UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

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OFFICE OF
WATER

MEMORANDUM

SUBJECT: Lead and Copper Rule - Clarification of Requirements for Collecting Samples and Calculating Compliance

FROM: Benjamin H. Grumbles
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TO: Regional Administrators
Water Division Directors
Regions I-X

This memo reiterates and clarifies elements of the Lead and Copper Rule (LCR) associated with the collection and management of lead and copper samples and the calculation of the lead 90th percentile for compliance. Over the past several months, Headquarters has been conducting a national review of implementation of the LCR. This review consists of both data analysis and feedback from expert panels on aspects of the rule. Headquarters is continuing its review, and will be making a determination in early 2005 on specific areas of the rule that may require changes in regulation or need clarification through guidance or training.

One area identified for additional guidance is the management of lead and copper samples and the calculation of the lead 90th percentile. Because the need for additional guidance was identified in both Headquarters' data review and the expert panels, Headquarters is addressing this area prior to the final determination on rule and guidance changes. This guidance reflects the requirements of the LCR as it is currently written. These issues may be revisited if EPA makes a determination that changes should be made to the LCR.

1) What samples are used to calculate the 90th percentile?

We have received several questions regarding what tap samples should be used to calculate the 90th percentile for lead, specifically, where utilities collect samples beyond the minimum number required by the regulations. EPA regulations require water systems to develop a targeted sampling pool, focused on those sites with the greatest risk of lead leaching. All compliance samples used to determine the 90th percentile must come from that sampling pool. All sample results from a system's sampling pool during the monitoring period must be included

in the 90th percentile calculation, even if this includes more samples than the required minimum number needed for compliance. [40 CFR 141.86(e)] For example, consider a situation where a system sends out sample kits to 150 households to ensure that it will have a sufficient number of samples to meet its required 100 samples for compliance. If the system receives sample results from 140 households, it would use the results of the 140 samples in calculating the 90th percentile.

In some cases, a utility may choose to take a confirmation sample to verify a high or low concentration. It is entirely possible for the concentration of a confirmation sample to be significantly higher or lower than the concentration of the original sample. However, where confirmation samples are taken, the results of the original and confirmation sample must be used in calculating the 90th percentile. The LCR does not allow substitution of results with "confirmation" samples, nor does it allow the averaging of initial and confirmation samples as a single sampling result. While we support re-sampling at a home with high lead levels, all sample results from the sampling pool collected within the monitoring period must be included in the calculation.

Inclusion of samples in 90th Percentile Calculations

40 CFR 141.86(e) "The results of any additional monitoring conducted in addition to the minimum requirements of this section shall be considered by the system and the state in making any determinations (i.e.; calculating the 90th percentile lead or copper level) under this subpart."

40 CFR 141.80(c)(3)(i) "The results of <u>all lead and copper samples taken during a monitoring period</u> shall be placed in ascending order from the sample with the lowest concentration to the sample with the highest concentration. ..." [emphasis added]

2) What should utilities do with sample results from customer-requested sampling programs?

EPA regulations require water systems to develop a targeted sampling pool, focused on those sites with the greatest risk of lead leaching. All compliance samples used to determine the 90th percentile must come from that sampling pool. [40 CFR 141.80(c)(1)] ("Samples collected at sites not meeting the targeting criteria may not be used in calculating the 90th percentile lead and copper levels." 56 Fed Reg. 26518 (June 7, 1991)). Maintaining a consistent set of compliance sample sites provides the system with a baseline against which to measure the 90th percentile over time. If a system designates sites which were not sampled during previous monitoring periods, it must notify the state and include an explanation of why the sampling sites have changed. [40 CFR 141.90(a)(1)(v) and 141.90(h)(2)]

In addition to compliance sampling, many water systems have additional programs to test for lead in drinking water at the request of homeowners. Customer-requested samples that are not collected as part of the system's regular compliance sampling pool may or may not meet the sample site selection criteria, and the system may not have sufficient information to determine whether they do or not. Including results from samples that do not meet the criteria could

inappropriately reduce the 90th percentile value. Therefore, samples collected under these programs should not be used to calculate the 90th percentile, except in cases where the system is reasonably able to determine that the site selection criteria for compliance sampling are satisfied.

However, even though these customer-requested samples are not used for the 90th percentile calculation, the sample results must still be provided to the state. [40 CFR 141.90(g)] If a significant number of customer-requested samples are above the lead action level, the state should re-evaluate the corrosion control used by the system and the composition of the compliance sampling pool. Further, where any results are above the action level, we strongly urge systems to follow up with the affected customers to provide them with information on ways to reduce their risk of exposure to elevated lead levels in drinking water.

3) What should states do with samples taken outside of the sampling compliance period?

The regulations require that systems on reduced monitoring collect samples during the period between June and September, unless the state has approved an alternate period. [40 CFR 141.86(d)(4)(iv)] Only those samples collected during the compliance monitoring period may be included in the 90th percentile calculation. [40 CFR 141.80(c)(3)]

An exception to this is where a state invalidates a sample and the system must collect a replacement sample in order to have a sufficient number with which to calculate compliance. The system must collect its replacement sample within 20 days of the invalidation. Even if the date of collection occurs after the closure of the monitoring period (but within 20 days of the invalidation), the results must be included in the 90th percentile calculation. [40 CFR 141.86(f)(4)]

Although samples collected outside the sampling compliance period should not be used in the compliance calculation, they must still be provided to the state [40 CFR 141.90(g)], as is the case with customer-requested samples.

4) What should states do to calculate compliance if the minimum number of samples are not collected?

As noted in guidance released earlier this year[1], states must calculate the 90th percentile even if the minimum number of samples are not collected. The LCR states that the 90th percentile level is calculated based on "all samples taken during a monitoring period" and does not require that the minimum required number of samples must be collected in order to calculate the 90th percentile level. [40 CFR 141.80(c)]

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[1] See March 9, 2004 memorandum from Cynthia Dougherty to Jane Downing at http://www.epa.gov/safewater/lcrmr/pdfs/memo_lcmr_lead_compliance_calculation.pdf

A system which fails to collect the minimum required number of samples incurs a monitoring and reporting violation and is thus required to conduct Tier 3 Public Notification (PN) [40 CFR 141.204(a)] and report the violation in its Consumer Confidence Report (CCR) [40 CFR 141.153(f)(1)]. The system will return to compliance for the monitoring and reporting violation when it completes these tasks and has completed appropriate monitoring and reporting for two consecutive 6-month monitoring periods (or one round of monitoring for a system on reduced monitoring). [*State Implementation Guidance for the LCRMR*, EPA-816-R-01-021]

Calculating the 90th Percentile

40 CFR §141.80(c)(3) – "The 90th percentile lead and copper levels shall be computed as follows:
(i) The results of all lead and copper samples taken during a monitoring period shall be placed in ascending order from the sample with the lowest concentration to the sample with the highest concentration. Each sampling result shall be assigned a number, ascending by single integers beginning with the number 1 for the sample with the lowest contaminant level. The number assigned to the sample with the highest contaminant level shall be equal to the total number of samples taken.
(ii) The number of samples taken during the monitoring period shall be multiplied by 0.9.
(iii) The contaminant concentration in the numbered sample yielded by the calculation in paragraph (c)(3)(ii) is the 90th percentile contaminant level.
(iv) For water systems serving less than 100 people that collect 5 samples per monitoring period, the 90th percentile is computed by taking the average of the highest and second highest concentrations.

5) What is a proper sample?

We have received numerous requests to clarify the LCR with respect to proper samples and grounds for invalidation.

The LCR was designed to ensure that samples are collected from locations which have the highest risk of elevated lead concentrations. The rule established a tiering system (Attachment A) that would guide utilities in selecting locations for tap sampling that are considered high risk and requires that the sampling pool be comprised of Tier 1 sites, if they are available. [40 CFR 141.86(a)]

The LCR also defines a proper sample as a first draw sample, 1 liter in volume, that is taken after water has been standing in plumbing for at least six hours, and from an interior tap typically used for consumption – cold water kitchen or bathroom sink tap in residences. [40 CFR 141.86(b)(2)] There is no outer limit on standing time.

To ensure that sampling is conducted properly, the LCR requires that samples be collected by the system or by residents if they have been properly instructed by the water system. As added insurance that the system gives proper instructions, the rule does not allow water systems to challenge sample results based on alleged homeowner errors in sample collection. [40 CFR 141.86(b)(2)]

6) How can utilities avoid problems with sample collection?

In order to avoid any problems with sample collection, the utility may wish to do the sampling itself or review the sample collection information before sending it to the lab. If the utility chooses to use residents to perform the sampling, it should provide clear instructions and a thorough chain-of-custody form for residents to fill out when the sample is taken. This will allow the laboratory or utility to eliminate improperly collected samples prior to the actual analysis. For example, if a sample bottle is only half full, then it should not be analyzed by the laboratory. Likewise, if the documentation accompanying the sample indicates that it was taken from an outside tap, the sample should not be analyzed. Systems may need to make arrangements to collect replacement samples for samples that are not analyzed by the laboratory.

Once a sample is analyzed, the results may not be challenged by the water system. As explained by Question #1 of this memorandum, the results for all samples from the compliance sampling pool must be included in the 90th percentile calculation unless there are grounds for invalidation. Improper sampling by residents is not a grounds for invalidation under 40 CFR 141.86(f).

7) On what grounds may a sample be invalidated?

The regulations allow the state to invalidate a lead or copper tap sample only if it can document that at least one of the following conditions has occurred:

1. The laboratory establishes that improper sample analysis caused erroneous results;
2. The state determines that the sample was taken from a site that did not meet the site selection criteria of this section;
3. The sample container was damaged in transit; or
4. There is substantial reason to believe that the sample was subject to tampering. [40 CFR 141.86(f)(1)]

We interpret the second condition to mean a site that is not part of the compliance sampling pool, that has not been identified as a Tier 1 or other high risk site, or that has been altered in such a way that it no longer meets the criteria of a high-risk site (e.g., new plumbing or the addition of a water softener).

It is important to note that states may not invalidate a sample solely on the grounds that a follow-up sample result is higher or lower than that of the original sample. [40 CFR 141.86(f)(3)] The system must report the results of all the samples to the state, and provide supporting documentation for all samples it believes should be invalidated. [40 CFR 141.86(f)(2)] The state must provide its formal decision on whether or not to invalidate the sample(s) in writing. If a state makes a determination to invalidate the sample, the decision and the rationale for the decision must be provided in writing. [40 CFR 141.86(f)(3)]

In conducting the national implementation review, we have noticed that some utilities

may have requested invalidation of samples because they believe that there was improper sampling on the part of the homeowner (e.g., drawing water from the incorrect tap). This is a concern because there may be a tendency to only consider sampling errors when there are high results, even though there could be sampling errors that would lead to artificially low results (e.g., collecting a sample after the line was flushed). In any event, EPA takes a strict interpretation of the invalidation requirements in the LCR. If a system allows residents to perform sampling as part of the targeted sampling pool, the system may not challenge the accuracy of sampling results because it believes there were errors in sample collection. [40 CFR 141.86(b)(2)] The state may only invalidate samples based on the criteria described above.

In sum, if a water system (1) sends a sample bottle to a home within its compliance sampling pool, (2) receives the sample back from the homeowner, (3) sends the sample to the laboratory for analysis, and (4) receives results from the analysis back from the lab; that result must be used in calculating the 90th percentile. The only exception to this is if the state invalidates the result in accordance with the regulation.

Conclusion

The Agency is continuing its wide-ranging review of implementation of the LCR and will use the information to determine what changes should be made to existing guidance, training and/or the regulatory requirements. This memo should help to provide clarification on issues related to calculating the 90th percentile and proper management of tap samples as required under the LCR. Please work with your states to ensure that they understand the requirements so that they may work with the public water systems under their jurisdiction to address any misinterpretations of the regulations. If you have additional questions or concerns, please contact me or have your staff contact Cynthia Dougherty, Director of the Office of Ground Water and Drinking Water at (202) 564-3750, or Ronald Bergman, Associate Chief of the Protection Branch in the Office of Ground Water and Drinking Water, at (202) 564-3823.

Attachment

cc: Regional Drinking Water Branch Chiefs
James Taft, Association of State Drinking Water Administrators

Attachment A

Tiering Classification System for Selection of Monitoring Sites

Tiering Classification	
If you are a Community Water System	***If you are an Non-transient Noncommunity Water System***
Tier 1 sampling sites are single family structures: with copper pipes with lead solder installed after 1982 *(but before the effective date of your State's lead ban)* or contain lead pipes; and/or that are served by a lead service line. ***Note :*** When multiple-family residences (MFRs) comprise at least 20% of the structures served by a water system, the system may count them as Tier 1 sites. **Tier 2** sampling sites consist of buildings, including MFRs: with copper pipes with lead solder installed after 1982 *(but before effective date of your State's lead ban)* or contain lead pipes; and/or that are served by a lead service line. **Tier 3** sampling sites are single family structures w/ copper pipes having lead solder installed before 1983.	**Tier 1** sampling sites consist of buildings: with copper pipes with lead solder installed after 1982 *(but before the effective date of your State's lead ban)*or contain lead pipes; and/or that are served by a lead service line. **Tier 2** sampling sites consist of buildings with copper pipes with lead solder installed before 1983. **Tier 3**: Not applicable.

Note:

- All States were required to ban the use of lead solder in all public water systems, and all homes and buildings connected to such systems by June 1988 (most States adopted the ban in 1987 or 1988). Contact the Drinking Water Program in your State to find out the effective date.
- A community water system with insufficient tier 1, tier 2 and tier 3 sampling sites, or an non-transient noncommunity water system with insufficient tier 1 and tier 2 sites, shall complete its sampling pool with representative sites throughout the distribution system. For the purposes of this paragraph, a representative site is a site in which the plumbing materials used at that site would be commonly found at other sites served by the water system. [40 CFR 141.86(a)(5) and (7)]

Source: *Lead and Copper Monitoring and Reporting Guidance for Public Water Systems*, EPA-816-R-02-009