MEMORANDUM

LEGISLATIVE REFERENCE BUREAU

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To: Ald. James A. Bohl, Jr.

From: Tea Norfolk, Legislative Fiscal Analyst – Lead

Date: October 17, 2016

Subject: The Concentration of Lead in Drinking Water for Thurmont, Maryland and Tacoma, Washington

This memo is in response to your request to provide information regarding the concentration of lead in the drinking water of two communities: Thurmont, Maryland and Tacoma, Washington.

Brief Summary

According to a 2008 study by Peter L.D. Van Caulart, VP & Director Environmental Training Institute in Ontario, "Fluorosilicate Compounds Increase Drinking Water Lead Levels, Hence Source Water Contamination," fluosilicic acid is a good solvent for lead, and the prevalence of children with elevated blood lead levels is about double that in non-fluoridated communities. In his study, he notes the following:

> 1992 Tacoma, Washington had to shut down the fluoridation equipment due to the fact that fluoride had eaten the pipes. The municipal water had approximately 32 parts per billion (ppb) lead at the time of the breakdown. After the breakdown, the lead level dropped to 17 ppb. When the equipment was fixed, the lead level shot back up to 32 ppb. The city fathers decided to discontinue the use of fluoride, and the lead level again dropped. Over the next several years the lead level continued to drop, and today it is about 5 ppb. IAOMT p24-25.
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> Thurmont, Maryland had an identical experience with fluoride raising lead levels in their municipal water system. IAOMT p25.

A 2015 report by Geoff Pain, “Plumbosolvency exacerbated by Water Fluoridation,” reports the same results: when Tacoma, Washington, discontinued fluoridation of its drinking water, lead levels in water dropped from 32 ppb to 17 ppb, and in Thurmont, Maryland, the lead levels dropped from 30 ppb to 7 ppb when fluoridation ceased.

A presentation by Frances Frech, “Fluoride and Lead,” originally presented at a State Lead Commission hearing in Hannibal, Missouri in 1994 stated the following:

> Let us tell you a tale of two cities–Tacoma, Washington, and Thurmont, Maryland. Both of them saw significant decline in lead levels only six months after fluoridation was stopped. (In Tacoma, that was due to equipment problems, in Thurmont, it was a temporary ban by the city council.) Tacoma registered a drop of nearly 50% (20); in Thurmont it was 78%. To the best of our knowledge, no other explanations were offered. In Thurmont the ban is now permanent.
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> Unfortunately, Tacoma returned to fluoridating its drinking water and a battle continues over whether to stop it.

Thurmont, Maryland

In 1992, Thurmont, Maryland stopped fluoridating its water. Lead levels dropped by 78%. Thurmont turned off the fluoridation equipment permanently.

Thurmont’s water department posts the following notice to residents: “The Town of Thurmont does not add fluoride to the water system.” Thurmont gets its water from five wells, one of which is ground water under the influence of surface water and is, accordingly, treated as surface water. Although the drinking water is not treated with fluoride, some fluoride does naturally occur in Thurmont’s drinking water.

Thurmont issues an Annual Drinking Water Quality Report. The 2016 report identified the likely source of fluoride as “[e]rosion of natural deposits” and “[d]ischarge from fertilizer and aluminum factories.” It further states that fluoride is a “[w]ater additive which promotes strong teeth. Of the sites tested under the U.S. EPA’s Lead and Copper Rule, one had lead levels in the 90^{th} percentile for parts per billion of lead. The likely source of contaminants was listed as “[c]orrosion of household plumbing systems; [e]rosion of natural deposits.” No lead was detected in 2012.

According to a February 2, 1994 article by Julia Robb published in The Frederick Post:

> Lead levels in town water have decreased significantly since town officials stopped adding fluoride, commissioners reported at Wednesday's meeting. They also voted to officially ban fluoridation.
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> Fluoride itself does not produce high lead levels, but fluoride must be introduced along with fluorosilicic acid, and town officials believe that the acid washes lead from pipe soldering, said Mayor Terrence Best.
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> When commissioners first had water tested in 1992, some houses had 50 times the accepted limit established by the U.S. EPA, and the average amount measured twice the limit, he said. Commissioners then stopped using fluoride.
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> The suggested lead limit in water is 15 parts per billion. A May 1993 test showed decreasing levels of lead in water. The high was 136.25 ppb, and the average was 9.25 ppb.
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> A third test, conducted in November, found the high at 31.95 ppb and the average at 7.11 ppb.

Tacoma, Washington

According to a 1992 letter written by C. R. Myrick, Water Quality Coordinator of Tacoma Public Utilities, after Tacoma temporarily ceased fluoridation:

> It is interesting to note the 90th percentile lead concentration was 17 ppb this time compared to 32 ppb last time. We have not been using fluoride since the drought this summer. This latest testing gives us some limited insight as to the amount of chemical adjustment that may be necessary. The percentage of homes that failed the "action level" was 9.8 percent.

According to a January 4, 2014 article by Robert Jay Rowen, MD, published in the Sonoma County Gazette:

Tacoma had to close down fluoridation in its system in 1992. Fluoridated water had eaten away metallic copper from its pipes, exposing lead in fittings. Lead levels soared. When fluoridation was stopped, lead fell, only to rise again when fluoride was restarted. Fluorsilicic acid caused lead levels to spike to over 900 ppb. Fluoride's addition creates ammonium fluosilicate, an established solvent for metallic copper alloys. Other cities have documented clear dangerous lead drinking water elevations after fluoridation began (Lebanon, OR, NYC, Thurmont MD).

Studies Linking Fluoride's Effects on Lead Leaching into Water

According to a 2007 study by RP Maas, et. al., published in Neurotoxicology, "Effects of fluoridation and disinfection agent combinations on lead leaching from leaded-brass parts," when chlorine was added to water, lead levels doubled from 100 to 200 parts per billion (ppb). When fluosilicic acid, a type of fluoride, was added to chlorinated water, lead levels increased to more than 900 ppb. In this study, lead concentrations seemed to increase with time over a three-week period of using water treated with chlorine and added fluosilicic acid. The conclusion of the study was that fluoride chemicals combined with other water additives, especially a combination of chloramines and fluosilicic acid, pull lead from plumbing systems into drinking water.

According to a 2007 study by Myron J. Coplan, et. al, published on Neurotoxicology, "Confirmation of and explanations for elevated blood lead and other disorders in children exposed to water disinfection and fluoridation chemicals," living in communities with silicofluoride treated water is associated with prevalence of children with elevated blood lead at a rate of approximately double the rate in non-fluoridated communities. Silicofluoride is associated with corrosion of lead-bearing brass plumbing, producing elevated water lead levels at the faucet.

According to a 2000 study by RD Masters, et. al., published in Neurotoxicology, "Association of silicofluoride treated water with elevated blood lead," previous epidemiological studies have associated silicofluoride-treated community water with enhanced child blood lead parameters. The highest likelihood of children having elevated blood lead levels occurs when they are exposed to both silicofluoride-treated water and likely to be subject to another risk factor known to be associated with high blood lead levels, such as old housing.

According to a 2010 study by RM Sawan, et. al., published in Toxicology, “Fluoride increases lead concentrations in whole blood and in calcified tissues from lead-exposed rats,” higher blood lead levels have been reported in children living in communities that receive fluoride-treated water. The authors found that fluoride consistently increased concentrations of blood lead and calcified-tissue lead in animals exposed to low levels of lead. The authors suggested that a biological effect not yet recognized may underlie the epidemiological association between increased blood lead levels in children living in water-fluoridated communities.

Dr. J. William Hirzy, Chemist in Residence at American University’s College of Arts and Sciences in Washington, D.C., and former EPA senior scientist, wrote a letter in 2013 to the acting administrator of EPA, petitioning EPA to prohibit the use of hydrofluorosilicic acid (HFSA) as a fluoridation agent, instead urging the use of pharmaceutical grade sodium fluoride. He identified as one of his reasons for urging this prohibition, the fact that, in combination with chloramine, HFSA leaches lead from pipes and plumbing fixtures into drinking water.

Note, however, that the CDC states that “according to the U.S. EPA and the National Association of Corrosion Engineers, corrosion is not related to fluoride.” Instead, corrosion is caused primarily by dissolved oxygen, pH, water temperature, alkalinity, hardness, salt, hydrogen sulfide, and certain bacteria. Additionally:

> Fluoride, at concentrations found in potable water, does not cause corrosion. A small increase in the corrosivity of potable water that is already corrosive may occur after treatment with alum, chlorine, fluorosilicic acid, or sodium silicofluoride, which decreases pH. This may occur in some potable water sources with little buffering capacity; it can easily be resolved by adjusting the pH upward.

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