How to Calculate 90th Percentile Values

Calculating 90th percentile values determines if your water system has exceeded the lead and/or copper action levels. The 90th percentile calculations for lead and copper are described in the steps below. These values are dependent on how many samples you are required to collect. Compare your calculated values to the action levels of .015 mg/L for lead and 1.3 mg/L for copper. The lead and copper action levels are exceeded when more than 10 percent of tap water samples collected during a monitoring period are greater than than the allowable levels of .015 mg/L for lead and 1.3 mg/L for copper.

If You Are Required to Collect More Than Five Samples:

Step 1:   Place *lead* results in ascending order (from lowest to highest value).

Step 2:   Assign each sample a number, 1 for lowest value.

Step 3:   Multiply the total number of samples by 0.9. This is your 90th percentile value.

Step 4:   Compare the 90th percentile level to the action level of 0.015 mg/L (can also be expressed as 15 parts per billion (ppb)). If your 90th percentile value is higher than 0.015 mg/L, you have an exceedance.

Repeat this procedure for copper sample results, except compare the 90th percentile copper level against its action level of 1.3 mg/L. If your 90th percentile value is greater than 1.3 mg/L, you have an exceedance.

Example:

Sample Rank	Sample Value mg/L for Lead	Sample Rank	Sample Value mg/L for Lead
1	0.00	6	0.007
2	0.00	7	0.009
3	0.001	8	0.010
4	0.001	**9 (90th Percentile)**	**0.010**
5	0.003	10	0.017

10 samples × 0.9=9th sample. In this example, the 9th sample is equal to the value of 0.010 mg/L which is below the lead action level of 0.015mg/L

Example:

Sample Rank	Sample Value mg/L for Lead	Sample Rank	Sample Value mg/L for Lead
1	0.00	7	0.003
2	0.00	8	0.007
3	0.00	9	0.009
4	0.001	10	0.014
5	0.001	**11 (90th Percentile)**	**0.016**
6	0.001	12	0.016

In this example the water system handed out 12 sample bottles to ensure they received at least 10 back. All samples taken during a compliance period will be used to calculate the 90th percentile even though your schedule may ask for less samples. Rounding is defined as follows:
1. Round down to the nearest whole number if the decimal is 0.4 or lower.
2. Round up to the nearest whole number if the decimal is 0.5 or higher.
12 samples × 0.9=10.8. Using rounding for this example equates to the 11th sample= 0.016 mg/L which is over the lead action level of 0.015 mg/L.

If You Are Required to Collect Five Samples:

Step 1: Place lead or copper results in ascending order.

Step 2: Take the average of the 4th and 5th highest sample (the two highest values added together and divided by two). This is your 90th percentile level.

Step 3: Compare the 90th percentile level against the lead or copper action level.

Example:

Sample Rank	Sample Value mg/L for Lead
1	0.00
2	0.001
3	0.003
4	**0.009**
5	**0.015**

The average of the 4th and 5th highest values equal 0.009 mg/L + 0.015mg/L=0.024 mg/L. 0.024 mg/L ÷ 2=0.012 mg/L which is below the lead action level of 0.015mg/L

If You Are Allowed to Collect Fewer Than Five Samples:

Step 1: Place lead or copper results in ascending order.

Step 2: Compare the highest sample value (this is considered to be your 90th percentile level) against the lead or copper action level.

Example:

Sample Rank	Sample Value mg/L for Lead
1	0.003
2 (90th Percentile)	**0.005**

The highest value is 0.005 mg/L which is below the lead action level of 0.015 mg/L