LEAD AND COPPER GUIDELINES: SAMPLING POOL SITE SELECTION, SAMPLING PROCEDURES AND FOLLOW-UP ACTIONS

The main objective of the Lead and Copper Rule (LCR), 15A NCAC 18C .1507, is to protect the public from contaminants resulting from corrosion in the piping system. LCR requires the water served by all community and non-transient non-community public water systems to meet the "action levels" for lead and copper as measured at the consumer taps and/or provide optimal corrosion control treatment to minimize these corrosion by-products within the distribution system. If more than 10 percent (10%) of the tap water samples collected during any monitoring period contains more than 0.015 mg/L for lead and/or 1.3 mg/L for copper, the action level will have been exceeded (i.e., if the "90th percentile" lead level is greater than 0.015 mg/L or if the "90th percentile" copper level is greater than 1.3 mg/L).

Steps Needed to Complete the Lead and Copper Monitoring Requirements

A. SAMPLING POOL SITE SELECTION

1. From the table below, determine the **standard** number of required sites to be sampled each compliance period, based on your system's population. (Note: Your system may qualify for reduced monitoring in the future, depending on sample collection and results.)

Number of Samples		
System Size (Population Served)	**Number of Sites (Standard)**	**Number of Sites (Reduced)**
> 100,000	100	50
10,001 - 100,000	60	30
3,301 – 10,000	40	20
501 – 3,300	20	10
101 – 500	10	5
≤ 100	5	5

2. Complete the required Construction Materials Report included with this package (also located on our website at http://deq.nc.gov/about/divisions/water-resources/drinking-water/compliance-services#lcr) and submit it to the Lead and Copper Rule Manager.

3. Use information gathered to complete your Construction Materials Report to select sampling pool sites that have the highest probability of corrosion. Tier 1 sites have the highest probability of corrosion so they are considered the highest priority sites, decreasing in priority to Tier 2, and then Tier 3. If no "Tier" sites are available, select "Other" sites as sampling pool sites.

For Community Water Systems (CWS):

Tier 1 sampling sites consist of single family structures that:
- contain copper pipe with lead solder that was installed January 1, 1983 through December 31, 1985; and/or
- contain lead pipe or are served by a lead service line (any age structure).

(**Note:** When multiple family residences 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 multiple-family residences that:
- contain copper pipe with lead solder that was installed January 1, 1983 through December 31, 1985; and/or
- contain lead pipe or are served by a lead service line (any age structure).

Tier 3 sampling sites consist of single family structures that contain copper pipes with lead solder installed before 1983.

If there are insufficient numbers of Tier 1, 2, and 3 sampling sites in a community water system, the system shall complete its sampling pool with representative sites throughout the distribution system. A site is considered a 'representative site' if the plumbing material used at that site would be commonly found at other sites served by the water system.

For Non-Transient Non-Community (NTNC) Water Systems:

Tier 1 sampling sites consist of buildings that:
- contain copper pipes with lead solder installed January 1, 1983 through December 31, 1985; and/or
- contain lead pipes or are served by a lead service line (any age structure).

(Note that Tier 1 NTNC sites differ slightly from that of Tier I CWS sites in that the Rule states "buildings" instead of "single family structures.")

A NTNC water system with insufficient Tier 1 sampling sites shall complete its sampling pool with sampling sites that contain copper pipes with lead solder installed before 1983. If additional sites are needed to complete the sampling pool, the NTNC water system shall use representative sites throughout the distribution system. 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.

** ***Important Note Regarding Lead Service Lines*** *(For CWS and NTNC Water Systems):*
As per 15A NCAC 18C Section .1507 [§141.86(a)(8)]: *Any water system whose distribution system contains lead service lines shall draw 50 percent of the samples it collects during each monitoring period from sites that contain lead pipes, or copper pipes with lead solder, and 50 percent of the samples from sites served by a lead service line. A water system that cannot identify a sufficient number of sampling sites served by a lead service line shall collect first-draw samples from all of the sites identified as being served by such lines.*

B. SAMPLING POOL SITING PLAN

1. Create a readable map, sketch or schematic of your distribution system. Clearly indicate the locations of the sampling pool sites. Be aware that it is in your best interest to select more sampling pool sites than the minimum **standard** number required. The designation of more than the minimum number of sampling pool sites available will provide greater flexibility in performing additional sampling, if necessary.

2. Assign each sampling pool site an alphanumeric identifier as a location code. The code for each sampling site must consist of three digits using letters, numbers, or a combination of both (for example: ABC, 123, 001, or 1B3). Add the location code for each sampling pool site to the map or sketch. DO NOT ever change the code for a location. If a site is dropped from the pool, the replacement site MUST have a new code.

3. Complete all information on the Lead and Copper Sample Siting Plan - Site Selection Process form **and** the Lead and Copper Sampling Pool - Details spreadsheet. The spreadsheet should list all sampling pool sites selected as specified in item one above. Be sure the sampling pool site location codes used in the spreadsheet correctly correspond to the location codes used on the map. For each sampling pool site listed in the spreadsheet, be sure to indicate the location code, physical site address (Street and City for CWS) or physical location (for NTNC), year built, plumbing materials in the structure, existence of a lead service line, tier level, tier level designation justification, and the date and designation of when the site was either added to, or deleted from, the sampling pool with comments explaining the changes. See the examples in the spreadsheet for listing CWS vs. NTNC systems.

4. Submit the following completed documents to the Lead and Copper Rule Manager for review. Be sure your public water system number and the name of your public water supply system are included on each document.
   - Map or schematic of distribution system denoting sampling pool site location codes;
   - Lead and Copper Sampling Pool Siting Plan - Site Selection Process form;
   - Lead and Copper Sampling Pool - Details spreadsheet; and
   - Construction Materials Report.

5. Note that any future changes to the sampling pool siting plan must be reviewed by the State and will require a written submittal of the change. Consult with your Regional Office when selecting new sites. Denote the date(s) of any changes and reasons for the changes on your Sampling Pool - Details spreadsheet and submit the revised Sampling Pool - Details spreadsheet and revised map/schematic to the Lead and Copper Rule Manager and the appropriate Regional Office.

C. SAMPLE COLLECTION PROCEDURES

1. Please refer to EPA's February 29, 2016 memorandum entitled "Clarification of Recommended Tap Sampling Procedures for Purposes of the Lead and Copper Rule" prior to collecting samples. (Posted on our website at http://deq.nc.gov/about/divisions/water-resources/drinking-water/compliance-services#lcr). Collect each water sample in bottles provided by your lab. Samples must be analyzed by a NC certified laboratory. The water shall stand motionless for at least 6 hours in the plumbing system before collection of the sample. Residential samples shall be collected from the cold-water kitchen tap or bathroom sink tap that is not fitted with a point-of-use treatment device. Non-residential samples shall be collected at an interior tap from which water is typically drawn for consumption. Leave faucet aerators in place when conducting sampling. Do not collect samples from outside spigots.

** ***Important Note Regarding Lead Service Lines*** *(For CWS and NTNC Water Systems):*
Sample collection at a location served by a lead service line requires a different sampling procedure from that used for locations without a lead service line. As per 15A NCAC 18C Section .1507 [§141.86(b)(3)]:

Each service line sample shall be one liter in volume and have stood motionless in the lead service line for at least six hours. Lead service line samples shall be collected in one of the following three ways:

i. At the tap after flushing the volume of water between the tap and the lead service line. The volume of water shall be calculated based on the interior diameter and length of the pipe between the tap and the lead service line;

ii. Tapping directly into the lead service line; or

iii. If the sampling site is a building constructed as a single-family residence, allowing the water to run until there is a significant change in temperature which would be indicative of water that has been standing in the lead service line.

2. Collect the required **standard** number of samples for a minimum of two consecutive six-month periods. (Note: For systems with less than five sampling sites, some sites will need to be sampled more than once, on different days, in order to obtain the required minimum five samples.)

3. Water systems must collect samples from the same sampling site from which it collected a previous sample. If, for any reason, the water system cannot gain entry to a sampling site in order to collect a follow-up sample, the system may collect the follow-up tap sample from another sampling site in its sampling pool as long as the new site meets the same targeting criteria, and is within reasonable proximity of the original site. The system must designate any site that was not sampled during previous monitoring periods and include an explanation of why sampling sites have changed with their 90th percentile report.

4. Calculate the 90th percentiles for lead and copper as described below:

   (a) List the lead results in ascending order in a column with the lowest concentration at the top of the list and highest concentration at the bottom of the list. Number each entry. Repeat this listing process using the copper results. Use the "Lead and Copper 90th Percentile Summary" form (or a similar reporting format that includes the same information) when submitting your 90th percentile calculations.

   (b) Multiply the number of samples in each column x 0.9 to determine the sample number that represents the 90th percentile.
   Example: 20 samples x 0.9 = 18
   Therefore, the result for the 18th sample in the ascending list is the 90th percentile.

   If you collect an odd number of samples, use interpolation to determine the 90th percentile.
   Example: 25 samples x 0.9 = 22.5
   In this case, the 90th percentile would be determined by adding one-half of the difference between the 22nd and 23rd sample results to the 22nd sample result as shown below.

   22nd sample result = 0.010 mg/L; 23rd sample result = 0.016 mg/L
   90th percentile value = 0.010 + ½ (0.016 – 0.010) = 0.013 mg/L

   (c) If you sample from only five locations, the 90th percentile value is calculated by averaging the 4th and 5th highest results.

5. In order to avoid a reporting violation, ensure that your laboratory reports the results of the sampling to the Public Water Supply Section by the 10th day of the month following the month in which the results are received or by the 10th day of the month following the end of a monitoring period, whichever is earlier.

D. REDUCED MONITORING

Based on sample collection and sampling results, systems may be eligible for reduced monitoring. If the 90th percentile for lead and the 90th percentile for copper are at or below the action level (0.015 mg/L for lead and 1.3 mg/L for copper) for two consecutive six-month periods, your water system may request reduced monitoring by completing and submitting the "Lead and Copper Reduced Monitoring Request Form" (located on our website) to the State's Lead and Copper Rule Manager.

E. MONITORING AND REPORTING CONSIDERATIONS

1. The results of all lead and copper sampling must be reported to the State including the results of non-compliance sampling, homeowner-requested sampling, and sampling conducted by a water system for investigatory or follow-up purposes, as well as, the required compliance samples.

2. For samples collected during a system's monitoring period:
   (Note: January 1st through June 30th and July 1st through December 31st are the monitoring period for systems on six -month monitoring frequencies. For systems monitoring annually or every three years, the monitoring period is June 1st through September 30th.)

   The following sample results MUST be reported to the State as **compliance samples** and be included in your water system's 90th percentile calculations for each applicable monitoring period:

   - All first draw samples collected at any of your system's sampling pool locations.
   - All first draw samples collected from non-sampling pool locations during the monitoring period where it is "reasonably able to determine" that the location sampled meets the highest priority tier level site classification for your system.

3. If your system's population has changed, be sure that you are sampling the proper minimum number of locations to avoid a monitoring violation. The addition of new sampling pool sites will require submittal of an updated Sampling Pool spreadsheet and associated map.

4. Sampling schedules and sample results are available for review on Drinking Water Watch located at this web page: https://deq.nc.gov/about/divisions/water-resources/drinking-water/sampling-status-and-drinking-water-watch.

F. REQUIRED FOLLOW-UP ACTIONS WHEN AN ACTION LEVEL IS EXCEEDED

If the 90th percentile for lead and/or the 90th percentile for copper exceed their corresponding action level (0.015 mg/L for lead and 1.3 mg/L for copper) for any compliance period, the following actions must be performed:

1. If the lead action level is exceeded, public education on lead in drinking water must be distributed to your system's customers within 60 days after the end of the monitoring period in which the exceedance occurred, and certification of completing this requirement must be provided to the State within 70 days after the end of the monitoring period in which the exceedance occurred. (See Public Notification Requirements below).

2. Submit a Corrosion Control Treatment (CCT) Recommendation (Form 141-C) to the State stating your system's plans to rectify the corrosion problem. The Form 141-C must be submitted within 6 months after the exceedance. To complete the CCT Recommendation, you must perform the following:

   - Measure Water Quality Parameters (WQPs) at each entry point after treatment and at the required number of locations in the distribution system during each monitoring period in which the action level has been exceeded; and
   - Collect water samples at each entry point after treatment and analyze them for lead and copper. (Note: Make sure your laboratory uses the appropriate reporting form specifically designated for these "Lead and Copper Source Water" samples.)

3. If necessary, submit within 6 months after exceedance, a Source Water Treatment (SOWT) recommendation to the State stating your system's plans to rectify any lead and/or copper contamination in your finished water.

4. If your system was on a reduced monitoring schedule, your system will be returned to a six-month **standard** monitoring schedule and will have to monitor from the **standard** minimum number of locations in the table on page 1.

Once treatment (CCT and/or SOWT) has been approved and installed, your water system must perform the following:

1. Monitor the tap water in the distribution system for lead and copper on a six-month schedule until the system qualifies for reduced monitoring;
2. Measure water quality parameters in the distribution system every six months until system qualifies for reduced monitoring;
3. Monitor the source water at each entry point after treatment for lead and copper (if necessary); and

4. Measure water quality parameters in the source water at each entry point after treatment every two weeks until the system qualifies for reduced monitoring.

After two consecutive six-month periods of follow-up monitoring have been performed, your water system must submit the results (on Form 141-C2 as a summary) to the State for review and for designation of the operating ranges for acceptable corrosion control treatment. Once these ranges have been established, your water system must complete another two consecutive six-month periods of monitoring (as described in items 2 and 4 above) to verify the ability of the installed treatment to meet the State-specified operating ranges.

If the lead and copper sample results are at or below the action levels, a small or medium system may request reduced monitoring from the State Lead and Copper Rule Manager. However, if an action level is exceeded, the system must continue to conduct tap sampling, continue public education distribution (if the lead action level is exceeded), continue water quality parameter sampling at entry point(s) and in the distribution system, and possibly begin a lead service line replacement program.

G. SOURCE WATER AND/OR TREATMENT CHANGES

The State's Lead and Copper Rule Manager must review and approve a change in source water, the addition of a new source, or long-term change in water treatment before it is implemented by the water system. Failure to notify the State and get approval before implementing the change is a violation under the Lead and Copper Rule. Systems should strive to submit their request **90 days** before the change is desired to allow time to resolve any comments and questions. Treatment changes to address a current MCL can be handled on a case-specific basis and the timeframes may necessarily be compressed.

Changes in source water and/or treatment may result in monitoring schedule changes and re-evaluation of your system's corrosion control treatment. Any necessary changes to a system's compliance monitoring schedule and corrosion control treatment will be determined on a case-by-case basis. To request a change, complete the form entitled "Request for Source Water and/or Treatment Changes Under the Lead and Copper Rule (LCR)" located on our website at http://deq.nc.gov/about/divisions/water-resources/drinking-water/compliance-services#lcr and submit it for approval to the Lead and Copper Rule Manager 90 days before the proposed change date.

H. PUBLIC NOTIFICATION REQUIREMENTS

1. **Federal Requirements:** The Lead and Copper Rule requires certain notifications to be provided to water system customers.

   - **Public Education -** In the event that a system experiences an exceedance of the lead action level after calculating the 90th percentile value, all customers of the water system and possibly other agencies and organizations must be notified of the action level exceedance and provided information regarding the health effects of lead and actions that can be taken to reduce lead in drinking water. This notification must be completed within 60 days after the end of the monitoring period in which the exceedance occurred, and certification of completion must be provided to the State within 70 days. A template containing all required information and language is available on our website at http://deq.nc.gov/about/divisions/water-resources/drinking-water/compliance-services#lcr .

   - **Consumer Notice of Lead Tap Water Results -** Customers at locations that were sampled for lead are required to be notified of the lead sampling result at their location. This notification must be provided to the consumers at the locations sampled within 30 days of receipt of the results by the water system. The system must certify completion of this requirement to the State within 90 days of the end of the monitoring period. The consumer notice is required to contain specific information and language. A template containing all required information and language is available on our website.

2. **State Requirements:** In addition, the State's Public Notification Requirements include Special Notification for Distribution System Samples under 15A NCAC 18C .1523(b). For individual lead or copper results above the respective action level, the consumers at the location sampled must be notified within 48 hours after receipt of the results by the water system if the sample was collected from the plumbing of a school or daycare, place of residence, or location supplying permanent or temporary housing. Templates for the Special Notification for Distribution System Samples are also available on our website.