

State of Delaware

**Drinking Water Sampling
in Delaware Schools**
Summary Report



This resource provides an overview of the 2023 Delaware school re-sampling initiative designed to identify levels of lead in drinking water. As Delaware moves toward the target of no detectable levels of lead to ensure school drinking water is safe, the next phase of risk reduction will be implementation of a filter first approach.

September 12, 2023
Revised September 13, 2023

Background

In October 2020, with the support of a grant from the federal Environmental Protection Agency (EPA), the Delaware Department of Education (DOE), in collaboration with the Delaware Division of Public Health (DPH), began a sampling initiative in Delaware schools to identify levels of lead in drinking water. The purpose was to identify concerns that could be addressed to reduce the risk of exposure to lead in school drinking water. Initial samples indicated lead may only be an issue at a limited number of fixtures in a small number of schools and did not indicate school-wide problems.

The original sampling initiative took place during the COVID-19 pandemic, and sampling occurred during building closures and extended periods of limited facility use. The [EPA's Training, Testing and Taking Action \(3Ts\) guidance](#), which provides best practices for reducing lead in drinking water, was not strictly followed during this sampling period. DOE identified challenges during the initial sampling period, which included sampling at fixtures with extended stagnation times, sampling fixtures that are not used for consumption, inadequate communication, and planning of next steps. While there were missteps in the initial sampling initiative, the State of Delaware took action by shutting off fixtures, consulted with experts, and developed a plan to resample fixtures in Delaware schools statewide. The plan included identification of the program action level, 7.5 ppb (0.0075 mg/L), that would serve as the guideline to prioritize remediation of elevations observed during the sampling. This level was determined to be appropriate for the program through discussions between DOE, DPH and EPA.

In December 2022, the State of Delaware identified \$1.5 million in funding to conduct a new round of sampling. This funding allowed sampling to be conducted at all consumption points in schools, as well as non-consumption points previously tested and shown to have elevated lead concentrations. Sampling was conducted by BATTA Environmental, an experienced environmental services firm based in Newark, Delaware. BATTA ensured qualified personnel took the samples and followed protocols developed from EPA's 3Ts guidance. A robust communications plan was put in place to guide activities and ensure districts and charters received all the necessary support before, during and after the sampling. In support of the sampling initiative and to avoid the issues with planning and communication identified during the previous sampling, a group of subject matter experts was engaged to provide guidance, review plans and communications and ensure the program was moving in the right direction. The DOE-led group included representatives from school and district administration, school facility and operations personnel, DPH staff, and representatives with communications and lead expertise.

Communication

Improving communication was an important part of the resampling initiative. In December 2022, DOE developed a new sampling plan and schedule. Districts and charters were contacted in advance of sampling and were provided instructions on stagnation times, flushing and other steps and information vital to a successful sampling

event. Regular communication leading up to sampling events allowed personnel to assist in planning, ask questions and ensure staff and facilities were prepared. As the project moved forward, communication prior to sampling improved to include a site visit where samplers and facility staff conducted walkthroughs of the facility to identify locations, map and label fixtures and lay the groundwork for sampling. The lessons learned early in the initiative were used to improve procedures and ensure sampling was as efficient and effective as possible.

As results came back to DOE, the next phase of the communications plan was implemented. This included virtual meetings with leadership from each district or charter school to review and discuss the first results they received. This allowed for improved coordination between DOE and the district or charter school on the publication of the results and ensured that the receiving district or charter school understood the results and had support in interpreting the information. DPH provided technical support and worked with DOE and the district or charter school as needed on source identification, remediation options and further sampling as needed. These efforts culminated in districts and charters being able to provide timely and regular updates to their communities as results were received.

Sampling Protocol

Sampling was conducted following the EPA 3Ts guidance, using protocols outlined in Attachment 1. Stagnation times (periods of no water use) of 6-18 hours were strictly adhered to, with sampling paused and/or rescheduled if samplers observed evidence of water use in the facility. Sampling was generally conducted either prior to the start of the school day, or at a time when students were not in the building. However, to avoid excessive stagnation periods, no sampling was conducted if the water fixture had not seen regular use for over 24 hours. With that in mind, sampling was conducted Tuesday through Saturday to ensure regular water use the day prior to the sampling event.

Results

BATTA Environmental began sampling in late December 2022 with the first results arriving in January 2023. DOE received results weekly and shared with the district or charter for dissemination to students, staff and communities within seven days of receipt. In addition, results and information were posted to de.gov/schoolwater on a weekly basis to ensure open communication and transparency throughout the process. The results can also be found on the [Delaware Open Data Portal](https://delawareopen.com/).

The dataset that was developed during this initiative was shared on de.gov/schoolwater with as little editing or reformatting as possible to avoid human error while allowing school communities to see the results for their schools. The dataset includes over 17,000 samples and is currently one of the most comprehensive statewide pictures of lead in school drinking water publicly available. The sampling data that was regularly

published is technical in nature because it was shared with minimal manipulation. With that in mind, DOE updated the dataset associated with this report to include clarifying information. The updates in the final dataset include additional columns with information on steps taken in response to elevated levels, but does not include additional samples. Acronyms and technical terms defined in this report should be considered a companion document to the final dataset.

- ***Dataset Fields***

Much of the information in the data sheet is self-explanatory, such as school and district, but other fields require additional explanation:

- **Facility Location ID** – Depending on the type of fixture, up to three separate samples could be collected. This field was included in the dataset to help readers determine which samples were collected at the same fixture.
- **Sample Types** – Most fixtures had two samples collected while fountains with internal coolers and some other units required an additional sample:
 - *Primary Sample (P)* – Commonly referred to as a first-draw sample, this is the first sample collected after the water has been left stagnant in the system for the required 8-16 hours. This is representative of the conditions present at the beginning of the day or after periods of infrequent use. This sample can help determine if the fixture itself is contributing lead to the water.
 - *Sequential Sample (S)* – This is a sample collected after the primary sample in fixtures, such as water fountains with coolers, to help determine if coolers, storage units or other components are potential sources of lead.
 - *Flush Sample (F)* – This is the last sample collected and helps determine if plumbing leading to a fixture is a potential source of lead.

- ***Results, Units and Qualifiers***

When interpreting the dataset the most frequent asked questions are in regards to the results, units and qualifiers. During the sampling initiative, there were suggestions made on different presentations of results; however, to avoid confusion, changes to the presentation of results were only made upon completion of the sampling. The dataset associated with this Final Report has additional columns and information to help all audiences better understand and interpret the data.

- **Results**

- Results are presented in the final dataset in both milligrams per liter (mg/L) and parts per billion (ppb). The lab results were shared during sampling with only mg/L units, as this is how the information was received from the analytical laboratory. Results are presented in the report as ppb for an easier correlation to the program action limit of 7.5 ppb.
- Results in mg/L can be converted to ppb by multiplying the mg/L result by 1,000. Example: 0.0075 mg/L multiplied by 1,000 equals 7.5 ppb.

- Reporting Limit (RL) – This is the limit set by the laboratory that they have 99% confidence in repeatable, accurate and precise results. The majority of results in the table have a RL of 2 ppb (0.002 mg/L). There are some samples that required an additional procedure to be performed by the lab, often due to turbidity (clarity) of the sample, which results in a RL of 1 ppb (0.001 mg/L).
- Method Detection Limit (MDL) – This is the limit of the method and equipment being used by the laboratory to determine if lead is present in the sample at or above the MDL of 0.66 ppb (0.00066 mg/L).
- For this project, samples that are designated with “U” are considered “non-detectable” below 2 ppb and are listed in the data spreadsheet as 2 ppb (0.002 mg/L). Results that are below 2 ppb are given a “J” qualifier, as they are considered estimated values because they are below the RL but above the MDL. BATTA’s analytical lab has high level of confidence in the results being repeatable down to a lower limit of 2 ppb (0.002 mg/L); DOE has discussed this with EPA and BATTA to ensure it is a conservative and appropriate approach for defining “non-detectable” and interpreting and communicating results.
- Qualifiers
 - **U** = lead was not detected above the reporting limit of 2 ppb (0.002 mg/L).
 - **J** = Result was below the reporting limit of 2 ppb (0.002 mg/L) but above the MDL of 0.66 ppb (0.00066 mg/L). This is considered an estimated value because it is outside the range of confidence the lab requires for results above the RL.

Conclusions and Next Steps

The sampling conducted from December 2022 through May 2023 has provided a comprehensive dataset to help guide next steps, including the implementation of a “Filter First” approach. The full dataset which provides information on individual samples and fixtures can be found on de.gov/schoolwater.

The results of the different samples at each fixture (primary, sequential and flush) are used to help determine the potential location of any lead observed in the sample. This helps guide remediation efforts and next steps. Lead observed in the primary sample, but not in the other samples, is an indication that the fixture is the issue and replacement may be a recommended next step. Based on sample results, districts and charters were provided with immediate and long-term recommendations for fixtures with results above the action limit of 7.5 ppb. Many of these remediations are underway.

Results from the sampling initiative were used to guide efforts to reduce lead in drinking water throughout Delaware schools. School districts and charters, with support from

DOE and DPH, implemented steps to best address any elevated levels. These steps primarily included fixture replacement and filter installation. Immediate recommendations consisted of turning off fixtures and/or posting signage to prevent consumption. Long-term solutions included fixture removal, fixture replacement and/or installation of high-quality filtration. Non-consumption sources, such as handwashing sinks, may have permanent signage warning against consumption, but schools are encouraged to address these sources as funding allows. Samples with results above 7.5 ppb (0.0075mg/L) were prioritized for remediation during the program, so samples below the action level have an “NA” for these columns in the dataset. School districts and charters are encouraged to review data from locations with results below 7.5 ppb (0.0075 mg/L) for future efforts to further reduce lead exposure. As the remediation efforts continue, DOE has added these recommendations, as well as steps the districts and charter schools have already taken, to the final dataset posted on de.gov/schoolwater.

As Delaware moves toward the target of no detectable levels of lead to ensure school drinking water is safe, the next phase of risk reduction will be implementation of a Filter First approach. Delaware’s implementation of Filter First will result in the installation of high-quality filtration and fixture removal or replacement to reduce lead safely and efficiently. This effort will shift from a reactive strategy of fixing problems as they are identified, to a more proactive approach, which includes providing high quality filtration on fixtures, replacing older fixtures with newer, lead-free models and other actions to reduce potential exposures to lead and other drinking water contaminants. This new paradigm does not wait for problems to be identified; it focuses available resources on continual improvement of drinking water quality through action rather than sampling.

In support of this effort, \$3.8 million dollars was allocated in the one-time supplemental appropriation ([House Bill 196](#) of the 151st General Assembly), which was signed by Governor Carney on June 30, 2023. This funding has been provided to districts and charter schools throughout the State, with allocations based on the approved capacity of each school building to provide a base number of bottle fillers, filtration systems and fixture replacements. Contingent on funding, it is the intent of the State that LEAs will install filtration at all consumption points.

Additionally, a statewide facility assessment tool is currently under development, as required by [Senate Substitute 1 for Senate Bill 270](#) of 151st General Assembly. Upon development, this tool will be available to all districts and charter schools no later than January 2024. The goal of the facility assessment tool is to provide an overall picture of school conditions, including water quality, and help prioritize the use of State funds in schools.

The State of Delaware has taken the school water initiative seriously and dedicated significant resources to ensure that stakeholders have a clear picture of existing water quality in our public schools. The State will continue to support our districts and charter schools as we work together toward the common goal of safe drinking water with no detectable levels of lead.

Sampling Protocol for Lead in Drinking Water In Delaware Schools and Childcare Facilities Conducted Under 2017 WIIN Grant

Below is the sampling protocol to be followed by Delaware Division of Public Health, Health Systems Protection (HSP) Staff and sampling contractors for samples collected under the purview of the EPA grant awarded to the Delaware Department of Education (DOE). Approved samplers are required to have adequate water sampling background, education, and training on the EPA 3Ts sampling guidance document. This document applies to initial and follow-up sampling events.

Sampling Plan

Sampling plans need to be completed before any sampling can occur in a facility. Sampling plans should be completed as far in advance as possible, ideally a few days ahead to ensure adequate preparation. In the event of a short notice sampling event, the plan should be completed prior to start of sample collection. Sampling plans must include the following:

- Building or facility contact who can provide comprehensive knowledge of water entry into the building and plumbing within the building.
- Identification of all consumable points and fixtures within the building
- Utilization of building blueprints or diagrams provided by facility maintenance staff
- Sampling of fixtures beginning closest to the water entry point and working outwards as dictated by the plumbing infrastructure in each building.
- If the building is more than one floor, sampling should begin from the lowest level first and then working up each subsequent floor.

Stagnation Times

- Communicate with facility staff to ensure that sampling points are not utilized between from the time the system is flushed to the time the samples are collected. It may be useful if they place a “Do Not Use” sign on each tap.
- Instruct facility staff to conduct a system flush the day prior to sampling no earlier than noon and no later than the close of the building, 16:00 – 18:00.
- The system should sit and “stagnate” for 8 to 16 hours before samples are collected. Samplers are to verify this with facility staff the day of sampling before any samples are collected.
- Sampling should not be conducted in facilities during extended closures, including weekends and holiday breaks. Sampling may be conducted on Saturdays at the discretion of the school district.

Sampling

- On the day of sampling conduct a building walkthrough with facilities personnel to ensure the sampling plan is correct and all fixtures have been identified.

- Identify the fixtures on the sampling map and give unique sample location names (i.e. Fountain by Room 123, Cafeteria Prep Sink, etc.)
- For sinks with both hot and cold knobs, use only cold water.
- Collect samples at a normal rate of speed, if water flow or pressure is too low document in the sampling plan and do not proceed with sample collection

Initial Samples

- Initial samples are to be collected at each sampling location
- Place bottle underneath tap, turn on fixture and collect all the water that comes out until ~250 mL of water is collected
- Place the tamperproof lid on the fixture and barcode/label on the bottle
- Place the corresponding form barcode/label on the sample form and fill in all the data areas
 - Facility
 - Time
 - Sampler Name
 - Sample Location
 - Sample Type
 - Stagnation Time
 - Additional Notes

Flush Samples

- After collection of the initial draw sample, run the fixture for 30 seconds
- With the fixture on, collect another 250 mL from the fixture
- Place the tamperproof lid on the fixture and barcode on the bottle
- Place the corresponding form barcode on the sample form and fill in all the data areas
 - Facility
 - Time
 - Sampler Name
 - Sample Location
 - Sample Type
 - Additional Notes

Chain of Custody

- Chain of custody (COC) forms are to be filled out at the completion of each sampling event.
- Each data sheet will have a barcode that matches the barcode on the bottle of the sample collected.
- Each COC will contain the following information
 - Sampling Site
 - Sample ID/Barcode
 - Analysis Requested
 - Sample Date

- Sample Time
- Sample Description/Location
- Total Number of Containers
- Transfer of custody must be filled out each time someone knew obtains possession of the samples or when the samples are dropped off to the lab.
- Carbon copies of the COC are to be retained once samples are dropped off to the lab for retention purposes.

Approved Samplers:

- HSP Environmental Hazards and Toxicology Staff
- ODW staff
- Subcontractors