Module 4: Developing a Sampling Plan

Plumbing Profile Questionnaire

This questionnaire is designed to assist with determining whether lead is likely to be a problem in a facility. A separate plumbing profile may be needed for each building, addition or wing of the facility, especially if the construction of each took place at different times. The questions in the left column will help to determine whether lead is likely to be a problem in a facility and will enable sampling effort prioritization. The middle column is where questions should be answered. Use the right column as a guide to interpret the answers and gain a better understanding of the significance of possible answers. Some of the questions in this questionnaire may not apply to a facility for various reasons. Skip those questions that do not apply.

Plumbing Profile Question	Answers	What Answers to the Plumbing Profile Questions Mean
1. When was the original building constructed? Were any buildings or additions added to the original facility? If so, complete a separate plumbing profile for each building, addition or wing.		**Older Buildings** – Through the early 1900s, lead pipes were commonly used for interior plumbing in certain parts of the country. Plumbing installed before 1930 is more likely to contain lead than newer pipes. After 1930, copper generally replaced lead as the most commonly used for water pipes. Up until the mid- to late-1980s (until the "lead-free" requirements of the 1986 Safe Drinking Water Act Amendments took effect), lead solder was typically used to join these copper pipes. The efforts of a public water system over the years to minimize the corrosiveness of the water may have resulted in a protective coating of mineral deposits forming on the inside of the water pipes (passivation). This coating insulates the water from the plumbing and generally results in decreased lead levels in water. If the coating does not exist or is disturbed, the water is in direct contact with any lead in the plumbing system.

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		Newer Buildings – New buildings are not likely to have lead pipes in their plumbing systems, but they are very likely to have copper pipes with solder joints. Buildings constructed prior to the late 1980s, before the "lead-free" requirements of the 1986 Safe Drinking Water Act Amendments, may have joints made of lead solder. Buildings constructed after this period should have joints made of "lead-free" solders. In addition, "lead-free" brass fixtures or plumbing components purchased or installed prior to 2014, the Reduction of Lead in Drinking Water Act effective date, were allowed to contain higher levels of lead. Even if "lead-free" materials were used in new construction and/or plumbing repairs, lead leaching may occur. See the **Training Section** for more information on the "lead-free" requirements.
2. If built or repaired since 1986, were "lead-free" plumbing and solder used in accordance with the "lead-free" requirements of the 1986 Safe Drinking Water Act Amendments? What type of solder has been used?		The 1986 Safe Drinking Water Act Amendments banned plumbing components that contained elevated levels of lead. The Reduction of Lead in Drinking Water Act further reduces lead in pipes, pipe fittings, plumbing fittings, and fixtures to a weighted average of 0.25 percent. The Act also redefines "lead-free" under the SDWA to mean: not containing more than 0.2 percent lead when used with respect to solder and flux and not more than a weighted average of 0.25 percent lead when used with respect to the wetted surfaces of pipes, pipe fittings, plumbing fittings, and fixtures. These provisions went into effect in January 2014. In some areas of the country, it is possible that high-lead materials were used until 1988 or perhaps even later. The local plumbing code

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		authority or building inspector may be able to provide guidance regarding when high-lead materials were last used on a regular basis in the area. If "lead-free" materials were not used in new construction and/or plumbing repairs, elevated lead levels can be produced. If the film resulting from passivation does not exist or has not yet adequately formed, any lead that is present is in direct contact with the water.
3. When were the most recent plumbing repairs made? Note the locations.		If the building (or an addition, new plumbing, or repair) is less than 5 years old and lead solder or other leaded materials were used (e.g., brass fixtures containing lead alloys, especially those purchased or installed prior to 2014 when the Reduction of Lead in Drinking Water Act took effect), elevated lead levels may occur. If water supplied to the building is corrosive, lead can remain a problem regardless of the plumbing's age.
4. Of what materials is the service connection (the pipe that carries water to the school or child care facility from the public water system's main in the street) made? Note the locations where the service line enters the building and connects to the interior plumbing.		Lead piping was often used for the service connections that join buildings to public water systems. In larger schools, the service line is probably not lead because lead is impractical for the larger service lines typically used in these facilities; however, many child care facilities reside in small buildings and are at a higher likelihood of being served by lead lines. Some localities required the use of lead service connections up until the "lead-free" requirements of the 1986 Safe Drinking Water Act Amendments took effect. Although a protective layering of minerals may have formed on these pipes, vibrations can cause flaking of any protective build-up and, thus, allow lead contamination to occur.

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5. What are the potable water pipes made of in the facility? Examples include: Lead, plastic, galvanized metal, cast iron, copper, other. Note the location of the different types of pipe, if applicable, and the direction of water flow through the building. Note the areas of the building that receive water first, and which areas receive water last.		Survey the building for exposed pipes, preferably accompanied by an experienced plumber who should be able to readily identify the composition of pipes on site. Most buildings have a combination of different plumbing materials. Lead pipes are dull gray in color and may be easily scratched by an object such as a knife or key. Also, a magnet will not stick to lead. Galvanized metal pipes are gray or silver-gray in color and are usually fitted together with threaded joints. A magnet will stick to galvanized iron pipe. In some instances, compounds containing lead have been used to seal the threads joining the pipes. Debris from this material, which has fallen inside the pipes, may be a source of contamination. Copper pipes are red-brown in color. Corroded portions may show green deposits. Copper pipe joints were typically joined together with lead solders until the "lead-free" requirements of the 1986 Safe Drinking Water Act Amendments took effect. Plastic pipes, especially those manufactured abroad, may contain lead. If plastic pipes are used, be sure they meet NSF International standards, http://info.nsf.org/Certified/pwscomponents/.
6. Are there tanks in the plumbing system (e.g., pressure tanks or gravity storage tanks)?		Some older tanks may contain coatings that are high in lead content. Tanks may accumulate sediment that could be flushed back into the plumbing system under certain circumstances. You may wish to contact the supplier or manufacturer to obtain information about

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Note the locations of any tanks, and any available information about the tank (e.g., manufacturer or date of installation).		coatings. They may also wish to hire a plumber or tank service contractor to inspect the tanks, especially gravity storage tanks that are located outside of the building. Although EPA encourages routine maintenance of hot water heaters, this guidance does not include sampling hot water outlets or hot water heaters, because hot water is not recommended for consumption (drinking/cooking). See Temperature Control Establishing Routine Practices in the **Taking Action Section.**
7. Was lead solder used in the plumbing system? Note the locations with lead solder.		The 1986 Safe Drinking Water Act Amendments banned plumbing components that contained high levels of lead. It is likely that high-lead solder and fluxes continued to be used until 1988 and even later in some areas of the country. The local plumbing code authority or building inspector may be able to provide guidance regarding when high-lead solder was last used on a regular basis in the area. It is important to note that the Reduction of Lead in Drinking Water Act did not revise the "lead-free" definition for solder and flux.
8. Are brass fittings, faucets or valves used in the drinking water system? (Note: Most faucets are brass on the inside.) You may want to note the locations on a map or diagram of their facilities and make extensive		Brass fittings, faucets, and valves are golden yellow in color, similar to copper in appearance, or are plated with chrome. After 1996, brass fittings installed in drinking water outlets such as faucets and water coolers were required to meet NSF/ANSI standards for lead content (NSF/ANSI 61, NSF/ANSI 372). While this percentage was considered "lead-free" under the 1986 Safe Drinking Water Act Amendments, some contamination problems still may occur. Older brass faucets and components may contain higher percentages of lead and lead solder in their interior construction and pose contamination problems. Note

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notes that would facilitate future analysis of lead sample results.		that state or local governments may have imposed this standard prior to 1988. The degree to which lead will leach from brass products containing alloys with less than 8 percent lead is dependent upon the corrosiveness of the water and the manufacturing process used to develop the product. You should request NSF/ANSI 61 certification on all drinking water system products purchased. Include a copy of the NSF/ANSI 61 certificate as a requirement on the purchase orders. The distributor or manufacturer can provide a list of certified products. NSF 372 covering pipes, pipe fittings, plumbing fittings, and fixtures was adopted in 2010, and dictates that a product has been certified as meeting a weighted average lead content of less than or equal to 0.25 percent when used with respect to wetted surfaces. See EPA's 2013 guidance, **How to Identify Lead-Free Certification Marks for Drinking Water System & Plumbing Materials** for additional guidance. The Reduction of Lead in Drinking Water Act further reduces lead in pipes, pipe fittings, plumbing fittings and fixtures to a weighted average of 0.25 percent. These provisions went into effect in January 2014.
9. How many of the following outlets provide water for consumption? Water coolers, water fountains with central chillers, cold water		In addition to lead components in the plumbing system, lead solders or lead in the brass fittings and valves used in some faucets, fountains, and refrigerated water coolers may be sources of lead. It is important to identify the locations of all such drinking water outlets. Faucets in bathrooms should not be used to obtain water for drinking. Although they may be adequate for washing hands, they may not be

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taps, ice makers, kitchen taps, or drinking fountains. Note the locations.		appropriate for drinking purposes. However, if bathroom faucets, locker room showerheads, and non-traditional drinking water outlets are known to be used for drinking or cooking (e.g., fill water jugs), sampling should be conducted. You may consider posting "Do Not Drink or Cook" signs.
10. Have you checked the brands and models of water coolers and compared them to the listing of banned water coolers in Appendix B of this document? Note the locations of any banned coolers.		Older water coolers (purchased or installed prior to 1988) may be a major source of lead contamination. See **Module 4** of this manual for a summary of EPA's list of water coolers found to contain lead. Use the list to help prioritize sampling. If a water cooler is listed as having a lead-lined tank, its water should not be used for drinking, and the cooler should be removed immediately, as these coolers pose the highest risk of contamination.
11. Do outlets that provide drinking water have accessible screens or aerators? (Standard faucets usually have aerator or screens. Many coolers and fountains also have inlet strainer screens.) If so, have the screens been cleaned? Note the locations.		Lead-containing sediments that are trapped on screens can be a significant source of lead contamination. Facilities should create a routine maintenance program to clean the screens regularly. See Cleaning in Establishing Routine Practices of the **Taking Action Section**. If sediment has been a recurring problem, regular cleaning of the screens and additional investigation of the reasons for the debris accumulation is appropriate. However, the manufacturer or water service provider should be contacted to obtain instructions for cleaning screens.
12. Are there signs of corrosion, such as frequent leaks, rust-		Frequent leaks, rust-colored water, and stains on fixtures, dishes, and laundry are signs of corrosive water. Blue-green deposits on pipes and sinks indicate copper corrosion; brown stains result from the corrosion

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colored water, or stained dishes or laundry? Note the locations.		of iron. Where such symptoms occur, high levels of lead, copper, and iron may be present in the water.
13. Is any electrical equipment grounded to water pipes? Note the locations.		If electrical equipment has been installed using water pipes as a ground, the electric current traveling through the ground wire will accelerate the corrosion of any interior plumbing containing lead. This practice should be avoided, if possible. However, if existing wires are already grounded to water pipes, the wires should not be removed from the pipes unless a qualified electrician installs an alternative grounding system. Check with the local building inspector on this matter. State or local building codes may require grounding of the wires to the water pipes. Improper grounding of electrical equipment may cause severe shock.
14. Have there been any complaints about bad (metallic) taste? Note the locations.		Although lead dissolved in water cannot be seen, tasted or smelled, the presence of a metallic taste or rusty appearance may indicate corrosion and possible lead contamination.
15. Check building files and ask the public water system to determine whether any water samples have been taken from the building for any contaminants. Name of contaminant(s)?		As discussed in the **Training Section**, lead testing may have previously been done voluntarily under the Lead Contamination Control Act. Results of analyses of general water quality, such as measures of pH, calcium hardness and carbonate alkalinity, can provide important clues about the corrosiveness of the water. If there is no data from the school or child care facility, the public water system should at least be able to provide information about the general water quality.

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What concentrations of the contaminant(s) were found? What was the pH? Is testing done regularly at the facility?		
16. Other plumbing questions: Are blueprints of the building available? Are there known plumbing "dead-ends," low use areas, existing leaks or other "problem areas"? Are renovations being planned for part or all of the plumbing system?		You should incorporate this information into decisions regarding sample locations and sampling protocol. They may wish to note the direction of water flow and the location of fixtures, valves, tanks, areas of sediment accumulation, areas of corrosion, etc., on a sketch or blueprint of the plumbing.