

The Flint, Michigan lead crisis, aftermath and ramifications

by Dave Leland

The drinking water lead crisis in Flint, Michigan continues to receive national and local media coverage and attention from Congress, USEPA and the state of Michigan. This tragic incident gives us the opportunity to take a fresh look at our collective lead and copper regulation implementation efforts to assure that we are collectively doing all we can do to minimize lead in drinking water. **This issue of the Pipeline is devoted entirely to this topic.**

Before we look in detail at the Flint crisis, what does it mean to water suppliers here in Oregon? Here are our recommendations for action in the aftermath of the Flint crisis:

1. Revisit your water system materials evaluation. Revisit status of lead pigtail removal from service lines, ensure completion.

Continued on page 2

State agencies announce plan to help school districts and childcare centers reduce lead in drinking water

by Dave Leland

On Jun. 8, 2016, Oregon’s education and health agencies recommended all school districts and childcare programs test drinking water this summer, as part of a statewide plan to reduce student exposure to lead. The plan, developed by the Oregon Department of Education (ODE) and the Oregon Health Authority (OHA), is in response to Governor Kate Brown’s April directive to the agencies to review water quality in schools and develop recommendations. See <http://public.health.oregon.gov/HealthyEnvironments/DrinkingWater/Pages/index.aspx> under “News.” Also see the OHA Fact Sheet on page 11.

Schools and childcare centers are likely to contact their water supplier as this plan moves forward. The plan is summarized here to help water suppliers respond to and assist their customers.

Continued on page 4

What’s in the Pipeline

The Flint, Michigan lead crisis, aftermath and ramifications	1	Consumer notification of individual results	8
State agencies announce plan to help school districts and childcare centers reduce lead in drinking water	1	Guidance for lead and copper sample collection.....	8
Ensuring proper sample site selection	4	Funding available for service line replacements.....	9
Lead and copper implications when adding a new source or treatment.....	6	Finding lead resources on the DWS website	10
Reporting requirements under the Lead and Copper Rule	7	Fact sheet: Information for schools and childcare facilities	11
		Meeting calendar.....	12
		Training Calendar	12

2. Review your sample site selections, be sure to include homes with lead pigtailed if any remain.
3. Revisit sampling instructions for residents to ensure instructions meet EPA guidelines — no “prestagnation flushing,” no aerator removal or cleaning, use wide-mouthed sample bottles.
4. Sample result invalidation by the state is limited only to lab error, bottle damage/ tampering, or site did not meet sample site selection criteria. Be sure you sample from sites with current active use because all results from legitimate sampling sites will count.
5. Revisit your corrosion control treatment, especially when adding a new source or treatment. Look for opportunities to optimize corrosion control treatment performance to reduce lead at the tap as much as possible.
6. Ensure consumer notification is timely following routine tap sampling.
7. Ensure required follow-up actions are taken on schedule after any lead action level exceedance, including timely and complete public education.
8. Be transparent to the public in all you do.

Flint, Michigan experienced a population drop of more than 50% since the 1960s, due largely to the exodus of automobile manufacturing in the 1980s. The remaining and largely minority population is severely economically disadvantaged and faces dismal health indicators and outcomes. The housing stock is old, with a substantial percentage of houses receiving city drinking water through lead service lines.

The state placed the city under its direct fiscal control in recent years in response to severe city financial shortfalls. In April 2014, the state-appointed financial emergency manager

directed that water purchased from the nearby city of Detroit be discontinued to save money. The city’s original water source up to the 1960s, the Flint River, was reactivated along with the existing water filtration plant. Detroit water was treated with orthophosphate corrosion inhibitors, but the original city source was not.

Water complaints rose rapidly after the source switch, including widespread red water and taste and odor, followed by *E. coli* detections. Subsequent increased chlorination levels resulted in elevated disinfection byproducts. Finally, increased numbers of *Legionella* infections in the community were reported. Lead levels at the tap were increasing through all of this because of the lack of corrosion control and the presence of lead water service lines, but this rise in lead levels was initially obscured by city sampling deficiencies.

Some city residents began to worry about lead, and persistently complained to local and state officials, to no avail. Help ultimately arrived from an EPA Region V inspector and a Virginia Tech academic expert and his students. Together they demonstrated alarming levels of lead at the taps of city residents. The county health department issued a “do not drink” advisory in October 2015 (18 months after switching sources), and the city switched back to Detroit water that same month.

In December 2015, a local pediatrician published a peer-reviewed journal article documenting a significant rise in the number of Flint children with elevated blood lead levels. That rise was associated with the increase in tap water lead levels resulting from the water source change to the Flint River. The Michigan governor declared an emergency, and distribution of bottled water and home filters began. Lead levels at the tap started and continue to decline, but recommendations to use bottled water or filters remain in place.

Continued on page 3

The Flint, Michigan lead crisis and why it occurred continues to be a focus of both investigative journalism and oversight by agencies and interest groups. The Flint Advisory Task Force final report, dated Mar. 16, 2016 (see <http://www.michigan.gov>), provides a detailed timeline of the events, assignment of responsibilities for the crisis, findings and recommendations. The report found:

1. The Flint water crisis is a story of government failure, intransigence, unpreparedness, delay, inaction and environmental injustice.
2. Though there may be some ambiguity in the EPA Lead and Copper Rule, none of it relates to what the Michigan Department of Environmental Quality should have done in Flint. There was and remains no justification for MDEQ not requiring corrosion control for the switch of water source to the Flint River.

Local media outlets across the country focus on the question, Could Flint happen here? In Oregon, we know there was little past use of lead water service lines compared to the United States. Use in Oregon was primarily short lead “pigtails” several feet in length that connected water mains to the water service line (see photo).

Oregon prohibited use of lead materials in 1985, including lead pipes in water systems and lead solder in plumbing. Water suppliers were required to identify and remove lead “pigtails” or “goosenecks” and any lead pipe. Later in the early to mid-1990s, the EPA Lead and Copper Rule was thoroughly implemented because the natural corrosiveness of Oregon water sources was well known. Corrosion control treatment was installed and operates in 165 communities.

In direct response to the Flint crisis, US EPA officially followed up with each state on its status of implementing the Lead and Copper Rule. You can view these “asks” and our responses to EPA on our drinking water website under “Hot Topics”:

1. Letters were sent to each state primacy agency director requesting action in five specific areas.
2. EPA regions followed up with each state on details about the state’s approach to lead rule implementation.
3. EPA regions followed up with each state on water systems with any lead action level exceedance in the past three years.

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ODE, with the support of health experts at OHA, is working with school districts and childcare programs to implement the plan this summer. The agencies are providing information and technical support to schools and childcare programs. The plan includes:

- **Drinking water testing:** Recommend all school districts and childcare centers test for lead in their facilities this summer and take corrective action where necessary, using the EPA 3Ts Revised Technical Guidance for Reducing Lead in School Drinking Water, which can be found at the website cited above. EPA guidance for schools differs markedly from EPA lead and copper rules for public water systems. This is most notable in two major respects: standing water sample volume is 250 ml, rather than 1 L; and remediation is recommended for a single tap if the lead level is more than 20 ppb, rather than 15 ppb as a 90th percentile of all samples.
- **Certified laboratories:** Recommend schools and childcare centers use certified drinking water testing labs to process water samples for lead.
- **Reportable results:** Require certified laboratories to report lead levels in school and daycare drinking water to OHA.
- **Online database:** Develop a database and a method to transfer lead test records from labs, schools and childcare centers to OHA. ODE and OHA will make results available to the public in an accurate and accessible online format. The database will be available later this fall.
- **Health expertise:** Provide technical assistance on lead and other environmental health issues to schools and daycare centers as needed.

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Ensuring proper sample site selection

by James Nusrala

Identifying appropriate sample sites: Materials evaluation

Close to 25 years have passed since every community and non-transient non-community water system had to complete a materials evaluation of its distribution system to identify high risk sample sites. Now is a good time to locate these records and ensure the information is still accurate. Have service lines been replaced? Has the customer updated their plumbing? If you have no record of this evaluation, water system personnel should repeat the evaluation with proper documentation.

Review the following information to determine the locations of highest risk of leaching lead or copper into customers' taps:

- All plumbing codes and permits
- Records in the building departments files that indicate the plumbing materials installed within publicly and privately owned structures connected to the distribution system
- Distribution maps and drawings
- Meter installation records
- Capital improvement and master plans
- Operation and maintenance manuals
- Interviews with senior personnel, building inspectors and retirees
- All existing water quality information, which includes the results of all prior analyses of the system or individual structures connected to the system, indicating locations particularly susceptible to high lead or copper concentrations

Continued on page 5

Proper sample site selection

A pool of targeted sampling sites is developed from the materials evaluation where the water system can collect the lead and copper tap samples according to the tiered criteria below. Sampling sites may not include faucets with point-of-use or point-of-entry treatment devices that remove inorganic contaminants. Review your lead and copper sample site locations to ensure you are sampling according to your approved list of sites.

Make sure your sampling pool consists entirely of highest priority tier 1 sites if possible. If you have insufficient tier 1 sites, identify tier 2 sites, then tier 3 sites, and finally sites with representative plumbing materials to complete your sampling site pool. A representative site is one where the plumbing materials would be commonly found at other sites served by the system. If water system personnel are not sure why certain sites are in the sampling pool, some research is necessary.

Community systems

Tier (priority)	Description of sample site
Tier 1 (highest priority)	Single family structures that contain copper pipes with lead solder installed from Jan. 1, 1983 through Jun. 30, 1985 or are supplied by lead pipes, including lead goosenecks or lead pigtails. When multiple-family residences comprise at least 20% of the structures served by a water system, the system may include these types of structures in its sampling pool.
Tier 2 (second highest priority)	Buildings, including multiple-family residences that contain copper pipes with lead solder installed from Jan. 1, 1983 through Jun. 30, 1985 or are supplied by lead pipes, including lead goosenecks or lead pigtails.
Tier 3 (third highest priority)	Single family structures that contain copper pipes with lead solder installed before 1983.

Non-transient non-community systems

Tier (priority)	Description of sample site
Tier 1 (highest priority)	Buildings that contain copper pipes with lead solder installed from Jan. 1, 1983 through Jun. 30, 1985 or are supplied by lead pipes, including lead goosenecks and pigtails.
Tier 2 (second highest priority)	Sampling sites that contain copper pipes with lead solder installed before 1983.

When you change sample site locations

Before changing sample site locations, submit documentation for review to your regulator (DWS, local county health department or Oregon Department of Agriculture). Use EPA form 141-A, complete pages 1 and 2, and include a separate page 3 for each newly identified sample site location. Form 141-A is located at this link: <http://www.bit.ly/samplesiteform>.

Contact your regulator if your water system contains any known lead service lines, lead goosenecks or lead pigtails (lead pipes) for further direction on sample site selection.

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Lead and copper implications when adding a new source or treatment

Kari Salis, PE

Water systems adding a new source or treatment may need to return to standard lead and copper tap monitoring (two rounds, six months apart) at the initial number of samples from the approved sampling site pool. The new source may also need to be treated if other sources are treated with corrosion control.

Adding a new source? Water that is currently not treated with corrosion control will need two rounds, six months apart once the new source goes on line. This is true unless you are adding a new groundwater source determined by Drinking Water Services (DWS) to be in the same aquifer as an existing source. Alternatively, you can submit a lead and copper evaluation that assesses water quality information from all sources and distribution to conclude the new source will not affect the lead and copper levels at the tap.

The new source must have the same treatment applied if the other sources are treated to control corrosion. This treatment must be used unless a lead and copper evaluation concludes the water quality of the new source is similar to the system and will not change the lead and copper levels at the tap. Systems using orthophosphate at one entry point to the distribution system must use it continuously at all entry points. Appropriate corrosion control treatment needs to be installed or an evaluation approved before DWS can issue approval to use the source.

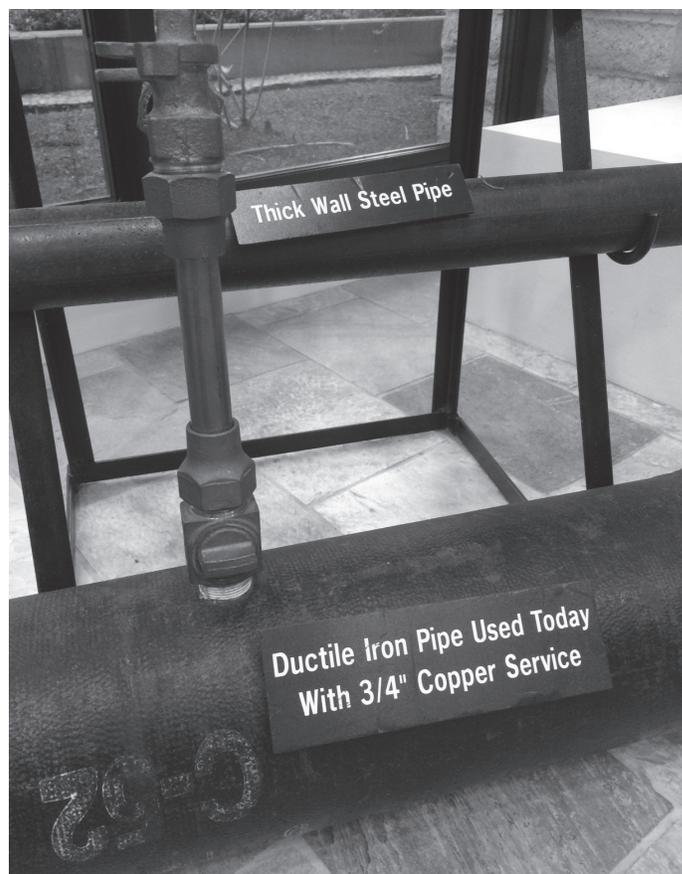
Adding new treatment? A system adding any new treatment that may affect lead or copper levels at the tap will need to conduct two rounds, six months apart once the new

treatment is in place. Treatment types that may affect lead and copper include:

- Adding or changing chemical disinfectant
- Adding or changing coagulation chemicals
- Ion exchange
- Reverse osmosis
- Membrane filtration
- Adding or changing corrosion control treatment

Alternatively, you can submit a lead and copper evaluation that includes a small-scale pilot test and concludes the new source will not affect the lead and copper levels at the tap.

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Reporting requirements under the Lead and Copper Rule

By Chuck Michael

The Lead and Copper Rule has many reporting requirements and compliance due dates. This article gives water suppliers a summary of some of those requirements.

Reporting due dates are when the state must receive a reporting requirement and not a postmark date. The most common compliance deadlines are listed below:

- Reporting of 90th percentile tap sample results are due 10 days after the end of the required seasonal monitoring period. Samples for systems on yearly and three-year monitoring must be collected between June 1 and September 30 and results submitted to DWS by October 10. Reports for systems on six-month monitoring are due January 10 and July 10. Water suppliers should collect samples with enough time for the lab to complete analysis and report by the due date.
- After a 90th percentile action level exceedance, the required actions and due dates will be detailed in a letter to the water system. The associated compliance schedules will be viewable at Drinking Water Data Online (<https://yourwater.oregon.gov/index.html>) on the “Compliance & Enforcement” link.
- Systems with corrosion control treatment and established minimum water quality parameters (WQP) must report the WQP levels at each entry point every month. These reports must include the parameters recorded at a maximum of every 14 days, but we recommend they be collected and reported daily. This report must be submitted within 10 days of the following month.

- Systems with corrosion control treatment and minimum WQP must also report distribution levels at the same interval and due dates as distribution tap samples above. The number of required sites is based on the population served by the system.
- Water suppliers must post or send consumer notifications within 30 days of receiving results from the lab (see separate articles on requirements). In addition, a representative copy of the notification, and certification it was provided to water users must be submitted to the state within three months after the end of the required seasonal monitoring period. Systems on yearly and three-year monitoring have a reporting due date of December 31. Systems on six-month monitoring have reporting due dates of March 31 and September 30.
- Any additional samples collected must be reported to Drinking Water Services separately each monitoring period. Include verification that the site does not meet regulatory samples site selection criteria.

You can submit reports by:

- Fax: 971-673-0694
Please include a cover sheet with the number of pages including the cover sheet, contact name and phone number.
- Email: dwp.dmce@state.or.us
- Mail: Water Quality Reports
P.O. Box 14350
Portland, OR 97293-0350

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Consumer notification of individual results

by Chuck Michael

The Lead and Copper Rule requires notification of the lead results and educational material be provided to those who actually drink the water at the location tested. This includes the residents of the home (or renters if applicable), the employees of a business and the parents of the students at a school. The notification for businesses can be posted in a common area for all employees to review instead of sending a letter.

The notification needs to include:

- The actual lead results of that location (not just the 90th percentile calculation for the water system)
- The maximum contaminant level goal and the action level for lead with the definitions for these two terms
- An explanation of the health effects of lead
- Actions consumers can take to reduce exposure to lead in drinking water
- Contact information for the water system

Notification templates can be found on our website <http://www.healthoregon.org/dwp> under Monitoring and Reporting, Forms, Lead and Copper, or <http://public.health.oregon.gov/HealthyEnvironments/DrinkingWater/Monitoring/Pages/monitoring.aspx#pbcr>.

Water suppliers must send or post the notification within 30 days of receiving results from the lab. In addition, a representative copy of the notification sent and certification it was provided to water users must be submitted to the state within three months after the end of the required seasonal monitoring period. This is December 31 for most systems (those required to sample between June and September).

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Guidance for lead and copper sample collection

by Amy Word

Is your system due for lead and copper sampling? Here are some steps you can take to correctly collect samples that will count for compliance.

- 1) If you have the homeowner collect the samples, explain where to take the lead and copper sample. It should be collected from either a kitchen COLD water tap or a regularly used bathroom COLD tap.
- 2) The water is to be stagnant for at least six hours. Taps used for lead and copper sampling need to be regularly used for drinking or food preparation. A spare bathroom that has not been used in several months is not a good choice. **Do not** pre-flush before hold time.
- 3) If the home uses a water softener, take from a tap not serviced by the softener.
- 4) **Do not** remove the aerator.
- 5) **Do not** pull from a home where the water has not been regularly used (i.e., vacation home or vacant home.)
- 6) EPA recommends wide-mouth sample bottles. These allow for a higher flow rate during sample collection. You can see if your lab offers these bottles.
- 7) **Turning the samples in to the lab certifies they have been collected properly. If the water system allows the homeowner to collect the water sample, make sure to explain the proper sampling procedures beforehand. If a homeowner takes a sample incorrectly, it is not going to be invalidated. See invalidation criteria below.**

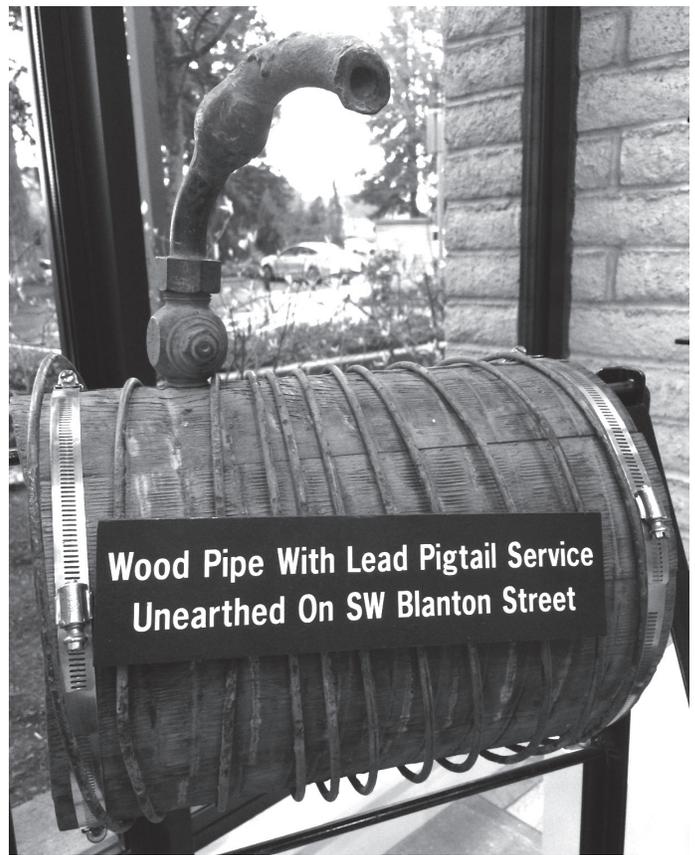
There are four criteria that EPA and DWS allows if a sample needs to be invalidated for compliance. These criteria are: 1) the testing laboratory establishes there was improper

Continued on page 9

sample analysis (lab provides documentation), 2) the sample site did not meet sampling criteria (i.e., janitor sink or outside spigot), 3) the sample container was damaged in transit (shipper provides documentation), and 4) substantial reason to believe the sample was subject to tampering. DWS will only invalidate if the request made matches one of these criteria. Requests for invalidation are needed before the end of the sampling period. If approved for invalidation, a replacement sample must be collected within 20 days.

EPA has updated their lead and copper page. To view the latest information and guidance materials, visit the website at <https://www.epa.gov/dwreginfo/lead-and-copper-rule>.

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Funding available for service line replacements

Did you know that Oregon's Drinking Water State Revolving Fund program can provide funding assistance for complete service line replacements, regardless of pipe material or ownership of the property where the service line is located? Funding assistance can be used for service line replacement from the public water main to the point it connects with premise plumbing. Any community or nonprofit non-community public water system is eligible for Drinking Water State Revolving Funds.

For more information about this funding opportunity, visit our website at <https://healthoregon.org/srf>, or contact the Infrastructure Finance Authority regional coordinator for your area, <http://www.oregon4biz.com/directory.php?d=5#reg>.

Finding lead resources on the DWS website:

On the Drinking Water Services homepage, <http://www.healthoregon.org/DWP>, go to “Monitoring & Reporting” and select “Monitoring & Reporting Forms.” Then click on “Lead and Copper” to view forms, documents and available resources on lead in drinking water.

Drinking Water

County & Dept. of
Agriculture Resources

Cross Connection &
Backflow Prevention ▶

Drinking Water State
Revolving Fund ▶

Emergency Preparedness
& Security ▶

Groundwater & Source
Water Protection ▶

Monitoring & Reporting ▶

Operator Certification ▶

Plan Review ▶

Rules & Implementation
Guidance ▶

Water System Operations ▶

Advisory Committee

Public Health > Healthy Environments > Drinking Water > Monitoring

Monitoring & Reporting Forms

On this page:

- Water System Sampling Points
- Coliform Monitoring
- Turbidity and Surface Water Treatment
- Disinfection Byproducts (DBPs)
- Groundwater Rule
- Maximum Residual Disinfectant Levels
- Chemical Monitoring
- Arsenic
- Radionuclides
- Lead and Copper

Statewide plan for reducing student exposure to lead in drinking water: Information for schools and childcare facilities

In April 2016, The Governor directed the OHA and the Oregon Department of Education (ODE) to review existing programs and create a plan to address the problem of lead in school water. In response, OHA and ODE will:

- Recommend all school districts and childcare facilities to test for lead in buildings.
- Recommend schools and childcare facilities to use accredited drinking water testing labs to process water samples for lead.
- Develop a database and method for transferring lead test records from accredited labs to OHA as a reportable test result.
- Provide drinking water technical expertise from OHA to schools and childcare facilities as needed to support them as they test water in their buildings.

Actions schools and childcare facilities can take

The key steps that need to be taken by school districts and early learning environments include:

1. **Identify sources of lead:** Schools and childcare facilities should test all taps used for drinking or food preparation in the building to identify any lead problems. Follow the [Environmental Protection Agency's 3 T's Revised Technical Guidance](#) to ensure that samples for lead are collected properly and from the right places. Use an [OHA-accredited drinking water laboratory](#) to analyze samples for lead.
2. **Stop access:** Prevent access to water taps that have more than 20 parts per billion (ppb) of lead. This should include shutting off taps, covering water fountains, and providing bottled water to students and staff members.
3. **Communicate:** Make results from tests for lead in water available to students, families, and the community as quickly as possible.
4. **Mitigate and correct:** Replace the sources of lead in building plumbing. Again, EPA 3T's Guidance should be followed.

Resources for schools and child care facilities

Environmental Protection Agency's 3 T's Revised Technical Guidance:

https://www.epa.gov/sites/production/files/2015-09/documents/toolkit_leadschools_guide_3ts_leadschools.pdf

List of OHA-accredited drinking water laboratories:

<http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Documents/dw-lead.pdf>

For advice and consultation on how test for lead in drinking water, please contact: OHA Drinking Water Services at (971-673-0405).



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The following websites provide links to upcoming meetings and trainings related to drinking water.

Meeting calendar

Drinking Water Advisory Committee

▶ <http://public.health.oregon.gov/HealthyEnvironments/DrinkingWater/Pages/members.aspx>

Cross Connection Advisory Board

▶ <http://public.health.oregon.gov/HealthyEnvironments/DrinkingWater/CrossConnection/Pages/advisoryboard.aspx>

Training calendar

▶ <http://public.health.oregon.gov/HealthyEnvironments/DrinkingWater/OperatorCertification/Pages/training.aspx>