

April 12, 2016

**INTERIM REPORT:  
LEAD CONCENTRATIONS IN DRINKING WATER AT  
CAROLINE ELEMENTARY SCHOOL, SLATERVILLE SPRINGS, NY**

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**I. Background**

Drinking water for Caroline Elementary School is supplied by an on-site groundwater well and disinfection system. The water system must meet the requirements of the NYS Sanitary Code Subpart 5-1. The Ithaca City School District (ICSD) is responsible for the operation of the water system; selected staff in the Facilities Department are certified water system operators. Regulatory oversight is provided by the Tompkins County Health Department (TCHD) Division of Environmental Health.

Requirements for controlling lead and copper in public water systems are contained in Section 5-1.40 to 49 of Subpart 5-1, Public Water Systems. Under these regulations, 90 percent of sample results must be at or lower than the lead action level of 15 ug/l, which is equivalent to 15 parts per billion (ppb). Action including public education, water monitoring, treatment or remediation must be taken when the 90<sup>th</sup> percentile requirement is exceeded. Since 2006, Caroline Elementary School has been on a 3-year monitoring schedule for lead and copper in accordance with these regulations.

Lead usually enters drinking water as a result of the corrosion, or wearing away, of materials containing lead in the water distribution system and household plumbing. Therefore, lead concentrations will vary throughout a water system. In a school's water systems, lead levels may increase when water in the plumbing system stands overnight, over the weekend, and throughout term breaks when there are no classes.

Schools that do not supply their own drinking water are not required to meet the specific regulations in the NYS Sanitary Code. In October 2006, EPA released revised technical guidance *3 T's for Reducing Lead in Drinking Water in Schools*. The Guidance provides information on how schools should test for lead in their drinking water and recommends corrective action be taken if a sample from a fixture exceeds 20 ppb.

There are differences in the procedures used when sampling for compliance with the NYS Sanitary Code and that recommended in the EPA *3 T's Guidance*. The regulations in the NYS Sanitary Code are aimed at identifying system-wide problems rather than problems at individual outlets. The EPA *3 T's Guidance* was designed to pinpoint problems at specific drinking fountains or other fixtures.

**II. Recent Sampling History**

Sampling requirements in 2015 for Caroline Elementary School included lead testing to be conducted between June 1 and September 30 at 5 locations. On August 25, 2015 before school was in session, the ICSD tested drinking water samples from Caroline Elementary Schools for lead (see Table 1). The result for one of the samples significantly exceeded the lead action

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level of 15 ppb. The 90<sup>th</sup> percentile was 75 ppb. TST-BOCES collected the samples for the ICSD. A letter report written by BOCES noted that for at least one location the water had not been used since the end of school in June and the sample was turbid. When water stands in the pipes unused for very long periods of time (many days), more lead can dissolve into the drinking water. Standing water likely contributed to the high August test result.

Consequently, 10 samples were collected in January 2016, following recommended flushing and sampling procedures. (See Table 1). With one exception (the sink in Rm. 27), all results were lower and the 90<sup>th</sup> percentile requirement was met. Results from the sink in Rm. 27 exceeded the action level of 15 ppb and one drinking water fountain (Rm. 53) was at the action level. The ICSD replaced the fixtures and piping at these locations.

In addition to replacing the two fixtures, the ICSD decided to hire an independent company to sample every fixture at Caroline Elementary School. The TCHD was not involved in the process. After school on the day before sampling, every fixture at Caroline Elementary School was simultaneously and vigorously flushed for several minutes. The entry-point valve was then shut off, turning off all water to the system. When the water was turned on the next morning, the water system had apparently depressurized over night. Ninety-one samples were collected on the morning on February 6. Samples from two locations had to be resampled for analysis. Those locations were resampled on February 9.

The results from this sampling event are included in Table 2. Of the 91 samples, 47 locations exceeded the action level of 15 ppb with an additional 2 locations at 15 ppb. Results ranged from a low of 1 ppb to 5000 ppb, with 14 locations at or exceeding 100 ppb. The location labeled "Boiler Room/Post Storage Tank Tap" (the closest sampling point to the source water) had a concentration of 68 ppb, but the Boiler Room sink sample had a concentration of 7.4 ppb.

When these results were received, the ICSD turned off all consumptive-use fixtures and provided certified bottled water to the school.

Sample results submitted to the TCHD in 2012, 2009 and 2006 had no results exceeding the action level (See Table 3). Previous samples were generally from different locations than the August 2015 and January 2016 samples.

A schematic of the Caroline School showing the ages of sections of the building is contained in Figure 1.

Several observations are important in reviewing this data:

- First, the procedures followed in the February 2016 school-wide sampling departed significantly from normal water system operation and standard sampling procedures. The

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vigorous flushing of the system, the shutting off of the water to the system and the reported depressurization of the Caroline Elementary School water system all may have created disruptive, turbulent or scouring conditions in the water pipes, potentially releasing lead-containing particles into the distribution system.

- The "Post Storage Tank Tap" in the Boiler Room contained 68 ppb lead (the location closest to the ground water source); however, other points in the system were below the action level. The Boiler Room "Entry Point" sample contained 7.4 ppb lead.
- The ICSD replaced the two fixtures in January 2016 that were at or above the action level. The February results for both of these locations were significantly higher than before the fixtures were changed.

These observations indicate that the February 2016 sample results do not accurately represent and may significantly exaggerate lead concentrations in the drinking water at Caroline Elementary School.

Note that the sampling locations located in the oldest part of the building (built in 1958) that were all at or below the action level of 15 ppb when sampled in 2006, 2009 and 2012 were also below the action level when sampled in February 2016.

### **III. TCHD Sampling – March 2016**

In consultation with NYSDOH, the TCHD made arrangements to sample 13 locations at Caroline Elementary School during the week of February 29. The purpose of the sampling was to evaluate conditions at specific fixture locations. The sampling was not conducted for compliance with the NYSDOH lead and copper requirements. Therefore, the procedures in the EPA *3 T's Guidance* were followed.

Locations were selected based on the locations with the highest previous concentrations, the "entry point" and one sample that was slightly elevated. Since the fixtures had been turned off to prevent use, the ICSD carefully flushed the system prior to sampling and the TCHD flushed the sample locations the afternoon prior to sample collection in an effort to remove any sediments or other contaminants that had been introduced to the system during the February school-wide sampling. Both a first draw and a flushed sample were collected.

TCHD staff visually examined samples collected during the flushing the day before sample collection. Unlike during some previous sample collection, no turbidity issues were identified. However, the water flowed through a coffee filter and debris was noted in three of the samples collected for visual analysis. During the sample collection the following day (on March 3), it was noted that one of the fixtures leaked and others leaked while the sample was being collected, so the result would not accurately represent a "first draw" sample. Turbidity was measured when the sample was collected. When possible, the aerators were removed after sample

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collection. Sediment or debris was contained on all aerators, including at the two fixtures that had been recently replaced due to high results in January.

One location, the Boiler Room "Post Storage Tank Tap" is located in a confined space and was not sampled. This is the location closest to the ground water source. During the March sample collection, TCHD staff noted that the fixture appears to be a brass hose bib. This tap is located after chlorination and the water storage tank. Little information is known about the steel storage tank, which is original to the building.

The ICSD replaced the aerators at all sinks that were sampled.

#### **IV. ICSD Sampling – March 2016**

During the week of March 7, the ICSD collected samples at the same locations (with the exception of the Boiler Room location) previously sampled by TCHD. The same procedures were followed except that all fixtures in the water system were not flushed the day before sampling. Since the fixtures had been turned off to prevent use, the ICSD carefully flushed the sample locations the afternoon prior to sample collection in an effort to remove any sediments or other contaminants that had accumulated.

#### **V. Findings**

The results from the TCHD sampling event on March 3 are summarized in Table 4. The results from the ICSD sampling event on March 11 are summarized in Table 5. Results from several sampling events are summarized in Table 6.

There was debris noted either on the coffee filter during the pre-sampling flushing, in the sample itself or on the aerator for all locations sampled on 3/4/2016 with the exception of the Room 49 drinking fountain and the Boiler Room sink. Debris was noted on all aerators at sink faucets.

With the exception of the Boiler Room sink, all results from 3/4/16 were significantly better than the school-wide results on 2/6/2016. The 2/6/2016 results ranged from 2,200 to 7.4 ppb, with most results greater than 100 ppb. The first-draw results from 3/4/16 ranged from 30.6 to 7.6 ppb. All flushed samples were below the action level of 15 ppb and many were below detection limits.

The results from the ICSD sampling on 3/11/2016 were generally consistent with the 3/4/2016 results. The aerators were cleaned or changed after the 3/4/2016 sampling event, but the results are not necessarily lower for the later sampling. With one exception (Rm 27 sink), the flushed samples on 3/11/2016 were also below the action level.

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Changing the fixtures at the sink in Room 27 and the drinking fountain in Room 53 did not significantly improve results. (Note: both the faucet and the drinking fountain/bubbler were changed at both these locations). The flushed sample in Room 27 was slightly higher than the first draw sample.

**VI. Interim Conclusions and Next Steps**

- As shown by the significantly lower results in both March 2016 sampling events, the procedures for the February sampling event produced elevated results that do not represent normal conditions for Caroline.
- Given that the locations sampled in March were those with the highest lead concentrations in the February sampling, both March 2016 sampling events indicates flushing is generally effective in reducing lead levels below the action level of 15 ppb.
- Cleaning and changing the aerator does not produce a significant improvement in water quality.
- Changing the fixtures was not effective in reducing lead concentrations below the action level. The new fixtures meet the 2014 "lead free" requirements, but more information is needed to assess conditions at these locations.
- The flushed sample was higher than the first draw sample in Room 27 for the ICSD 3/11/16 sampling, indicating that there may be a problem with something in the plumbing near that location.
- It is unlikely that the source water is a significant contributor of lead. The 68 ppb found at the "Post Storage Tank Tap" (the closest sampling point to the source water) during the 2/6/2016 sampling could reflect leaching from the fixture, which is a brass hose bib, or water quality changes in the storage tank resulting from the vigorous flushing and depressurization of the system. A true source water tap was installed after this sampling was complete and sample results for lead and water quality parameters as required under the NYS Sanitary Code are pending.
- A plumbing profile needs to be developed before significant additional sampling is conducted or changes are implemented.
- Since lead concentrations tend to increase when water sits in the pipes, the TCHD recommends the fixtures be used for non-consumptive uses (e.g., hand washing) when possible under supervision.
- Drinking water fountains that exceeded the action level should remain bagged or turned off.