THE MARYLAND DEPARTMENT OF THE ENVIRONMENT
WATER SUPPLY PROGRAM

LEAD AND COPPER RULE GUIDANCE

For Small Public Water Systems (population 3,300 or fewer)

The 1986 Safe Drinking Water Act (SDWA) Amendments mandated the development of the National Primary Drinking Water Regulation for lead and copper. In response, the Environmental Protection Agency (EPA) promulgated the Lead and Copper Rule (LCR) which became effective on July 7, 1991. These requirements are applicable to all community water systems (CWS) and non-transient non-community water systems (NTNCWS). This guidance material focuses on the requirements of water systems serving populations of 3,300 or fewer persons.

The Lead and Copper Rule differs from previous regulations in that it replaced compliance determination based on a maximum contaminant level (MCL) with a three-pronged approach to reducing lead and copper levels:

1. Treatment technique requirements, including corrosion control and source water treatment;
2. Lead service line replacement program;
3. Public Education for lead.

Water monitoring results for lead and copper determine whether a system will be required to optimize treatment, replace lead service lines, and/or deliver a lead public education program.

The LCR specifies comprehensive monitoring schemes, requiring first-draw sampling at the consumers' taps. To evaluate the sample results, the LCR establishes Action Levels (AL) for lead and copper. A water system is considered to have exceeded an AL when more than 10% of all sample results (90^{th} percentile) are greater than 0.015 milligrams per liter (mg/L) for lead or 1.3 mg/L for copper.

INITIAL MONITORING REQUIREMENTS:

Small water systems (population <3,301) were required to begin collecting lead and copper samples at consumers' taps in 1993 on a six-month frequency. During initial monitoring, systems serving 501 to 3,300 persons are required to collect a minimum of 20 samples, systems serving 101 to 500 persons are required to collect a minimum of 10 samples, and systems serving 100 or fewer persons are required to collect a minimum of 5 samples.

Systems which do not exceed an AL during the first initial six-month monitoring period are required to continue to monitor for lead and copper during a second six-month period. Systems which do not exceed an AL for two consecutive six-month periods may reduce the frequency of lead and copper monitoring from semiannual to annual and reduce the number of sample sites (for most systems). If the lead and copper 90^{th} percentile values are very low (i.e. 0.005 mg/L for lead and 0.65 mg/L for copper) for two consecutive six-month periods, then a water system may reduce the frequency of lead and copper monitoring from semiannual to triennial (three years) and is not required to perform annual lead and copper monitoring.

Systems which exceed an AL during the first six-month period may proceed directly to the determination of a corrosion control treatment technique and do not have to complete a second consecutive six-month period, although determining lead and copper levels over the course of an entire year is suggested.

Sample Site Selection

Sample site plans meeting certain criteria need to be completed before the initiation of monitoring. Each water system must perform a materials survey to determine the extent of lead and copper used in the distribution system and internal plumbing in buildings served by the system. Sample sites are classified into three tiers:

Tier 1:

Community Water System

Single-family structures that contain copper pipes with lead solder installed between 1983 and 1989, and/or are served by lead service lines, and/or contain lead pipes (NOTE: *In 1989 lead solder was banned for use in plumbing for drinking water in Maryland).*

Multiple-family residences (if comprise at least 20% of the structures served by a water system) that contain copper pipes with lead solder installed between 1983 and 1989, and/or are served by lead service lines, and/or contain lead pipes.

NOTE: 50% of the Tier 1 samples must be sites that are served by lead service lines if available.

Non-transient Non-Community Water System

Buildings that contain copper pipes with lead solder installed between 1983 and 1989, and/or are served by lead service lines, and/or contain lead pipes are served by lead service lines.

Tier 2:

Community Water System

Multiple-family residences that contain copper pipes with lead solder installed between 1983 and 1989, and/or are served by lead service lines, and/or contain lead pipes.

Non-Transient Non-Community Water System

Buildings that contain copper pipes with lead solder installed before 1983.

Tier 3:

Community Water System

Single-family structures that contain copper pipe with lead solder installed before 1983.

All samples must be collected from Tier 1 sites unless a system can demonstrate to the State prior to initial monitoring that a sufficient number of Tier 1 sites do not exist. Also, sample sites with home water treatment units, such as water softeners, should only be used if they are the only sites available.

MDE recommends that systems identify at least 25% more sample sites than required number to supplement the sample pools. In addition, MDE strongly encourages water systems to have a good representation of the entire water distribution system by selecting Tier 1 sites spread throughout the water distribution system, including consecutive water systems (when applicable).

In conducting materials surveys, systems are required to review their records including maps, meter installation records, maintenance records, and other historical documentation. Systems are also required to review permit files to determine the presence of lead service lines. Recent records should verify lead service line replacements and/or repairs. Suggested sources of information include senior or retired utility personnel, piping suppliers, and community surveys or selective mailings.

Lead and Copper Sample Collection

Once adequate sample sites have been identified, lead and copper sampling and analysis may begin. The sampling procedure must be strictly adhered to and certification form the water system is required to ascertain the validity of the sample collection (see **attached** Lead and Copper Rule Monitoring Report Form). Samples must be 1 liter in volume. Samples from residential buildings must be collected from cold water kitchen or bathroom sink. Samples from non-residential buildings must be collected from interior taps from which water is typically drawn for consumption (e.g. kitchen sink, water fountain, etc.). If a sufficient number of valid sample taps is not available, please contact MDE regarding sampling alternatives (NOTE: A minimum of 5 samples is required; samples sites may be tested more than once with a minimum of 6 hours in between samples to meet this requirement).

Each sample must be first-draw (water must stand motionless in the plumbing system for a minimum of 6 hours). Residents are permitted to collect samples; a sample collection form is **attached** and should be signed by the sample collector to certify that proper collection procedures were followed. However, if a water system allows residents to sample, it cannot later dispute the validity of the sample collections. Samples do not have to be acidified immediately and should not be if residents are sampling. However, samples must be acidified within 14 days of collection.

Analysis of lead and copper samples must be performed by drinking water laboratories certified for lead and copper analysis by the State. A list of approved laboratories is **attached** for your use.

Lead Sample Customer Notice

Effective March 2011, all Community and Non-Transient Non-Community water systems in Maryland are required to notify their water customers of their individual lead sample results within 30 days of the water system receiving lead and copper sample results from the laboratory. This notification must be conducted every time lead and copper tap testing occurs for your water system regardless of the sample results (NOTE: This notification is different from the lead public education program which is required when the Lead Action Level is exceeded and is discussed later in this guidance document).

For CWS, a Notice of the individual sample result must be delivered to each resident who had a sample collected at their home. For NTNCWS, a Notice with a summary of all lead results may be posted in a conspicuous place (e.g. central bulletin board) within each building. **Attached** are the Lead Sample Result Notice template and certification form for your use. Please note that there are different forms for CWS and NTNCWS, and the documents are named accordingly.

IF A SYSTEM EXCEEDS AN AL DURING INITIAL MONITORING (OR DURING SUBSEQUENT MONITORING):

Initial Water Quality Parameter Monitoring

Systems that exceed a lead or copper AL are required to test certain water quality parameters (WQP) throughout the water system and at points of entry to the distribution system. Systems must test for WQPs during each period in which an AL is exceeded. Systems should test for lead and copper early in the monitoring period to allow sufficient time for WQP sampling if it is determined to be necessary. Systems have 6 months from the beginning of the monitoring period to complete WQP sampling.

The WQPs include: pH, alkalinity, calcium, conductivity, and temperature. Orthophosphate must be tested only if an inhibitor containing a phosphate compound is used, and silica must be tested only if an inhibitor containing a silicate compound is used.

When WQP testing is required, systems serving between 501 and 3,300 persons must sample a minimum of 2 distribution sites twice during the monitoring period; systems serving 500 or fewer persons must sample a minimum of 1 distribution site twice during the monitoring period. For any system required to test WQPs, each point of entry to the system must be tested twice for WQPs during the monitoring period. Distribution sample sites must be representative of the entire distribution system (coliform sample sites are recommended as WQP sample sites). The point of entry (POE) samples should be representative of all water sources. If sources are combined before entry to the distribution, the samples should be collected when all sources are represented. As much time as possible between the first and second set of WQP sampling is recommended; the data will be more useful when studying possible corrosion control techniques.

Some of the WQPs need to be determined in the field, others must be analyzed in the laboratory. Temperature and pH must be determined in the field, and conductivity can be determined in either the field or the laboratory. The remaining parameters should be analyzed by a laboratory. Temperature may be measured by either a hand-held thermometer or by a combined temperature/pH electrode and meter. A pH electrode and meter must be used to measure pH. The pH meter needs to be calibrated at pH 7.0 and a second level, either pH 4.0 10.0, depending on the pH range typically found in the system. The pH electrodes, conductivity probes, or thermometers should never be placed in samples that are to be analyzed for the other WQPs. The remaining WQPs require two samples of 500 milliliters each; one of the samples requires acidification for calcium analysis.

Lead Public Education Requirements

Any system which exceeds the lead AL has 60 days from the end of a monitoring period to deliver a public education program. EPA has provided specific language that must be included in all printed materials distributed through a water system's lead public education program. It includes health effects of lead, sources of lead, how to minimize exposure to lead from drinking water, and provides sources of additional information. As long as any water system continues to exceed the lead AL, public education program notifications will have to be repeated every six to twelve months. The Lead Public Education instructions, certification form, and template, which includes the EPA mandatory language, **may be obtained from MDE**.

For CWSs, the lead public education program requires a mandatory water bill statement, delivering notifications to water system customers and newspapers, and pamphlets and/or brochures to facilities/organizations regularly visited by high risk groups in the Community (i.e. pregnant women and children), contacting local public health agencies, making a good faith effort to identify and deliver public education materials to licensed childcare centers, public and private preschools, and obstetricians-gynecologists and midwives, must contact local health agencies, and implementing at least one activity (e.g. Public Service Announcements) from EPA's "Outreach Toolbox."

For NTNCWSs, the lead public education program requires delivering the EPA mandatory form and notifications to all water system customers and posting informational posters in each building served by the facility.

Source Water Monitoring Requirements

Within six months from the end of a monitoring period, any system which exceeds a lead or copper AL is required to collect one source water sample from each point of entry to the distribution system and analyze it for lead and copper. The sample must be collected from a thoroughly flushed tap. The results must be submitted to MDE. MDE will determine if source water treatment for the removal of lead and copper is necessary.

Corrosion Control Treatment Requirements

Within six months from the end of a monitoring period, any system which exceeds a lead or copper AL is required to recommend a plan for corrective action to the State: for CWS, the plan must include optimizing corrosion control treatment; for NTNCWS, the plan can be either optimizing corrosion control treatment and/or plumbing/fixture replacement. A copy of the EPA Lead and Copper Guidance Manual "Volume II: Corrosion Control Treatment" (EPA 811-B-92-002) is recommended for any system which exceeds an AL. It may also be obtained from the National Drinking Water Clearinghouse at (800) 624-8301 or info@mail.nesc.wvu.edu.

Systems must evaluate the effectiveness of each of the following corrosion control treatment techniques and if appropriate, combinations of the following treatments to identify optional corrosion control treatment for the system:

1. Alkalinity and pH adjustment (carbonate **passivation)**;
2. Calcium hardness adjustment (calcium carbonate precipitation);
3. Orthophosphate inhibitor;
4. Silicate inhibitor.

The MDE Water Supply Program will review your submittal and either approve your recommendation, require a study, or designate an alternate treatment. Any treatment selected must meet with MDE approval prior to installation.

Lead Service Line Replacement

The Lead and Copper Rule requires replacement of lead service lines in any system which has lead service lines and continues to exceed the lead AL after installing and/or optimizing corrosion control treatment.

INITIAL MONITORING REPORTING REQUIREMENTS:

All water systems must report the results of initial lead and copper monitoring within 10 days after the end of the monitoring period (January 10 for the July through December period and July 10 for the January through June period). A monitoring report form and sample collection form are attached for water systems' use. All systems are required to submit the laboratory reports showing the results of all tap samples analyzed for lead and copper and the corresponding address of each sample site, the specific tap tested (e.g. kitchen sink), the dates and times that the water was last used and the water sample was collected, and the sample site classification (i.e. Tier classification). As mentioned earlier in the Lead and Copper Sample Collection section, a certification is needed from each system verifying that each sample was first-draw and 1 liter in volume, and to the best of their knowledge, stood motionless in the plumbing for at least six hours. For water systems where residents collect lead and copper samples, certifications are required to be signed by the residents stating that the samples were collected after the water system informed them of proper sampling procedures. With the exception of initial monitoring, explanations of sample site changes are required (form **attached**).

REDUCED MONITORING REQUIREMENTS:

Any small system which completes two consecutives six-month monitoring periods without exceeding an AL may progress to reduced monitoring. Reduced monitoring begins with either annual or triennial monitoring (depending on the 90^{th} percentile values) at a reduced number of sample sites (for most systems). Annual monitoring is allowed when the 90^{th} percentile values are between 0.006 mg/L and 0.015 mg/L for lead and between 0.066 and 1.3 mg/L for copper; triennial monitoring is allowed when the 90^{th} percentile value is 0.005 mg/L or less for lead, and is 0.65 mg/L or less for copper. Systems serving 501 to 3,300 persons are required to collect 10 samples and systems serving 500 or fewer persons are required to collect 5 samples. Systems must collect lead and copper samples at consumers' taps during the months of June, July, August, or September. The sample sites must be randomly selected from the original sample pool. The results of reduced monitoring must be reported to MDE by October 10.

After three consecutive years of monitoring (2 initial 6-month periods and 2 annual periods) without exceeding an AL, a system on an annual monitoring schedule for lead and copper may progress to triennial monitoring. Triennial monitoring consists of sampling lead and copper once each three years at the number of sites specified above for annual monitoring. As with annual monitoring, samples must be collected during the months of June, July, August, or September.

Additional Information

Please call the MDE Water Supply Program at (800) 537-6101 ext. 3729 or the EPA Safe Drinking Water Act Hotline at (800) 426-4791 for further assistance in conducting lead and copper monitoring.

Attachments:

1. Lead and Copper Monitoring Report Form (to be completed by person coordinating sample collection)
2. Sample collection Form (to be completed by person(s) collecting samples)
3. List of Approved Laboratories
4. Change of Sampling Site Form
5. Lead Sample Customer Notice template and certification form
6. Lead Public Education instructions, certification form, and template