

Operator Quiz Corner – Answer Key

1)

0.005	0.017	0.002	0.002	0.015	0.007	0.009	0.011	0.011	0.002
0.003	0.006	0.011	0.020	0.012	0.002	0.004	0.010	0.005	0.002

The easiest way to calculate the 90th percentile result is to recognize that the highest 10% of the results can be discounted and the next highest result is the 90th percentile. In the example above, there are 20 samples and 10% of 20 samples is 2. Therefore, the highest two results can be discounted, and the next highest result is the 90th percentile.

Highest Result	0.020	
2 nd Highest Result	0.017	
3 rd Highest Result	0.015	90th Percentile
4 th Highest Result	0.012	
5 th Highest Result	0.011	
6 th Highest Result	0.011	
7 th Highest Result	0.011	
8 th Highest Result	0.010	
9 th Highest Result	0.009	
10 th Highest Result	0.007	
11 th Highest Result	0.006	
12 th Highest Result	0.005	
13 th Highest Result	0.005	
14 th Highest Result	0.004	
15 th Highest Result	0.003	
16 th Highest Result	0.002	
17 th Highest Result	0.002	
18 th Highest Result	0.002	
19 th Highest Result	0.002	
20 th Highest Result	0.002	

2) The important conversion to remember is that there are 1000 ug/L in 1 mg/l. It is also good to remember that a ug/L is the same as a part per billion (ppb) and a mg/L is a part per million (ppm).
 $1.3 \text{ mg/L} \times (1000 \text{ ug/L} / 1 \text{ mg/L}) = \mathbf{1300 \text{ ug/L}}$ which is the same as 1300 ppb

3) The Lead and Copper Rule Action Level for copper, as written in the regulation, is 0.015 mg/l which is 2 significant digits. Any results with 3 or more significant digits must be rounded up or down accordingly. In the sample problem the result of 0.0154 would be rounded down to **0.015**. In this case the 90th percentile value is equal to the Action Level not above the Action Level, so the system would not be considered to have exceeded the Action Level. If the 90th percentile value was 0.0155 or greater, it would be rounded up to 0.016 which would be an exceedance of the lead Action Level. Khan Academy has a couple of nice short YouTube videos which explains the concept of significant figures and rounding:

<https://www.youtube.com/watch?v=eCJ76hz7jPM>

<https://www.youtube.com/watch?v=jvp0mtr1kFM>

4) The most recent LRAA is the average of the results for the four most recent quarters for each site. Therefore the 4th Quarter 2018 results are not considered in the LRAA calculation. In this example the site with the highest LRAA is Site #4.

	4th Qtr 2018	1st Qtr 2019	2nd Qtr 2019	3rd Qtr 2019	4th Qtr 2019	LRAA
Site #1	88	60	54	33	61	52
Site #2	25	12	23	9	25	17.25
Site #3	90	77	30	29	84	55
Site #4	50	43	48	69	68	57