule Monitoring History |                                        |                                   |                     |                      |                       |  |  |  |              |
|-------------------------------------------------------|----------------------------------------|-----------------------------------|---------------------|----------------------|-----------------------|--|--|--|--------------|
| Monitoring Period                                     | 90th Percentile<br>(parts per billion) | Number of Samples<br>above 15 ppb | Samples<br>Required | Samples<br>Collected | Required<br>Frequency |  |  |  |              |
| Jan. - June 2015                                      | 1.1 ppb                                | 6                                 | 60                  | 68                   |                       |  |  |  | * Unofficial |
| July - Dec. 2014                                      | 6 ppb                                  | 2                                 | 100                 | 100                  | 6 months              |  |  |  |              |
| New Source and Treatment - Flint River and Flint WTP  |                                        |                                   |                     |                      |                       |  |  |  |              |
| June - Sept. 2011                                     | 0 ppb                                  | 0                                 | 23                  | 23                   | 3 years               |  |  |  |              |
| June - Sept. 2008                                     | 0 ppb                                  | 0                                 | 33                  | 33                   | 3 years               |  |  |  |              |
| June - Sept. 2005                                     | 1.4 ppb                                | 0                                 | 33                  | 33                   | 3 years               |  |  |  |              |
| June - Sept. 2002                                     | 4 ppb                                  | 1                                 | 33                  | 33                   | 3 years               |  |  |  |              |
| June - Sept. 2001                                     | 4.4 ppb                                | 0                                 | 33                  | 33                   | 1 year                |  |  |  |              |
| June - Sept. 2000                                     | 7 ppb                                  | 2                                 | 33                  | 33                   | 1 year                |  |  |  |              |
| Jan. - June 1999                                      | 5 ppb                                  | 0                                 | 33                  | 33                   | 1 year                |  |  |  |              |
| July - Dec. 1998                                      | 7.4 ppb                                | 1                                 | 33                  | 33                   | 6 months              |  |  |  |              |
| July - Dec. 1997                                      | 5 ppb                                  | 1                                 | 33                  | 33                   | 6 months              |  |  |  |              |
| Jan. - June 1997                                      | 4.5 ppb                                | 1                                 | 33                  | 33                   | 6 months              |  |  |  |              |
| DWSO Study and OCC Treatment                          |                                        |                                   |                     |                      |                       |  |  |  |              |
| July-Dec. 1992                                        | 14.4 ppb                               | 3                                 | 33                  | 33                   | 6 months              |  |  |  |              |
| Jan. - June 1992                                      | 15 ppb                                 | 4                                 | 33                  | 33                   | 6 months              |  |  |  |              |

## STATE OF MICHIGAN



JOHN ENGLER, GOVERNOR

## DEPARTMENT OF PUBLIC HEALTH

3423 N. LOGAN/MARTIN L. KING JR., BLVD.

P.O. BOX 30195, LANSING, MICHIGAN 48909

Vernice Davis Anthony, Director

March 15, 1993

City of Flint  
1101 South Saginaw Street  
Flint, Michigan 48502

WSSN: 2310

Attention: Mr. Charles Smith, Utilities Superintendent

Subject: Lead/Copper Monitoring

Gentlemen:

We have reviewed the results of the second round of the lead and copper monitoring completed for your water supply for the period of July 1, 1992, through December 31, 1992. The samples were collected and analyzed to comply with the U.S. Environmental Protection Agency's Lead and Copper Regulation. The action levels specified in the regulation require that the 90th percentile results from the distribution system samples for lead and copper not exceed 15 and 1300 ug/l, respectively.

Since the 90th percentile lead level for your water system is 14.4 ug/l, the lead action level of 15 ug/l has not been exceeded. Also, the 90th percentile copper level was significantly below the copper action level of 1300 ug/l. This means that your water system has met both action levels for the first two monitoring periods.

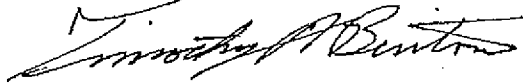
Although many of the Detroit Water and Sewerage Department (DWSD) customers have met the action levels, DWSD is required to conduct a study to determine whether their water treatment processes can be improved to further reduce corrosion. The study is to be completed by July 1, 1994, and any recommended treatment modifications must be in place by January 1, 1997.

City of Flint  
Page 2  
March 15, 1993

Further monitoring of your water system for lead and copper will not be required until the DWSD study is complete and any additional corrosion control treatment has begun. We will inform you when monitoring is again required. This may be as late as January 1997.

If you have any questions, please call me at (517) 335-8309.

Sincerely,



Timothy A. Benton, P.E.  
District Engineer  
Division of Water Supply  
Bureau of Environmental and  
Occupational Health

TAB:im

cc: John Weisenberger, Water Plant Supervisor  
cc: Genesee County Health Department

**Feuerstein, Heather (DEQ)**

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**From:** Wurfel, Brad (DEQ)  
**Sent:** Monday, September 28, 2015 3:36 PM  
**To:** Feuerstein, Heather (DEQ)  
**Subject:** FW: Need upate on lead / copper tests for Flint

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**From:** Muchmore, Dennis (GOV)  
**Sent:** Friday, July 24, 2015 6:16 PM  
**To:** Wurfel, Brad (DEQ); Saxton, Thomas (Treasury); Wyant, Dan (DEQ)  
**Cc:** Hollins, Harvey (GOV)  
**Subject:** RE: Need upate on lead / copper tests for Flint

Thanks.

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**From:** Wurfel, Brad (DEQ)  
**Sent:** Friday, July 24, 2015 4:18 PM  
**To:** Saxton, Thomas (Treasury); Muchmore, Dennis (GOV); Wyant, Dan (DEQ)  
**Subject:** FW: Need upate on lead / copper tests for Flint

Guys, here's an update and some clarification on the lead situation in Flint. Please limit this information to internal for now.

By the tenants of the federal statute, the city is in compliance for lead and copper. That aside, they have not optimized their water treatment (for the most part, this means adding phosphates to minimize the degree that the water Ph mobilizes lead and copper in people's home plumbing).

Compliance with the standard started with testing. A June-December run of tests (all in homes with lead in their premise plumbing) concluded in December. Another January – June round of sampling concluded last month. Everything checks out in terms of compliance, but now the next step is optimizing the water supply.

So, In about two weeks, DEQ will be sending a formal communication about the optimizing issue. The federal program has long timelines for action. A community water supplier gets 18 months to study the options, and two years thereafter to implement water system optimization measures.

My point: Conceivably, by the time we're halfway through the first timeline, the city will begin using a new water source with KWA ... and conceivably, the whole process starts all over again.

In terms of near-future issues, the bottom line is that residents of Flint do not need to worry about lead in their water supply, and DEQ's recent sampling does not indicate an eminent health threat from lead or copper. That said, anyone with lead pipes in their premise plumbing (this translates to tens of thousands of homes in our older urban centers, btw) should at least be aware that they have them, and to some limited degree that's going to impart minute parts per billion of lead in water no matter what. Its why nobody uses lead water pipes anymore.

The long version of this note is below. Let's connect next week. I'd like some thoughts about what more the state could be doing – most immediately, to convey the results of our testing and tell the story to the residents of Flint in an effort to quell some fears.

Thanks!

b

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**From:** Busch, Stephen (DEQ)  
**Sent:** Friday, July 24, 2015 3:46 PM  
**To:** Wurfel, Brad (DEQ)  
**Cc:** Shekter Smith, Liane (DEQ); Wyant, Dan (DEQ); Pallone, Maggie (DEQ); Prysby, Mike (DEQ); Benzle, Richard (DEQ)  
**Subject:** RE: Need update on lead / copper tests for Flint

Brad,

As we discussed, the City has completed the last round of monitoring (Jan 1 – June 30, 2015). The last samples came in about a week ago. We have made the compliance determination that the 90<sup>th</sup> percentile level is 11 parts per billion, which is below the Action Level Standard of 15 parts per billion (there is no Lead maximum contaminant level standard). The federal rule requires measuring lead levels in water from household plumbing materials to determine the corrosivity of the City's water in order to limit exposure.

I have provided a summary of Flint's lead compliance monitoring from the last 20+ years since this regulation started in 1991. The City of Flint itself has never had a 90<sup>th</sup> percentile level exceed the 15 part per billion action level. Sampling requirements look at the worst case plumbing materials. Samples must be collected in accordance with the regulatory requirements and criteria in order to be used for compliance determinations.

Because the City of Flint serves a population of over 50,000 they are required to have Fully Optimized Corrosion Control. While it is possible to meet the fully optimized requirement without additional treatment, based on their two rounds of sampling since switching to the Flint River, we have determined they did not meet the eligibility for this per the regulation. They now have to complete a study (within 18 months) and are then allowed a period of additional time (2 additional years) to install the selected treatment for Fully Optimized Corrosion Control in accordance with the regulatory requirements. This is what DWSD was required to do back in 1993 – 1997 (see attached letter and study). We are planning to suggest the City directly submit a treatment process to shorten the timeline to achieve full optimization. This letter is currently being drafted but won't be ready to mail out for another week.

Liane and I had a conference call with EPA region V in Chicago on Tuesday to go over all of this and they are in support of these next steps with the City.

The matter will be potentially further complicated when the City switches over to water from the Karegnondí Water Authority next year to re-evaluate the continuing requirement to fully optimize corrosion control.

The DEQ recognizes that there is has been no level of lead exposure determined to be safe, but again the regulation was developed to optimize water corrosivity to limit exposure and the City is following the regulatory requirements.

Lead is not coming from the Flint River or the City's Water Treatment Plant or the public distribution system. It is from lead service lines into homes and from plumbing materials and fixtures within the private property of the household.

As watermain are replaced within the City lead services associated with that section of watermain would be replaced in order to reconnect to City water. This would also place burden on the homeowner to pay for having the service line re-plumbed. However, since 2000 only 16 miles of the City's 500 miles of watermain have been replaced as they did not have the financial means to do so.

Let us know if there are questions or you need any additional information.

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](mailto:buschs@michigan.gov)

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**From:** Wurfel, Brad (DEQ)  
**Sent:** Friday, July 24, 2015 12:09 PM  
**To:** Busch, Stephen (DEQ); Prysby, Mike (DEQ)  
**Cc:** Shekter Smith, Liane (DEQ); Wyant, Dan (DEQ); Pallone, Maggie (DEQ)  
**Subject:** Need upate on lead / copper tests for Flint

Guys, the Flint Ministers met with the Governor's office again last week. They also brought along some folks from the community – a college prof and a GM engineer – who imparted that 80 water tests in Flint have shown high lead levels.

Could use an upate on the January / june testing results, as well as recap of the December testing numbers, and any overview you can offer to edify this conversation.  
Call me or email today if possible. Thanks!  
b

Brad Wurfel  
Communications Director  
Michigan Department of Environmental Quality  
517-284-6713  
PPI cell

**Feuerstein, Heather (DEQ)**

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**From:** Wurfel, Brad (DEQ)  
**Sent:** Monday, September 28, 2015 3:39 PM  
**To:** Feuerstein, Heather (DEQ)  
**Subject:** FW: Flint Lead Monitoring Letter  
**Attachments:** City of Flint PbCu15 8\_17\_15.pdf

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**From:** Busch, Stephen (DEQ)  
**Sent:** Monday, August 17, 2015 2:36 PM  
**To:** Wurfel, Brad (DEQ)  
**Cc:** Sygo, Jim (DEQ); Benzie, Richard (DEQ); Cook, Pat (DEQ); Prysby, Mike (DEQ); Rosenthal, Adam (DEQ); Pallone, Maggie (DEQ); Shekter Smith, Liane (DEQ)  
**Subject:** Flint Lead Monitoring Letter

Brad,

As there has been much interest regarding lead related to Flint drinking water, I have attached our latest letter which covers the most recent January – June 2015 monitoring period. The City is in compliance with the 15 part per billion action level for lead. Yet based on these results, the treatment cannot be deemed to provide fully optimized corrosion control treatment, and the City will need to recommend additional treatment to achieve this optimization under the Lead and Copper Rule requirements established under the Michigan Safe Drinking Water Act. This is all spelled out in the attached letter.

If you have any questions or would like any additional information you may contact me at the number below.

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](mailto:buschs@michigan.gov)



RICK SNYDER  
GOVERNOR

STATE OF MICHIGAN  
DEPARTMENT OF ENVIRONMENTAL QUALITY  
LANSING DISTRICT OFFICE



DAN WYANT  
DIRECTOR

August 17, 2015

Mr. Brent Wright  
City of Flint - DPW  
Flint Water Plant  
4500 North Dort Highway  
Flint, Michigan 48505

Dear Mr. Wright:

SUBJECT: Flint, City of WSSN: 02310  
Lead and Copper Monitoring of Drinking Water Taps

The Department of Environmental Quality (DEQ), Office of Drinking Water and Municipal Assistance (ODWMA), received your report for the monitoring period January 1, 2015, through June 30, 2015.

| Action Levels                      | Results this monitoring period |                                 |                       |                        |
|------------------------------------|--------------------------------|---------------------------------|-----------------------|------------------------|
|                                    | 90th Percentile                | # of Samples Above Action Level | # of Samples Required | # of Samples Collected |
| Lead 15 parts per billion (ppb)    | 11 ppb                         | 6                               | 60                    | 69                     |
| Copper 1.3 parts per million (ppm) | 0.16 ppm                       | 0                               | 60                    | 69                     |

Ninety percent or more of the sites you tested are within action levels under the administrative rules promulgated under the Michigan Safe Drinking Water Act, 1976 PA 399, as amended (Act 399). These results must be reported on your 2015 Consumer Confidence Report (CCR) due to our office, your customers, and the local health department, by July 1, 2016. Also include the following statement in the CCR, regardless of the lead and copper levels:

*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 30 seconds to 2 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 at 1-800-426-4791 or at <http://www.water.epa.gov/drink/info/lead>.*

Mr. Brent Wright

2

August 17, 2015

Recent changes to the Lead and Copper Rule (LCR) require the water supply to provide individual lead tap results to people who receive water from sites that were sampled, even if lead was not detected, within 30 days of learning of results. You must also send us a certification that you met all the delivery requirements along with a sample copy of your customer notice by three months after the end of the monitoring period. To download the *Lead and Copper Report and Consumer Notice of Lead Result Certificate* in Microsoft Word or PDF format, visit <http://www.michigan.gov/deq>. Click on Water, Drinking Water, Community Water Supply, and Reporting Forms under the Manuals, Forms and Brochures heading. Water supplies that fail to distribute the Consumer Notice of Lead Results must include the following statement in their CCR, "During the year, we failed to provide lead results to persons served at the sites that were tested as required by the Lead and Copper Rule."

While the City's LCR compliance monitoring has continued to meet action level requirements, the LCR also requires all large systems (those serving over 50,000 people) to optimize corrosion control regardless of their 90th percentile lead concentration. One way to demonstrate fully optimized corrosion control treatment is through two consecutive six month rounds of LCR compliance monitoring in which the difference between the 90th percentile level and the highest source water lead concentration is less than the Practical Quantitative Level for lead (0.005 milligrams per liter). Since the City did not meet these criteria in both the July – December 2014, and January – June 2015, sampling periods, the City must now recommend a treatment to fully optimize corrosion control treatment within six months in accordance with requirements under Act 399, Administrative Rule 604f (R 325.10604f). **This recommendation must be provided to our office as soon as possible, but no later than January 1, 2016.**

However, given the past use of phosphate treatment by the Detroit Water and Sewerage Department (DWSD) to fully optimize corrosion control treatment when the City was a wholesale customer of DWSD, the ODWMA recommends the City select this as its recommended treatment option, and begin implementation as soon as possible to address ongoing concerns by customers regarding lead levels within their premise plumbing systems. Under the second step of this Rule, the DEQ can specify optimal corrosion control treatment.

Our office will inform you when monitoring needs to be conducted as part of the optimization of the implemented corrosion control treatment. Customer requested samples for lead shall continue to be collected and analyzed. Please make every attempt to select the same sites used in the previous monitoring period, giving Tier 1 sites first priority. If original sites are unavailable, select replacement sites based on the Tier 1, 2, and 3 criteria.

Please contact me at 517-284-6644 or [rosenthala@michigan.gov](mailto:rosenthala@michigan.gov) at your earliest convenience to discuss how the City will be complying with the above requirements.

Sincerely,



Adam Rosenthal, Environmental Quality Analyst  
Lansing District Office  
Office of Drinking Water and Municipal Assistance

cc: Mr. Michael Glasgow, City of Flint

**Feuerstein, Heather (DEQ)**

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**From:** Wurfel, Brad (DEQ)  
**Sent:** Monday, September 28, 2015 3:30 PM  
**To:** Feuerstein, Heather (DEQ)  
**Subject:** FW: LeeAnn Walters Draft

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**From:** Brown, Eric (GOV)  
**Sent:** Thursday, August 27, 2015 3:20 PM  
**To:** Wurfel, Brad (DEQ)  
**Subject:** Re: LeeAnn Walters Draft

Very helpful, thanks

Sent from my mobile device

On Aug 27, 2015, at 3:14 PM, Wurfel, Brad (DEQ) <[WurfelB@michigan.gov](mailto:WurfelB@michigan.gov)> wrote:

Don't know what it is, but I know what it's not. The key to lead and copper in drinking water is that it's not in the source water, or even the transmission lines (most of which are cast iron). It's in the premise plumbing (people's homes). The reason statute requires operators of large systems to test for lead & copper in homes when they switch sources is because large systems inevitably means old neighborhoods, where there's likely a lead connection line to the homes or lead pipes in the premise plumbing (or lead in the solder of copper lines installed before the mid-1990s), and what we're checking for is whether the Ph of the new source water is mobilizing lead in the pipes.

Ironically, the leading fix for it is adding phosphate (ironic because we're fighting to reduce phosphorus in surface water all over the state, but particularly in the Western Lake Erie Basin). The phosphate smooths the water and reduces the interaction.

In accordance with statute, we sent Flint a letter early this month saying they passed muster on the two required rounds of lead and copper tests, but we still want them to 'optimize' their system (phosphates). By law, they now have 18 months to create an optimization plan, and something like two years thereafter to implement that plan. But they're going to switch sources again in June / July of next year, which starts the whole process over again. Such is the wisdom and flexibility of the federal statute ...

This person is the one who had EPA lead specialist come to her home and do tests, then released an unvetted draft of his report (that EPA apologized to us profusely for) to the resident, who shared it with the ACLU, who promptly used it to continue raising hell with the locals.

Bottom line is that folks in Flint are upset – because they pay a ton for water and many of them don't trust the water they're getting – and they're confused, in no small part because various groups have worked hard at keeping them confused and upset. We get it. The state is trying like mad get the word out that we're working on every aspect of the health safety of local water that we can manage, and the system needs a lot of work

(because the city didn't do any discernable maintenance for nearly 40 years and the transmission lines are falling apart), but it's been rough sledding with a steady parade of community groups keeping everyone hopped-up and misinformed.

Tell me what I can do to help you with the Peters' meeting, or anything else.

b

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**From:** Brown, Eric (GOV)  
**Sent:** Thursday, August 27, 2015 2:55 PM  
**To:** Wurfel, Brad (DEQ)  
**Subject:** RE: LeeAnn Walters Draft

So this resident's lead levels are much higher than the 90<sup>th</sup> percentile mentioned in the previous email. What is the discrepancy?

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**From:** Wurfel, Brad (DEQ)  
**Sent:** Thursday, August 27, 2015 2:00 PM  
**To:** Brown, Eric (GOV) <[BrownE15@michigan.gov](mailto:BrownE15@michigan.gov)>  
**Subject:** FW: LeeAnn Walters Draft

Letter to a very vocal resident that went out this week. This may be what Peters' office is wanting to discuss with you. This letter has some really useful info on lead and copper testing.

b

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**From:** Shekter Smith, Liane (DEQ)  
**Sent:** Monday, August 24, 2015 1:10 PM  
**To:** Wurfel, Brad (DEQ)  
**Cc:** Devereaux, Tracy Jo (DEQ); Busch, Stephen (DEQ); Benzle, Richard (DEQ); Sygo, Jim (DEQ); Shaler, Karen (DEQ)  
**Subject:** RE: LeeAnn Walters Draft

When you say they should see it as well. Do you mean see the draft or be cc'd on the e-mail?

If the former, do you wish to share it with them?

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**From:** Wurfel, Brad (DEQ)  
**Sent:** Monday, August 24, 2015 11:22 AM  
**To:** Shekter Smith, Liane (DEQ)  
**Cc:** Devereaux, Tracy Jo (DEQ); Busch, Stephen (DEQ); Benzle, Richard (DEQ); Sygo, Jim (DEQ); Shaler, Karen (DEQ)  
**Subject:** RE: LeeAnn Walters Draft

Comprehensive. Thanks for sharing this, Liane. Lots of important information here. I'd suggest that Harvey Hollins and Dennis Muchmore need to see it as well.

b

**From:** Shekter Smith, Liane (DEQ)  
**Sent:** Monday, August 24, 2015 10:37 AM  
**To:** Wurfel, Brad (DEQ)  
**Cc:** Devereaux, Tracy Jo (DEQ); Busch, Stephen (DEQ); Benzie, Richard (DEQ); Sygo, Jim (DEQ); Shaler, Karen (DEQ)  
**Subject:** RE: LeeAnn Walters Draft

Brad – below is our draft response to Ms. Walters in followup to our meeting at the Governor's Office. Thought you might like to review the draft before we send it out. Also, is there anyone else that should see this before it is sent?

Dear Ms. Walters,

I wanted to update you regarding our Department's findings related to questions raised during our meeting at the Governor's office on August 4. I apologize for the delay in getting back to you.

#### Lead and Copper Monitoring

Regarding Flint lead and copper compliance monitoring for the January – June 2015 period, the City has confirmed that all lead and copper samples collected throughout the City, whether routine sites or customer requests, were sent to the State of Michigan lab for analysis. Individual sample results are provided to the property owner within 30 days of receiving the lab results in accordance with the Michigan Safe Drinking Water Act (Public Act 399, 1976 Administrative Rule 410(5)). Results from the State of Michigan lab are provided directly to our Office.

Staff have confirmed that the lead 90<sup>th</sup> percentile compliance calculation of 11 parts per billion is based on 69 samples that met the appropriate sampling location site criteria, and met the sample collection site and collection protocol requirements of the Safe Drinking Water Act for this monitoring period. A minimum of 60 samples were required for this monitoring period. As indicated during the meeting, the City's sampling for lead complies with the Action Level standard of 15 parts per billion, but based on the population served by the City and these results, the City will need to make a recommendation to the MDEQ on how they will fully optimize their corrosion control treatment. These next steps continue to follow the requirements of the Lead and Copper Rule.

Samples collected at your residence of 212 Browning Avenue were not included this compliance determination as you utilize a whole home filter. As stated in the Michigan Safe Drinking Water Act (Public Act 399, 1976 Administrative Rule 710a, Lead and Copper in tap water; monitoring requirements) "Sampling sites may not include faucets that have point of use or point of entry treatment devices designed to remove inorganic contaminants." Such treatment alters the water chemistry and water quality such that it is no longer representative of public water from the City's distribution system. Therefore, the City cannot use samples collected at your residence as part of its determination for public water system compliance with the lead or copper action level standard.

#### Sample Summary (samples taken at your residence)

For your information, we are providing the information that we've gathered regarding samples collected at your home. Our records indicate between February and June of this year there were six samples collected by either you or Mr. Mike Glasgow with the City of Flint, and submitted to the State Laboratory for analysis as follows:

February 11, Bathroom tap, collected at 10:20 AM by Mike Glasgow. This sample was analyzed for aesthetic metals (copper, iron, manganese, and zinc) which does not include lead analysis.

February 18, Kitchen tap, collected at 7:15 AM by you. This sample was analyzed for lead (104 parts per billion) and copper (non-detect).

February 25, Kitchen tap, collected at 10:26 AM by Mike Glasgow. This sample was analyzed for metals including lead. All results (including lead) were non-detect except for Barium 0.01 parts per million. The result for Barium was well below its maximum contaminant level of 2 parts per million.

March 3, Kitchen tap, collected at 6:00 AM by you. This sample was analyzed for lead (397 parts per billion) and copper (non-detect).

March 18, Kitchen tap, collected at 11:10 AM by Mike Glasgow. This sample was analyzed for lead (4 parts per billion) and copper (non-detect).

April 2, Pre-point of service, collected at 8:00 AM by you. This sample was analyzed for lead (707 parts per billion) and copper (110 parts per billion).

#### Lead Education/Outreach

As we discussed during the meeting, we support efforts to educate homeowners about the sources of lead in their private residence, provide guidance measures to reduce the potential for lead exposure, and provide information on resources for lead abatement. Along those lines, our Office has been in contact with the Department of Health and Human Services, Environmental Health Division, Healthy Homes Section and had some preliminary discussions about a public education and assistance campaign regarding household lead issues, guidance and abatement.

Lead monitoring by public water systems serves a dual purpose. The first purpose is to ensure the public water supply is adequately treating its water to address corrosion potential and help limit lead exposure. The second purpose is to inform homeowners about lead levels within their individual residence so that they can make educated choices regarding their own exposure risk.

#### pH Results

During the meeting concerns were also expressed regarding pH levels within customer plumbing systems. As you may know, pH has no associated contaminant level as it is simply a numeric scale used to specify the acidity or alkalinity of a solution. The City of Flint conducts daily monitoring of pH values on both its raw and finished (treated) water at the City's water treatment plant as part of its operations. The City is also required to conduct water quality parameter monitoring in the distribution system, which includes pH. Samples are analyzed in accordance with Standard Methods using properly calibrated analytical equipment. Results for pH from these samples are summarized below.

Since late April 2014 – June 2015, the following pH conditions were reported:

Water Treatment Plant – Finished Water plant tap pH range = 7.07 minimum to 9.9 maximum, overall average 7.7, measured daily. We believe the 9.9 is a one- time anomaly from softening treatment.

Distribution System – Water Quality Parameters taken from 25 sample sites located throughout and monitored quarterly

July – Sept. 2014: pH 7.71 average, range 7.56 – 7.86

Oct. – Dec. 2014: pH 7.88 average, range 7.62 – 8.10

Jan. – March 2015: pH 7.81 average, range 7.60 – 7.99

April – June 2015: pH 7.63 Average, range 7.48 – 7.80

In addition, the City's treated water contains alkalinity, which is a measurement of the buffering capacity of water to resist a change in pH. As you can see from the water quality parameter monitoring results above there has been very little change in pH within the City's distribution system. The pH levels described within customer site piping or premise plumbing systems are believed to be the result of onsite treatment and not representative of water quality shown to be occurring in the public water supply system.

#### Consumer Confidence Report

Finally, there was confusion during the meeting regarding the City's annual water quality report, the Consumer Confidence Report which we have since been able to clarify.

The City of Flint issued two separate Consumer Confidence Reports (CCR's) in 2015 covering the water quality data from 2014. One report was for the period of January – April 2014 when the City was obtaining water from Detroit (DWSD). And a second report was for the period April – December 2014 when the City was using the Flint River and its own Water Treatment Plant.

The CCR for DWSD water was mailed to customers in June. The Flint River based CCR was mailed to customers in mid-July, delayed due to issues with the printing contractor. We agree that having two separate reports caused confusion. We are working with the City to ensure both reports are posted to the City's website and both are made available when requested by customers. Should the City choose to create separate CCR's during the year that the City of Flint connects to the Karegnondi Water Authority we will work with the City to provide more clarity and try to have all material included in a single mailing.

The DWSD based CCR is the one community members had at the meeting, while the DEQ brought a copy of the Flint River based CCR. As separate and distinct sampling was done under each source, this explains the discrepancy in the values and monitoring periods being reported in the respective CCR's.

We appreciate your interest in these matters and hope this has addressed many of the questions brought up during our meeting. I would like to provide this information to both Dr. Sullivan and Ms. Mayes, but I do not have their contact information. I'm hoping you can share this with them and any others that may be interested.

Sincerely,

**Feuerstein, Heather (DEQ)**

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**From:** Wurfel, Brad (DEQ)  
**Sent:** Monday, September 28, 2015 3:35 PM  
**To:** Feuerstein, Heather (DEQ)  
**Subject:** FW: steve busch

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**From:** Benzie, Richard (DEQ)  
**Sent:** Thursday, September 03, 2015 11:20 AM  
**To:** Wurfel, Brad (DEQ); Busch, Stephen (DEQ); Shekter Smith, Liane (DEQ); Prysby, Mike (DEQ)  
**Subject:** RE: steve busch

If he needs to talk to someone here, Mike Prysby was the one who contacted Flint officials to learn what was decided at the meeting held Tuesday between the city and their consultant to discuss a number of issues including the possibility of optimizing their treatment for corrosion control. Mike provided an update that I forwarded to Region 5 EPA as they were asking about the status.

But this information is best obtained from the city officials that Mike contacted to learn what was discussed.

Richard

---

**From:** Wurfel, Brad (DEQ)  
**Sent:** Thursday, September 03, 2015 11:16 AM  
**To:** Busch, Stephen (DEQ); Shekter Smith, Liane (DEQ); Benzie, Richard (DEQ); Prysby, Mike (DEQ)  
**Subject:** FW: steve busch

What do we want to do with this today? Seems Steve's outta here.  
b

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**From:** Ronald Fonger [<mailto:RFONGER1@mlive.com>]  
**Sent:** Thursday, September 03, 2015 11:03 AM  
**To:** Wurfel, Brad (DEQ)  
**Subject:** steve busch

Brad:

We are planning to follow up on the issue of Flint optimizing its water system to further limit exposure to lead from plumbing in homes.

I left messages we Steve Busch Wednesday and again this morning and am expecting to get some information from the city on what it's doing or considering.

Any help in getting a minute with Steve would be appreciated.

Thanks for this and your help yesterday,

**Ron Fonger**  
MLive Media Group  
Reporter

mobile PPI

**Feuerstein, Heather (DEQ)**

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**From:** Wurfel, Brad (DEQ)  
**Sent:** Monday, September 28, 2015 3:34 PM  
**To:** Feuerstein, Heather (DEQ)  
**Subject:** FW: mayor walling's comment

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**From:** Shekter Smith, Liane (DEQ)  
**Sent:** Friday, September 11, 2015 1:47 PM  
**To:** Busch, Stephen (DEQ); Wurfel, Brad (DEQ); Benzie, Richard (DEQ)  
**Subject:** RE: mayor walling's comment

It should be noted that the city does need to obtain a construction permit to install treatment. They have not yet applied for such a permit. So I'm not sure what the mayor means about us finally allowing them to proceed. The ball's in their court.

Liane J. Shekter Smith, P.E., Chief  
 Office of Drinking Water and Municipal Assistance  
 Michigan Department of Environmental Quality  
 517-284-6543

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**From:** Busch, Stephen (DEQ)  
**Sent:** Friday, September 11, 2015 1:45 PM  
**To:** Wurfel, Brad (DEQ); Shekter Smith, Liane (DEQ); Benzie, Richard (DEQ)  
**Subject:** RE: mayor walling's comment

The City has not sent us their recommendation at this time. Per our 8/17 letter (attached), we recommended they select phosphate treatment which was previously provided by DWSD. They have until the end of the year to make a recommendation, but they are planning to have the treatment in place by January 2016. Their engineering consultant is working on this. Howard Croft noted this in his September 3 email to members of the technical advisory team the City formed.

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](mailto:buschs@michigan.gov)

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**From:** Wurfel, Brad (DEQ)  
**Sent:** Friday, September 11, 2015 1:18 PM  
**To:** Shekter Smith, Liane (DEQ); Busch, Stephen (DEQ); Benzie, Richard (DEQ)  
**Subject:** FW: mayor walling's comment

Help?

**Feuerstein, Heather (DEQ)**

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**From:** Wurfel, Brad (DEQ)  
**Sent:** Monday, September 28, 2015 3:35 PM  
**To:** Feuerstein, Heather (DEQ)  
**Subject:** FW: steve busch

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**From:** Benzie, Richard (DEQ)  
**Sent:** Thursday, September 03, 2015 11:20 AM  
**To:** Wurfel, Brad (DEQ); Busch, Stephen (DEQ); Shekter Smith, Liane (DEQ); Prysby, Mike (DEQ)  
**Subject:** RE: steve busch

If he needs to talk to someone here, Mike Prysby was the one who contacted Flint officials to learn what was decided at the meeting held Tuesday between the city and their consultant to discuss a number of issues including the possibility of optimizing their treatment for corrosion control. Mike provided an update that I forwarded to Region 5 EPA as they were asking about the status.

But this information is best obtained from the city officials that Mike contacted to learn what was discussed.

Richard

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**From:** Wurfel, Brad (DEQ)  
**Sent:** Thursday, September 03, 2015 11:16 AM  
**To:** Busch, Stephen (DEQ); Shekter Smith, Liane (DEQ); Benzie, Richard (DEQ); Prysby, Mike (DEQ)  
**Subject:** FW: steve busch

What do we want to do with this today? Seems Steve's outta here.  
b

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**Sent:** Thursday, September 03, 2015 11:03 AM  
**To:** Wurfel, Brad (DEQ)  
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Reporter

mobile PPI

**Feuerstein, Heather (DEQ)**

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**To:** Feuerstein, Heather (DEQ)  
**Subject:** FW: mayor walling's comment

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**To:** Busch, Stephen (DEQ); Wurfel, Brad (DEQ); Benzie, Richard (DEQ)  
**Subject:** RE: mayor walling's comment

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Stephen Busch, P.E.  
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Lansing and Jackson District Supervisor  
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[buschs@michigan.gov](mailto:buschs@michigan.gov)

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**From:** Wurfel, Brad (DEQ)  
**Sent:** Friday, September 11, 2015 1:18 PM  
**To:** Shekter Smith, Liane (DEQ); Busch, Stephen (DEQ); Benzie, Richard (DEQ)  
**Subject:** FW: mayor walling's comment

Help?

**Feuerstein, Heather (DEQ)**

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**From:** Wurfel, Brad (DEQ)  
**Sent:** Monday, September 28, 2015 3:34 PM  
**To:** Feuerstein, Heather (DEQ)  
**Subject:** FW: question about optimal WQP ranges for Flint's water

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**From:** Yanna Lambrinidou [mailto:pnalternatives@yahoo.com]  
**Sent:** Monday, September 28, 2015 12:30 PM  
**To:** Busch, Stephen (DEQ)  
**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

Dear Mr. Busch,

I appreciate your response.

Would you be able to send me a copy of the modified consecutive system approach to lead and copper monitoring that EPA approved?

I am sorry I cannot route my question through the NDWAC or my WG. I am not a NDWAC member, and my WG disbanded when our final report was completed back in August. I apologize if I have caused any confusion. The questions I am posing come solely from me because I am in the process of writing a dissenting opinion about the NDWAC LCR WG recommendations that is due to EPA in a couple of weeks. One of the main reasons I am writing this opinion is because of concerns I have about the LCR's CCT requirement. Your experience with and implementation of the LCR in Flint is extremely helpful to me in deepening my understanding about the LCR's CCT requirement and will undoubtedly allow me to write a more informed discussion.

I thank you in advance for your help on this matter and your support of ongoing efforts to assess the LCR carefully and thoroughly.

Kindly,

Yanna Lambrinidou

Yanna Lambrinidou PhD  
 Parents for Nontoxic Alternatives  
 PO Box 6283  
 Washington DC 20015  
 P 202.997.1834  
 B [www.dcdwasawatch.blogspot.com](http://www.dcdwasawatch.blogspot.com)

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**From:** "Busch, Stephen (DEQ)" <BUSCHS@michigan.gov>  
**To:** Yanna Lambrinidou <pnalternatives@yahoo.com>  
**Cc:** "Benzie, Richard (DEQ)" <BENZIER@michigan.gov>; "Cook, Pat (DEQ)" <COOKP@michigan.gov>; "Prysby, Mike (DEQ)" <PRYSBYM@michigan.gov>; "Wurfel, Brad (DEQ)" <WurfelB@michigan.gov>; "hyde.tinka@epa.gov" <hyde.tinka@epa.gov>  
**Sent:** Friday, September 25, 2015 8:26 AM  
**Subject:** RE: question about optimal WQP ranges for Flint's water

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](mailto:buschs@michigan.gov)

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**From:** Yanna Lambrinidou [<mailto:pnalternatives@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

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**From:** "Busch, Stephen (DEQ)" <[BUSCHS@michigan.gov](mailto:BUSCHS@michigan.gov)>  
**To:** Yanna Lambrinidou <[pnalternatives@yahoo.com](mailto:pnalternatives@yahoo.com)>; "Wurfel, Brad (DEQ)" <[WurfelB@michigan.gov](mailto: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](mailto: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  
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