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**From:** Deltoral, Miguel <deltoral.miguel@epa.gov>  
**Sent:** Friday, February 27, 2015 5:59 AM  
**To:** Crooks, Jennifer;Prysbey, Mike (DEQ)  
**Cc:** Busch, Stephen (DEQ);Rosenthal, Adam (DEQ);Poy, Thomas;Schock, Michael;Porter, Andrea  
**Subject:** Re: HIGH LEAD: FLINT Water testing Results

Jen/all - I think things got garbled in translation...

What I was saying is that where you find Pb values that high, it is usually due to particulate lead. Not always, but generally. Particulate lead is released sporadically from lead service lines, leaded solder and leaded brass in a number of ways and folks tend to discount these values as anomalies, but particulate lead release is a normal part of the corrosion process and it is universal (common) in all systems. It's just that it is not captured as often by the infrequent LCR sampling. If systems are pre-flushing the tap the night before collecting LCR compliance samples (MDEQ still provides these instructions to public water systems) this clears particulate lead out of the plumbing and biases the results low by eliminating the highest lead values. If systems are pre-flushing and still finding particulate lead, the amount of particulate lead in the system can be higher than what is being detected using these 'pre-flushed' first-draw samples. My point on that was that people are exposed to the particulate lead on a daily basis, but the particulate lead is being flushed away before collecting compliance samples which provides false assurance to residents about the true lead levels in the water.

Some quick notes on particulate lead release:

- Fe/Mn can transport lead from the lead service lines into the home. The lead sorbs onto the Fe/Mn particles. In GW systems, Fe/Mn can come from the source water and more Fe from the water mains. In SW systems, the Fe typically is released from the water mains.
- Lead released from lead service lines can also 'seed' galvanized iron pipes inside the homes. Again, the lead sorbs onto the iron on the pipes and be released sporadically. Generally, the higher the flow, the more Fe and Fe+Pb particulate you will likely get.
- If there is a partial lead service line (lead connected to copper) you can get additional lead release due to galvanic corrosion.
- Leaded brasses and solder can also release particulate lead under certain circumstances.
- The particulate can contain very high concentrations of lead (hundreds to thousands of ppb Pb) which is a much higher concentration than lead paint, so even small particles can result in high lead values.
- If the lead service line was disturbed (water main repair/replacement, meter installation repair/replacement, service line leak repairs, etc.) you can have VERY high lead levels in the scale and sediment that is dislodged from the inside of lead service lines. Here in Chicago, during a partial lead service line replacement, we collected the scale and sediment that came into the home and we found 300,000+ ug/L lead in the scale; 125,000 ug/L Pb in the sediment. Very dangerous.
- Higher levels of PO<sub>4</sub> (3-4 mg/L Ortho) seem to reduce the amount of particulate Pb that is released in the absence of physical disturbances to the lead lines. Doesn't stop it entirely, but should generally reduce the occurrence. Caveat – Other water quality issues can change the chemical complexes that form on the pipe, so cleaner sources with more consistent WQ form more predictable scale complexes.

If I remember correctly, Detroit is feeding PO4 for the LCR, but since Flint is no longer part of that interconnection, I was wondering what their OCCT was. They are required to have OCCT in place which is why I was asking what they were using.

Mike Schock is our resident expert and may be able to help out with the simultaneous compliance (Pb & DBPs) so I would suggest that folks give him a call.

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**From:** Crooks, Jennifer  
**Sent:** Thursday, February 26, 2015 04:15 PM  
**To:** Prysby, Mike (DEQ)  
**Cc:** Busch, Stephen (DEQ); Rosenthal, Adam (DEQ); Deltoral, Miguel; Poy, Thomas  
**Subject:** HIGH LEAD: FLINT Water testing Results

Thank you, Mike. These results are dated 2/18/15, so they're probably different results than the results Adam had, but they still have to be included in with compliance calculation of the 90<sup>th</sup> percentile. What dates are the earlier compliance samples?

Yes, the stagnation of the water would increase the lead levels, and I'm glad you're following up with the City to get the lead levels reduced for Mrs. Walters' home—which will hopefully be effective for her neighbors because they are also most likely being exposed to these high lead levels. Miguel reminded me this morning, there are no safe levels of lead in drinking water.

I talked with Miguel Del Toral about his knowledge on research on lead. He said that high levels of iron, usually bring high levels of lead. The large amount of black sediment at Mrs. Walters' home, is most likely particulate lead, Miguel said, where the lead actually bonds to the iron sediment. While the particulates of lead/iron are small, they're very highly concentrated with lead—up to 95% lead.

Miguel was wondering if Flint is feeding Phosphates. Flint must have Optimal Corrosion Control Treatment—is it Phosphates? Or is it pH/Alkalinity Adjustment? The reason he asks, is because systems using the pH/Alkalinity adjustment have problems with lead levels in the 100's or higher—and they have problems with random lead particulate matter in the distribution system. Miguel said that we all know that flushing regularly helps reduce the lead concentrations, but not immediately. The City can't just flush in advance of taking the compliance samples, they have to flush the lines on a regular schedule.

The problem with high lead issues, is that the water has so many different variables, that it's hard to pinpoint what is causing what problem where. From a public health perspective, can we assume that the high lead levels in Mrs. Walters' neighborhood are isolated to just her area? Or are they more widespread?

Please feel free to contact Miguel directly—312-886-5253; Deltoral.miguel@epa.gov.

Jennifer

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**From:** Prysby, Mike (DEQ) [mailto:PRYSBYM@michigan.gov]  
**Sent:** Thursday, February 26, 2015 10:25 AM  
**To:** Crooks, Jennifer