SAFETY OF AMES DRINKING WATER
LEAD UPDATE

May 24, 2016

BACKGROUND

For the past few months, national media outlets have been reporting on the serious health issues in Flint, Michigan, due to the exceptionally high lead concentrations in the drinking water[1]. This report is being presented in response to a handful of customer inquiries regarding the Ames drinking water.

Corrosion Control and Water Stability in Ames

Water chemistry is a very important consideration for drinking water suppliers. If the water chemistry is "aggressive" or "corrosive," it can attack metal piping, causing heavy metals and other toxic chemicals to leach into the water. Such has been the case in Flint, Michigan.[1] Just a few of the conditions that can make water corrosive include water that has a pH on the acidic (low) end of the spectrum (below 7.0) and water with too low of an alkalinity (dissolved minerals).

In Ames, the water chemistry is specifically and intentionally maintained to be on the other side of the stability spectrum, in the "slightly depositing" range. Ames Water has a pH that is about 9.5 standard units. As opposed to "aggressive" water that can corrode and dissolve pipes, Ames water forms a slight deposit on the inside of pipes. **The deposits formed by Ames water create a barrier between the drinking water and the pipe material, protecting the water from coming into contact with lead pipes, fittings, or solder. It also serves to sequester (bind) any lead that may leach from the pipes and other fixtures.**

Ames Water Quality

When the Lead and Copper Rule was first enacted by the US EPA in the early 1990s, the City of Ames developed a sampling and monitoring plan that was intentionally designed to provide a "worst case" evaluation from across the community; a sampling plan that continues to be used today. All sample locations used in Ames' monitoring are residential properties that are known to have lead components somewhere in either the service line (the property's connection between the water main and the water meter) or elsewhere in the home's internal plumbing system, based on records maintained by Public Works and the Inspections Division. It should be noted that the use of lead in service lines or plumbing has been prohibited by the plumbing code for more than two decades.

[1] See the attached Appendix for more information about the Flint water crisis.

The sampling techniques used have likewise been very carefully crafted in order to collect a sample that would have the greatest potential to capture any lead leaching from the pipe materials.

When the Lead and Copper sampling first began, samples were collected every six months. After the first three rounds of monitoring found virtually no lead in the water, the required sampling schedule was reduced to once every three years. That schedule is allowed to continue unless high lead levels are discovered or until the City makes a significant change in its treatment process (as will happen when the new treatment plant comes on-line).

Over the past 25 years of sampling, there has never been a valid sample that showed a lead concentration that exceeded the Safe Drinking Water Act's Action Level of 15 parts per billion. The only sample that exceeded the action level was found to be from a property that had very recently made in an internal plumbing change, damaging the protective coating formed by the water deposits. **This track record of virtually non-detectable lead levels in Ames water is due to the water chemistry maintained by the utility. The ability of pipes to leach lead, copper, or other toxics into the water is greatly reduced.**

Federal Lead and Copper Rule Revisions

An update to the federal Lead and Copper Rule has been in the works for a number of years, and not surprisingly the events in Flint, MI, have impacted what is now likely to be included. For example; for the first time, the new rule is expected to require all water utilities to enact a corrosion control program, something Ames has had in place for years.

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In light of the recent events in Flint, MI, virtually all drinking water industry trade associations have come out in vocal support of increased public education and awareness by utilities. Some organizations representing the industry are going even farther. On March 7, 2016, the American Water Works Association (AWWA) Board of Directors voted unanimously to recommend to the U.S. Environmental Protection Agency (EPA) that any revisions to the Lead and Copper rule "…forge a path towards the total elimination of lead service lines." AWWA Executive Director David LaFrance explained the decision by saying, "*Most water professionals are perplexed – even stunned – at what transpired in Flint. But the Flint crisis lays bare a simple fact: As long as there are lead pipes in the ground or lead plumbing in homes, some risk remains.*"

AMES PUBLIC INFORMATION STRATEGY

In order to reassure our customers, staff is undertaking a public information campaign with two main target audiences: 1) the general consumer, and 2) targeted customers believed to have lead components in their service lines or premise plumbing. The initiative is a joint effort between the Water and Pollution Control Department, Public Works Department, Fire Department (Inspections Division), Planning and Housing Department, and Public Relations office.

General Consumers. Information has already begun to be distributed to customers about the safety of Ames water. The cover article in the April *City Side* publication describes the treatment process used in Ames, and highlights the intensive monitoring of the process to ensure consistent water quality. A similar message is included on the cover of the 2016 Water Quality Report, which was released in April and is provided online and by request to all customers of the Ames water utility. Additionally, a comprehensive FAQ section about lead has been added to the Water Treatment Plant pages on the City's web site, using the friendly URL CityOfAmes.org/Lead. Over the next few months, informational materials will be featured using a variety of City of Ames public outreach tools: newsletters, video, social media, website and more.

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The information provided through these formats is of a general nature, answering questions like "Why is lead a concern?" "What does Ames do to protect against lead in the drinking water?" and "What can I do to reduce my exposure to lead?" It will also highlight the proactive history of the Ames utility by pointing out that Ames has been using "low lead brass" water meters and meter fittings for more than 10 years, long before it became mandatory. It will also point out that recent EPA guidelines to utilities on how to sample for lead have been part of our standard practices for decades. All of the technical material being posted has been sourced from reputable governmental or industry trade association sources, including the EPA, the U.S. Centers for Disease Control, the Iowa Department of Natural Resources, and the American Water Works Association.

Targeted Consumers. Staff is currently compiling a listing of all properties believed to contain lead products in the water service line or in-home plumbing. Many of these property owners and residents may be unaware that they even have lead components in their private plumbing systems. **Each of the properties so identified will be sent a letter informing them that City records indicate that they may have lead in their plumbing system.** They will also be provided with a brochure that explains the history of lead monitoring in Ames and the ways the City manages the chemistry of its drinking water to protect against lead contamination. The

brochure will also provide simple, easy steps that residents can follow to lower their risk of lead exposure, including the following tips.

- Allow your cold water faucet to run wide open for about 30 seconds before using water for cooking or drinking purposes. This allows stagnant water, which would have had a longer time in contact with the lead plumbing, to be flushed away.
- Always use cold water for consumption, even when cooking. Sometimes there is a desire to shorten the time it takes to boil a pot of water by starting with hot tap water. But lead can dissolve more easily in hot water, so it is best to heat cold water on the stove when it will be consumed. The overwhelming method of lead exposure is through ingestion. Lead is not readily absorbed by the skin or by inhalation, so showering or doing laundry in hot water is not a concern.
- If any plumbing changes are made in the house, consider the use of a lead filter for up to 18 months. Even something as simple as changing out a faucet can disrupt the coating that has been deposited on the pipes by Ames water. Sometimes those deposits have captured small amounts of lead and when the deposits are disturbed, lead can be released.

Accompanying the letter will be information about the City's routine Lead and Copper sampling program and an invitation to participate in the round of sampling to take place later this summer.

For properties that are on the list of locations believed to contain lead plumbing, the City will be offering in the letter to perform a lead test at no cost to the customer or property owner. For properties that are not on the list of locations with lead service lines, the City will provide information on outside private laboratories that the owner or resident can use to arrange their own test at their expense. The cost to a customer for a private laboratory to perform the analysis is approximately $25.

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Internal Staff Training

Training will be provided to all front-line customer service staff in work locations likely to receive inquiries about lead from the public. An up-to-date listing of known properties containing lead service lines will be available in multiple departments, making it a simple matter for most customers to determine the status of their property.

LONG-TERM STRATEGY ON LEAD SERVICE LINES

An important aspect to consider when evaluating potential strategies for the complete replacement of lead service lines is the ownership of the service line. Ownership of the service line varies from one community to another. Chapter 28 of the Ames Municipal Code explicitly affirms that the water service line is owned by the property owner.

> *"All service connections with the city water supply from the main to the meter, including the corporation cock, service line, curb cock and curb box shall be installed and maintained at the expense of the property to be served. Ownership of the entire service connection remains with the property." Section 28.214*

Based on historical records reviewed by Public Works, there are 306 lead service lines believed to remain in Ames. Staff is considering a change that could provide a long-term strategy to help reduce the number of lead service lines in Ames.

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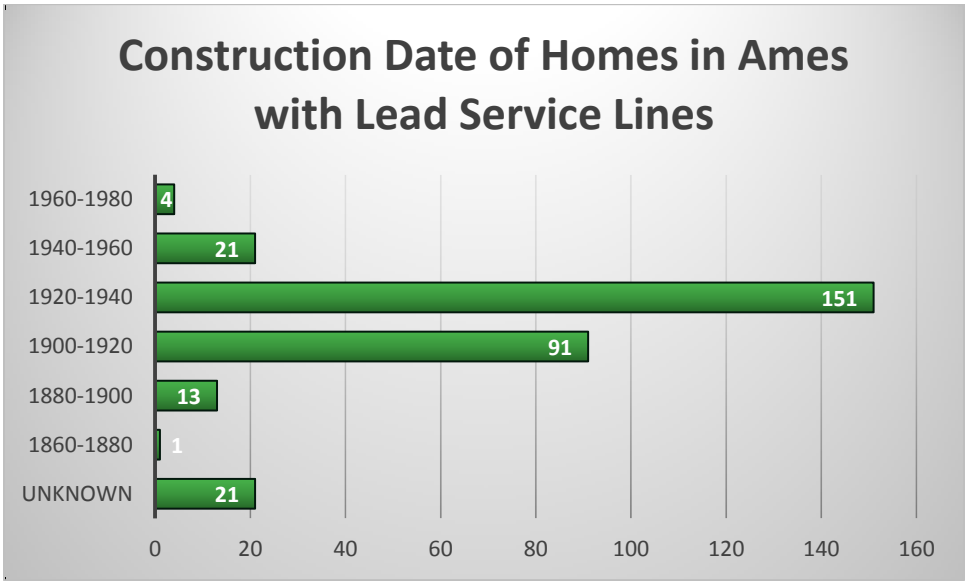
Water Main Replacement Prioritization

It has been a long-standing practice to replace – at the utility's cost – any lead service lines encountered during a water main replacement or service line transfer project. The rationale is similar to why a customer needs to be careful when replacing fixtures inside the house: disturbing lead plumbing can suddenly take a system that was safe due to the coatings on the pipes and make it unsafe by disturbing those coatings. In the case of a water main replacement project, the reason for the disturbance to the piping is because of a City-initiated project. As a result, the utility covers the full cost of the service line replacement.

Moving forward, Public Works will add this to its list of considerations used to prioritize its water main replacement plans, with the number of lead service lines on a given water main now being included as an additional consideration. Over time, this will slowly shrink the number of remaining lead service lines in the community. Based on the projects identified in just the first two years of the Capital Improvements Plan alone, it appears that as many as 30 lead service lines may be replaced, paid 100% by the water utility.

SUMMARY

The operational practices of the Ames water utility have served to protect its customers from the risks of lead contamination, thanks to carefully controlled water chemistry and regular water quality monitoring. Since the water service lines and premise plumbing are owned by the property owner and not the City, staff recognizes the importance of educating residents about lead. Staff is undertaking a proactive public education effort to help residents understand the protections provided by the utility and informing them of additional measures they can take to further mitigate the risk of lead contamination.



The most reliable method to protect against lead contamination of homes and businesses is the complete removal of lead service lines and internal plumbing. Staff will begin including the presence of lead service lines in the list of factors used to prioritize water main replacement projects.

APPENDIX:
Background on Flint, MI Situation

Multiple factors in Flint have combined to result in the current drinking water crisis. A detailed timeline, excerpted in large part from a Detroit Free Press report found at http://www.freep.com/pages/interactives/flint-water-crisis-timeline/ and from the City of Flint's web site found at cityofflint.com, is provided below.

A City in Financial Crisis. The City of Flint was in a severe economic crisis. General Motors had shut down a large manufacturing facility, leading to exceptionally high unemployment and a substantial loss of population. At the peak, more than 80,000 Flint-area residents were employed by GM; today that number stands at 2,820. The unemployment rate in Flint in 2010 was over 23%, due in no small part to the loss of GM as a major employer in the community. When the jobs left, so too did the population. The US Census Bureau estimates that the Flint population, which was once over 220,000, had dropped to only 98,000 in 2014.

In 2002, the City of Flint was $30 million in debt. Upset over the situation, voters recalled their mayor. Shortly thereafter, Michigan Governor Snyder appointed an emergency manager to oversee the City's finances. A prolonged period of severe austerity measures was enacted by the emergency manager, who had the unquestioned, final decision on every financial matter of the City. While these measures were successful in shrinking the City's debt by about $14 million over a nine-year period, they came with a cost of shrinking local government employment and deferred maintenance. The City of Flint was simply caught by the math; squeezed between the size of the infrastructure it had built to meet its past demands and the remaining tax base available to fund the ongoing operation and maintenance of that infrastructure.

In 2011, a state review board determined that Flint was still mired in a "state of local government financial emergency." A new emergency manager was appointed by the Governor. The emergency manager's first reported action was to dismiss the City Administrator, Human Resources Director, and several other high-level appointed officials. All pay and benefits were eliminated for elected officials. All financial decisions were once again subject to the review and ultimate discretion of the emergency manager.

Geopolitical War. Historically, the City of Flint had contracted with the Detroit Water and Sewerage Department to purchase drinking water. Flint's emergency manager believed that Detroit was overcharging Flint and that it would be less expensive to buy into the newly formed Karegnondi Water Authority (KMA), which was under development. Flint gave notice to Detroit in March of 2013 of its intention to stop purchasing water effective in 2017.

Detroit Water immediately blasted Flint's decision, issuing a public statement asserting that Flint had "effectively launched the greatest war in Michigan's history." Detroit did offer a revised rate structure to Flint, which was rejected by the emergency manager, saying that the

offer from Detroit was still more expensive than joining the KWA. Flint's emergency manager signed an agreement in April of 2013, formally entering into the KWA.

In response, Detroit sent Flint a letter informing them that, under the terms of their purchased water agreement, Detroit may terminate the delivery of water with 12 months' notice. The letter served as that 12-month notice, meaning Flint had to find another source by April 2014 – three years before the KWA system was to be operational. Suddenly, Flint had to come up with an interim water supply and treatment system, and they had less than 12 months to be operational.

Inappropriate Decision-making Authority Coupled with Lax Technical Oversight. The emergency manager directed the abandoned Flint water treatment plant be brought out of moth-balls and returned to service, using water from the Flint River as its source. The Michigan Department of Environmental Quality participated in the decision and issued a construction permit to bring the Flint Water Treatment Plant back on-line.

Every spending decision for the restoration of treatment activities was subject to the review and approval of the emergency manager. Even the selection of treatment chemicals was made by the emergency manager, with the ultimate decision appearing to be solely based – in every case – on cost. When the selection of corrosion control strategies was considered, the emergency manager reportedly directed Flint staff to use ferric salts in lieu of the more expensive phosphate-based corrosion control that had been used by Detroit. There are no reports that anyone checked the impact that the change in corrosion control methods would have on the overall water chemistry.

Water Quality Problems Begin. In April 2014, just days before Detroit was going to cut off the delivery of water to Flint, the renovated Flint Water Treatment Plant began operating with water from the Flint River. A Michigan Department of Environment Quality news release stated that "the quality of the water being put out meets all of our drinking water standards, and Flint water is safe to drink." But the state did not require corrosion control measures; and neither the State DEQ nor the Flint water system had checked the stability or corrosivity of its water.

Residents almost immediately begin to express concerns about the water; most notably the sudden and wide-spread change in the color of the water. Worker's at GM's engine assembly plant noticed corrosion on parts coming out of the machining process. Soon after the changeover, Flint was forced to issue a city-wide "boil water advisory" due to the presence of coliform bacteria in the water. Water plant staff began hydrant flushing and boosted the chlorine level. The bacterial quality improved and the boil advisory was dropped, only to be reinstated later in 2014 because of new coliform testing. Again, the response by Flint Water was to increase chlorine levels.

The water utility had not fully considered the impact on water quality resulting from using the Flint River as its source, nor had it considered the resulting health impact potential of mixing the high organic matter found in the Flint River with the elevated chlorine levels. When high

organic matter concentrations are exposed to elevated chlorine concentrations, a group of disinfection byproducts known as trihalomethanes, or THMs, are formed. These compounds, at high enough concentrations, can cause serious liver and kidney problems. The Flint water exceeded the federal limits and the City, in early 2015, had to issue a warning to its residents of the elevated THM levels.

Because of the number of advisories that had been issued, staff of the University of Michigan's Flint campus decided to test the water from drinking fountains on campus. They discovered elevated lead levels in two infrequently used drinking fountains in two older buildings.

At about this time, Detroit Water offered to reconnect Flint, if Flint will agree to a new long-term arrangement. Flint rejected the offer.

The Lead Crisis Erupts. By this time, residents were becoming increasingly frustrated at the perceived lack of response by the water utility. On January 21, 2015, a meeting with scientists was held at City Hall where residents brought jugs of discolored water that "tastes funny and smells terrible."

A local activist brought a video to the City Council of a rash her son was experiencing, which she attributed to the drinking water. The City agreed to test the water at her home. The results of that testing revealed exceptionally high lead levels. The mother/activist next contacted the regional EPA office in Chicago. EPA staff was alarmed at the results and began questioning the Michigan Department of Environmental Quality (DEQ). The Michigan DEQ responded that "Flint has an optimized corrosion control program." That was not the case. Recall that the Michigan DEQ does not require corrosion control and Flint was doing nothing to monitor its water stability. A consultant commissioned by the City suggested a $50,000 annual expense for different corrosion control chemicals. That recommendation was rejected due to the cost.

The Director of the Pediatric Residency Program at Hurley Medical Center in Flint initiated a research project to look at the prevalence of lead poisoning before versus after the change in water supplies. What she found was that the percentage of children with lead poisoning tripled, going from about 5% to almost 16%. And the location where the children lived correlated directly with the areas of highest lead in the drinking water.

In April 2015, the Michigan DEQ finally admitted to the EPA that Flint had no corrosion control in place, but that Flint was conducting Lead and Copper sampling as required by the Safe Drinking Water Act. DEQ confirmed to the EPA that the DEQ had imposed no other requirements on Flint to test for lead. The EPA directed the state DEQ to assist Flint on its various water quality issues. In July 2015, Governor Snyder asked the DEQ for a status report. DEQ reported that Flint was fully complying with the Lead and Copper Rule and that the problem was isolated to just a single house. Other officials at the state level reportedly became concerned that the issues were being systematically "swept under the rug."

[It was later discovered that the sampling protocols used by Flint when sampling for lead and copper were entirely inappropriate. The sampling is required to be done in a very precise fashion in order to collect a 'worst case' sample. The water must have sat stagnant in the home's plumbing for at least six hours, so the lead has time to leach out. The sample collected must be the absolute first flush out of the faucet so the sample is coming from the home's plumbing and not the water main. Additionally, the water flow must be at full volume so any particulate matter settled in the pipes is flushed out and collected in the sample container. In Flint, those collecting samples were instructed to run the faucet for five minutes prior to collecting the sample. And the sample jars had exceptionally small openings, meaning the water could only run at a trickle to fill the containers.]

In August 2015, a Virginia Tech researcher notified the DEQ that he would begin a study of Flint's water quality. The researcher, Dr. Marc Edwards, had spent more than 10 years working with the EPA's Office of Ground Water and Drinking Water on lead issues. The results, posted on-line at www.flintwaterstudy.org, found a 90th percentile lead value in Flint of 25 parts per billion, exceeding the EPA's established 15 parts per billion. This is more alarming given that the researchers were not able to initially target the "worst case" homes. Lead concentrations in some Flint homes were reportedly found at concentrations of over 13,200 parts per billion.

In response to this monitoring data, Flint finally issued a "lead advisory" in September 2015, but still insisted it is in compliance with all federal Safe Drinking Water Act requirements. When the State Department of Public Health and Human Services confirmed the findings of the Hurley Medical Center Study, a public health emergency was finally declared for the City of Flint in October 2015.

After receiving a grant from the state and other charitable foundations, Flint reconnected to Detroit Water in October 2015. While there are some indications that the lead levels may be starting to drop, at this time, it is not known how long it might take for the protective scale to be fully reformed on the inside of the pipes and fixtures. The Michigan Attorney General has now opened an investigation into possible criminal activities.