

Section 3

Two-Step Sampling Process

EPA recommends that a two-step sampling process or protocol be followed for identifying lead contamination, especially in large buildings where many samples are to be taken. In the first step, screening samples are collected to identify the location of outlets providing water with high lead levels. In the second step, follow-up water samples are taken from problem locations. The results of initial and follow-up samples are then compared to determine the sources of lead contamination and to determine appropriate corrective measures.

This protocol is not to be used to determine whether a water supplier meets Federal lead standards. You should be certain that any analytical laboratories or consultants conducting testing on your facility's behalf are aware that this protocol differs from the protocol to be used by public water suppliers. The protocol described in this booklet is intended to facilitate the identification of sources of lead causing contamination problems in single outlets. The testing protocol to be used by public water suppliers (i.e., under the Lead and Copper Rule or National Primary Drinking Water Regulation for lead) is designed to identify system-wide problems.

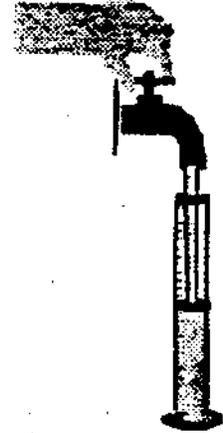
The testing protocol described in this section has been field tested and found to provide results that are generally reliable. Despite the fact that lead levels of samples taken at various times from the same sample site may vary, the results will generally be similar.

Overview of the Two-Step Sampling Process

This section provides a brief definition and overview of the purpose of each of the two steps in EPA's lead testing protocol.

Step 1: Initial Sampling

In Step 1, **initial screening samples** are taken to determine (1) the lead content of water entering your facility and (2) the lead content of water sitting in various outlets within your building. The goal of Step 1 is to **identify problem outlets or outlets with high lead concentrations.**



To determine the lead content in water entering your facility, contact your public water supplier to identify what lead levels you might expect. *(If you completed the plumbing profile questionnaire discussed previously, you will already have this information.)* Second, test water representative of your service connector to determine what contribution the connector is making to lead concentrations in your building. Obviously, if the water coming into your facility or through your service connector contains excessive amounts of lead, you are likely to see similar or even greater amounts of lead when you test individual drinking water outlets.

For individual outlets, initial samples generally involve the collection of "morning, first-draw" water. Such samples consist of the first "plug" of water emitted from an outlet after the outlet has been sitting for a period of 8 hours or more (*see general collection procedures on page 50*). As you will recall, the longer water is in contact with plumbing containing lead, the more opportunity exists for the water to pick up lead. Morning, first-draw water most often contains the highest concentrations of lead. Such samples will, therefore, generally reflect the "worst case scenario" for a given outlet.

The Trigger to Follow-Up Testing

If initial test results reveal lead concentrations greater than 20 ppb for a given outlet, follow-up testing is recommended. EPA has established this numeric cut-off, or trigger to follow-up testing to ensure that the sources of lead

contamination in drinking water outlets are identified. The protocol, which consists of an established sample size, volume and water retention time, is aimed at identifying lead problems in outlets under "worst case" conditions.¹

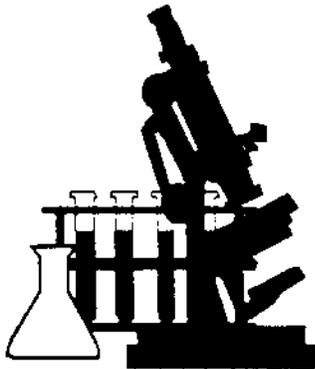
Step 2: Follow-Up Sampling

In Step 2, follow-up samples are collected and analyzed from outlets whose initial test results revealed lead concentrations greater than 20 ppb. The purpose of Step 2 is to pinpoint where lead is getting into drinking water so that appropriate corrective measures can be taken. Additional samples from the interior plumbing within the building are often necessary to further pinpoint the sources of lead contamination.

As with initial samples, follow-up samples are to be taken before a facility opens and before any water is used (see *general collection procedures on page 50*). Follow-up samples generally involve the collection of water from an outlet where the water has run for 30 seconds. This sampling approach is designed to analyze the lead content in the water in the plumbing behind the wall and the outlet. This is in contrast to the initial sample, which measures the lead content of the water in the outlet itself. A comparison of initial and follow-up samples will enable you to assess where the lead may be getting into the drinking water: either from the outlet or from the plumbing directly behind the outlet. Exhibit 9 provides diagrams of some common drinking water outlets and "cut-aways" of the plumbing behind these devices.



>20 ppb



Depending upon the number of outlets to be tested, both initial and follow-up testing can be completed in one day, or initial samples can be taken first with follow-up testing conducted once initial test results are completed and interpreted.

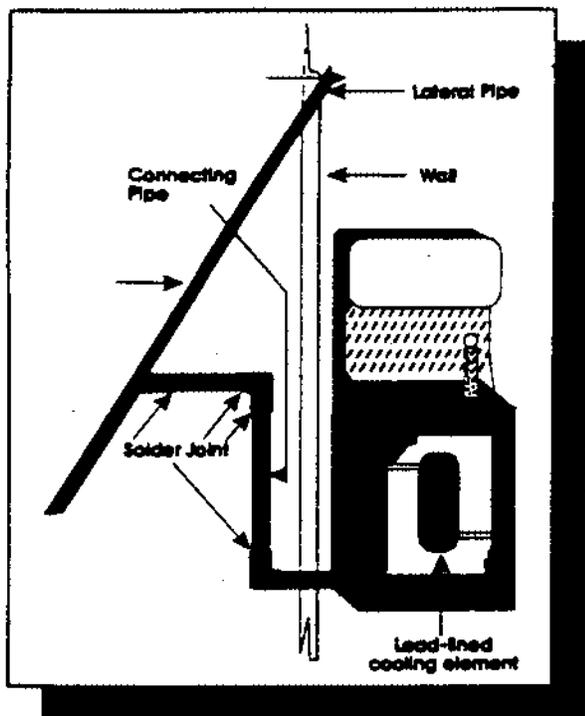
The total number of samples to be taken from a building will depend upon the size of the building, the number of outlets used to supply drinking water, and the expected extent of contamination. More outlets with elevated lead levels will require correspondingly more follow-up samples to pinpoint the sources of contamination. In general, a larger number of samples will result in the best assessment of the source and extent of lead in your drinking water. Part 2 of this document contains the general procedures to be followed in collecting samples and provides instructions for both initial and follow-up testing by outlet type. The next section of this Part explores the remedies that can be employed if lead problems are found.

¹Under the National Primary Drinking Water Regulation for lead, an action level of 15 ppb is established for samples taken by public water suppliers in high-risk residences. It is important to note that the testing protocol used by public water suppliers is aimed at identifying system-wide rather than individual outlet problems. Moreover, the sample size, volume and water retention time are different. As a result, the action level is lower for public water suppliers than the level that is recommended under this testing protocol for schools and non-residential buildings.

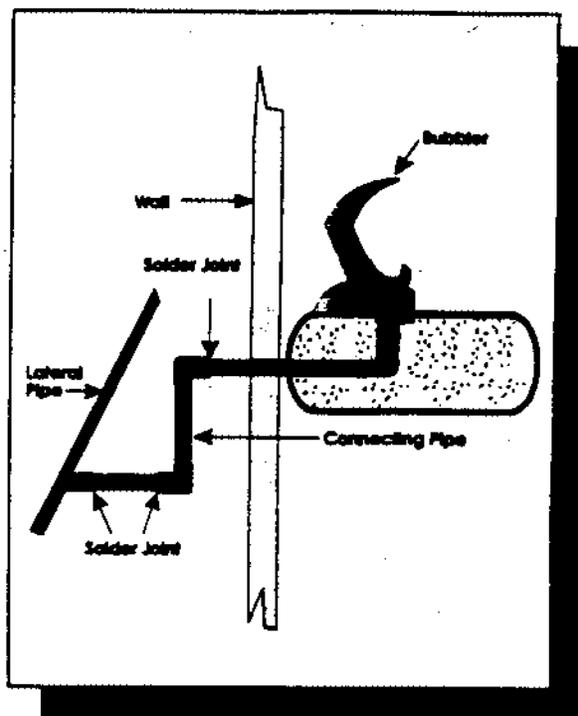
When the lab returns your test results, the concentrations of lead in your drinking water samples will be reported in metric form such as milligrams per liter (mg/L) or micrograms per liter ($\mu\text{g/L}$), or they will be reported as a concentration such as parts per million (ppm) or parts per billion (ppb), respectively.

- One milligram is 1/1,000 of a gram (about the size of a tiny pinch of salt); 1 mg/L is equal to 1 ppm.
- One microgram is one, one-millionth of a gram (one thousand times smaller than a milligram); 1 $\mu\text{g/L}$ equals 1 ppb.
- 0.005 mg/L or ppm is equal to 5 $\mu\text{g/L}$ or ppb (note the movement of the decimal point).

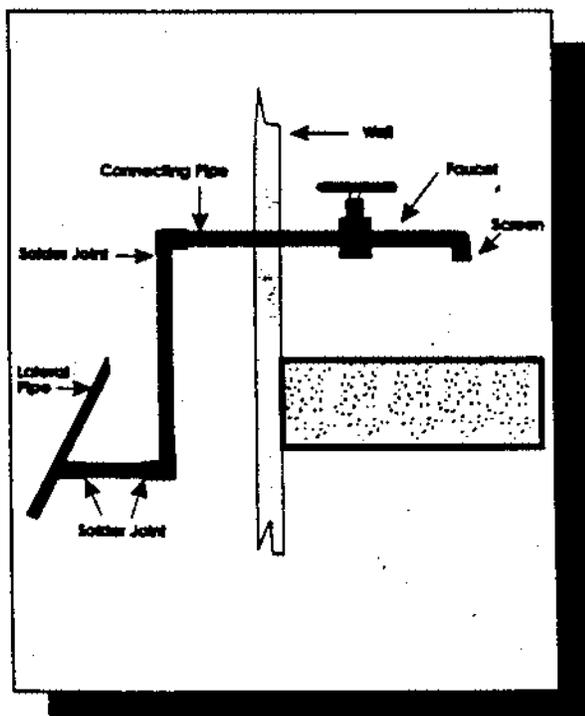
Two-Step Sampling Process



Water Cooler



Bubbler



Faucet (Tap)

Sources of Lead in Drinking Water

Common sources of lead in drinking water include:

- solder
- fluxes
- pipes and pipe fittings
- fixtures (e.g., brass faucets containing alloys of lead)
- sediments

Exhibit 9 Common Drinking Water Outlets