

# ESSENTIALS OF SURFACE WATER TREATMENT TRAINING

## Exercise #5: Using EPA CT tables to calculate CTs required

**Directions:** Use the data provided in the examples below to determine the CTs required for giardia inactivation at the treatment plant for that day

Example #1: Conventional filter plant (2.5-log)

CT parameters measured at the 1<sup>st</sup> user as follows:

- Temperature: 10° C
- pH: 7.0
- Free chlorine residual: 0.8 ppm
  
- Contact time T: 100 minutes

What are the CTs required for that day? **18**

What was the CT achieved? **80**

Were CTs met? **Yes**

Example #2: Slow sand filter plant (2-log)

CT parameters measured at the 1<sup>st</sup> user as follows:

- Temperature: 16° C
- pH: 6.6
- Free chlorine residual: 0.5 ppm
  
- Contact time T: 46 minutes

What are the CTs required for that day? **24**

What was the CT achieved? **23**

Were CTs met? **No**

Example #3: Membrane filter plant (2.5-log)

CT parameters measured at the 1<sup>st</sup> user as follows:

- Temperature: 8° C
- pH: 7.3
- Free chlorine residual: 1.3 ppm
  
- Contact time T: 100 minutes

What are the CTs required for that day? **31**

What was the CT achieved? **130**

Were CTs met? **Yes**

**Bonus:** Use the data provided in the examples below to determine the CTs required for virus inactivation at the treatment plant for that day

Table A-7. CT Values for Inactivation of Viruses by Free Chlorine<sup>1</sup>

Temperature (C)	Log Inactivation					
	2.0-log		3.0-log		4.0-log	
	pH=> 6-9	10	6-9	10	6-9	10
0.5	6	45	9	66	12	90
5	4	30	6	44	8	60
10	3	22	4	33	6	45
15	2	15	3	22	4	30
20	1	11	2	16	3	22
25	1	7	1	11	2	15

CT parameters measured at the 1<sup>st</sup> user as follows:

- Temperature: 10° C
- pH: 7.0

What log inactivation is required for viruses in surface water? **4.0-log**

What are the CTs required for viruses that day? **6**

Assuming a contact time T of 30 minutes, what free chlorine concentration is needed to meet the CT required above? **0.2 ppm**

What does this tell you about meeting the CT requirements for viruses compared to meeting the CT requirements for giardia? **If you meet CT requirements for giardia, then you automatically meet them for viruses (i.e. it takes more CTs to inactivate Giardia than it does for viruses)**