REPORTING REQUIREMENTS

Overview

- How to fill out the monthly SWTR operating reports
  - How often to record turbidities
  - Highest turbidity of the day
  - Peak hourly demand flow
  - CT calculations
- Common mistakes
- What to do when things go wrong

How to fill out the monthly SWTR reports

- There are 4 forms:
  - Conventional/Direct
  - Slow Sand / Membrane / DE / Unfiltered
  - Cartridge
  - UV (if used for *Giardia* credit)
- Must use correct form because each has questions that must be answered that are specific to the filtration type

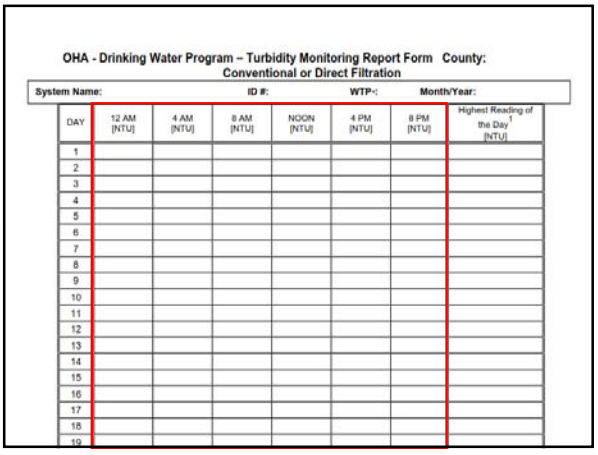
How to fill out the monthly SWTR reports

Forms have places to report:

- Turbidity
- Peak Hourly Flow
- CT calculations
- Log inactivation requirement (0.5 or 1.0-log, CF/DF only)

Turbidity

- Record how often?
  - Conventional and direct: every 4 hours
  - SSF, DE & Alternative: daily
- Report CFE turbidities
- Answer questions about IFEs
- Highest turbidity of the day (can be between the 4 hour readings)



OHA - Drinking Water Program – Turbidity Monitoring Report Form County:
Conventional or Direct Filtration

System Name: ID #: WTP*: Month/Year:

DAY	12 AM [NTU]	4 AM [NTU]	8 AM [NTU]	NOON [NTU]	4 PM [NTU]	8 PM [NTU]	Highest Reading of the Day [NTU]
1							
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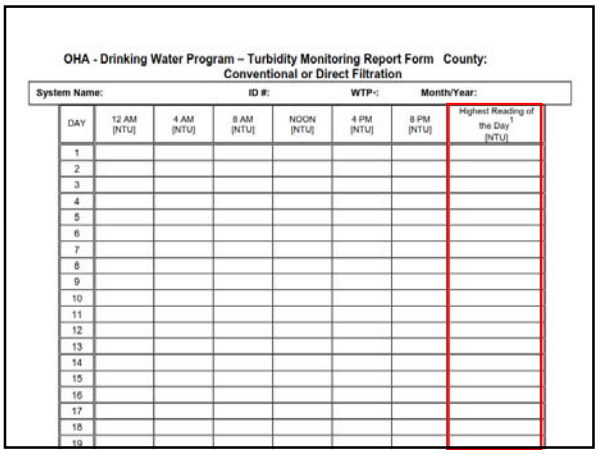

OHA - Drinking Water Program – Turbidity Monitoring Report Form County:
Conventional or Direct Filtration

System Name: ID #: WTP‹: Month/Year:

DAY	12 AM [NTU]	4 AM [NTU]	8 AM [NTU]	NOON [NTU]	4 PM [NTU]	8 PM [NTU]	Highest Reading of the Day [1] [NTU]
1							
2							
3							
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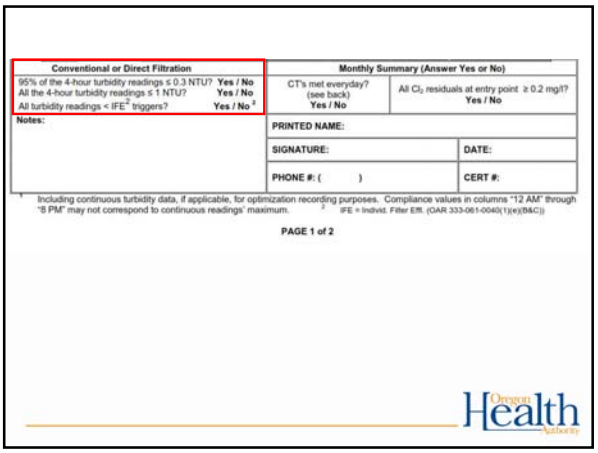

Conventional or Direct Filtration	Monthly Summary (Answer Yes or No)	
95% of the 4-hour turbidity readings ≤ 0.3 NTU? Yes / No All the 4-hour turbidity readings ≤ 1 NTU? Yes / No All turbidity readings < IFE[2] triggers? Yes / No [3]	CT's met everyday? (see back) Yes / No	All Cl_2 residuals at entry point ≥ 0.2 mg/l? Yes / No
Notes:	PRINTED NAME:	
	SIGNATURE:	DATE:
	PHONE #: ( )	CERT #:

[1] Including continuous turbidity data, if applicable, for optimization recording purposes. Compliance values in columns "12 AM" through "8 PM" may not correspond to continuous readings' maximum. [2] IFE = Individ. Filter Eff. (OAR 333-061-0040(1)(e)(B&C))

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Peak hourly flow

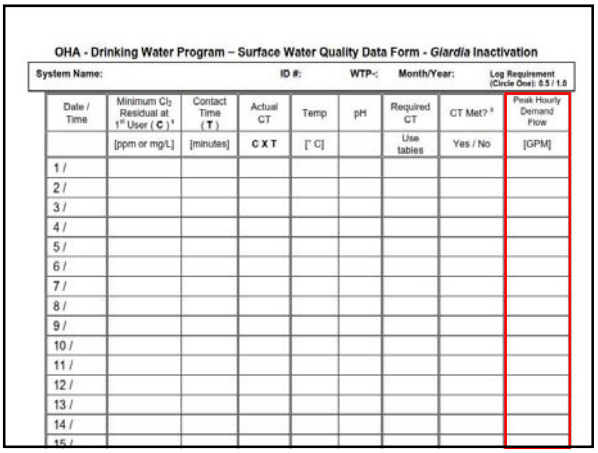
- Report the Peak Hourly Flow
  - greatest volume of water passing through the system during any one hour in a consecutive 24 hr period
- Not the same as Peak Instantaneous Flow
- Report demand flow: flow leaving the clearwell, not plant flow (in most cases)

Method for determining peak hourly demand flow

- On a daily basis, use the best available operational data to identify the hour within the 24 hr period that had the highest demand flow
- For the hour of highest demand flow:
  - Calculate the average flow rate within the one hour period (i.e., add the flow rates and divide by the number of data points).
  - Use as many data points as possible, preferably no less than four data points taken at 15 minute intervals

Method for determining peak hourly demand flow (continued)

- For systems that only have a flow totalizer, spot check throughout the day to determine the time of peak demand
- Once that time has been identified (e.g., 8am or 9pm for residential; mid-day for industrial), then record how much water is used during that hour each day and divide by 60 minutes to get a peak hour demand



OHA - Drinking Water Program – Surface Water Quality Data Form - *Giardia* Inactivation

System Name: ID #: WTP‹: Month/Year: Log Requirement (Circle One): 0.5 / 1.0

Date / Time	Minimum Cl_2 Residual at 1st Use (C) [1]	Contact Time (T)	Actual CT	Temp	pH	Required CT	CT Met? [2]	Peak Hourly Demand Flow
	[ppm or mg/L]	[minutes]	C X T	[° C]		Use tables	Yes / No	[GPM]
1 /								
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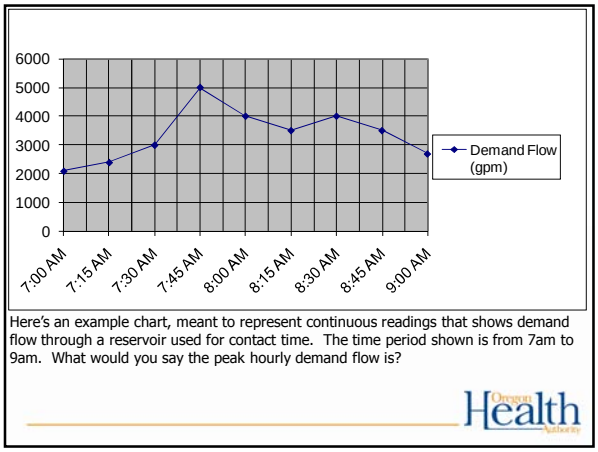
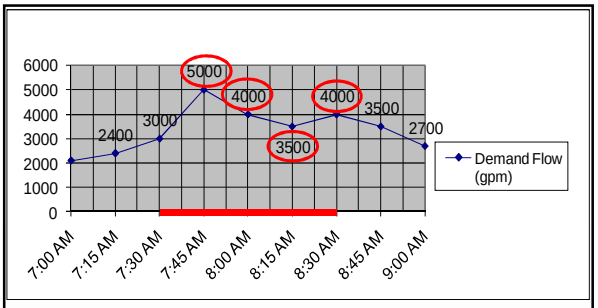
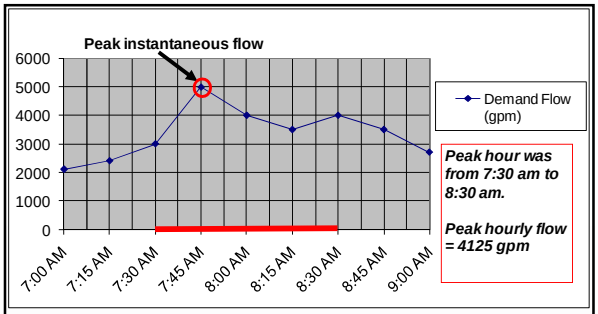


Here's an example chart, meant to represent continuous readings that shows demand flow through a reservoir used for contact time. The time period shown is from 7am to 9am. What would you say the peak hourly demand flow is?



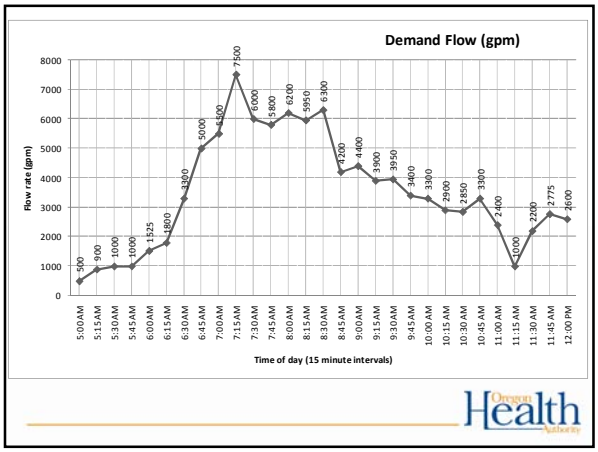
Again, the peak hourly demand flow is the hour within the 24-hr period of the highest demand flow. The red line represents the span of 1 hour: **7:30 am to 8:30 am – the peak hour.** The avg. of the 4 data points equals **4125 gpm - the peak hourly demand flow.**



The highest flow point, **5000 gpm, is the peak instantaneous flow**, not the peak hourly demand flow.

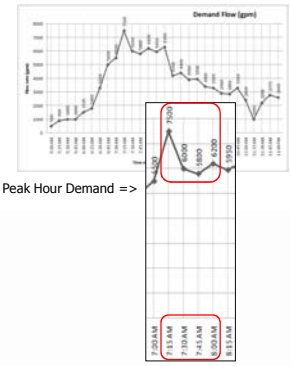
Exercise #4

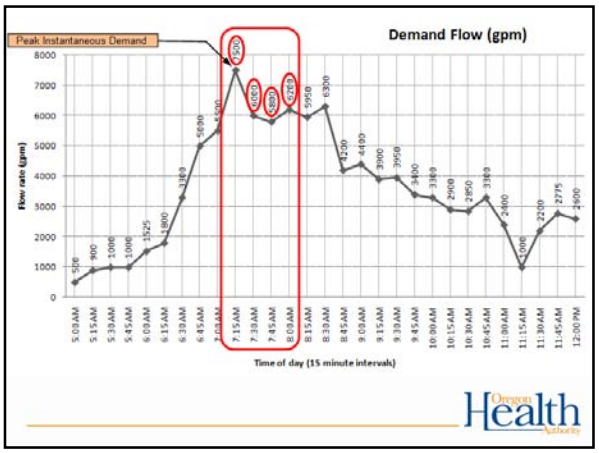
- Calculate peak hourly demand flow based on continuous flow rate data



Time (min)	Demand Flow (gpm)	Running Hourly Average Flow (gpm)
5:00 AM	500	
5:15 AM	900	
5:30 AM	1000	
5:45 AM	1000	850.0
6:00 AM	1525	1,106.3
6:15 AM	1800	1,331.3
6:30 AM	3300	1,906.3
6:45 AM	5000	2,906.3
7:00 AM	5500	3,900.0
7:15 AM	7500	5,325.0
7:30 AM	6000	6,000.0
7:45 AM	5800	6,200.0
8:00 AM	6200	6,375.0
8:15 AM	5950	5,987.5
8:30 AM	6300	6,062.5
8:45 AM	4200	5,662.5
9:00 AM	4400	5,212.5
9:15 AM	3900	4,700.0
9:30 AM	3950	4,112.5
9:45 AM	3400	3,912.5
10:00 AM	3300	3,637.5
10:15 AM	2900	3,387.5
10:30 AM	2850	3,112.5
10:45 AM	3300	3,087.5
11:00 AM	2400	2,862.5
11:15 AM	1000	2,387.5
11:30 AM	2200	2,225.0
11:45 AM	2775	2,093.8
12:00 PM	2600	2,143.8

<= Peak Hour Demand =>





Exercise #4: Calculating Peak Hourly Demand Flow

Directions: Work as a group to determine what the peak hourly demand flow is based on the graph below.

Questions:

At what 1-hour interval did PHD occur? **7:00 am (7:01 am) to 8:00 am**

What is the peak hourly demand flow (gpm)? **6375 gpm (sum 4 data pts & divide by 4)**

What was the peak instantaneous demand flow (gpm)? **7500 gpm**

Bonus questions:

Is it ok to use the peak instantaneous flow instead for calculating time T? **Yes; it's more conservative**

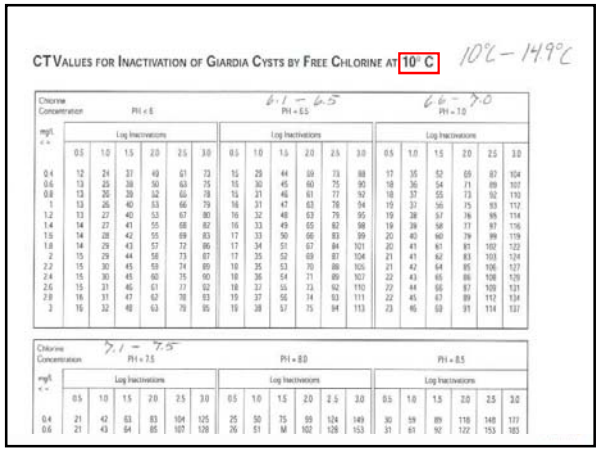
If so, what are the advantages/disadvantages? **Advantage: easy to determine. Disadvantage: it may exceed the tracer study flow by more than 10%**

Is it ok to use the average daily flow instead for calculating time T? **No**

Why or why not? **Averaging the whole day would not be conservative enough (it would not account for sustained period of high flow which is when it is important for CTs to be met)**

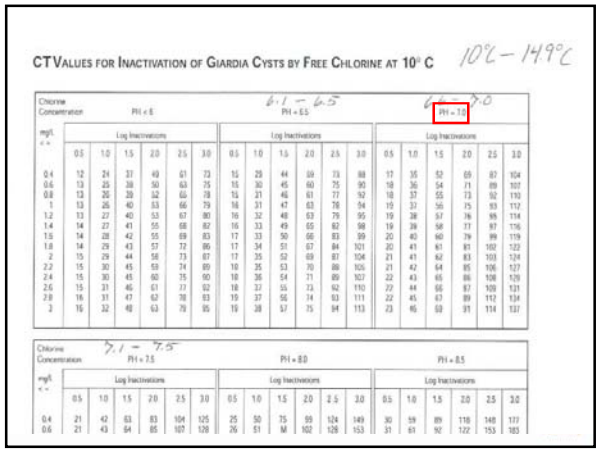
How to use the EPA CT tables to figure out $CT_{required}$

- There are six EPA CT tables based on temp
- Find the correct table based on your water temperature in degrees Celsius.
  - °C = 5/9 x (°F – 32)
- If water temp is between values, then round down
  - Example: for water temp of 12°C, use the 10°C table
  - *Even if the water temp is 14.9°C, round down to 10°C*
- *Water gets more viscous the colder it gets and chemical reactions take longer, so rounding temp down is more conservative.*



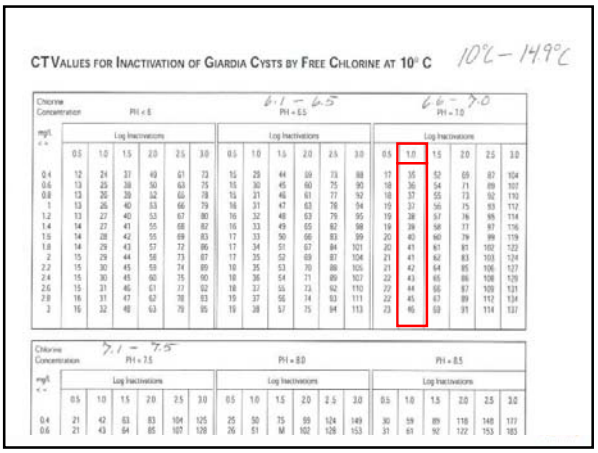
How to use the EPA CT tables (cont.)

- There are 7 sections for pH on each table
- Find the section that corresponds to your water's pH level
- If your pH is between the choices, then round up to the higher pH
  - Example: if pH of water is 6.8, use the pH 7.0 section



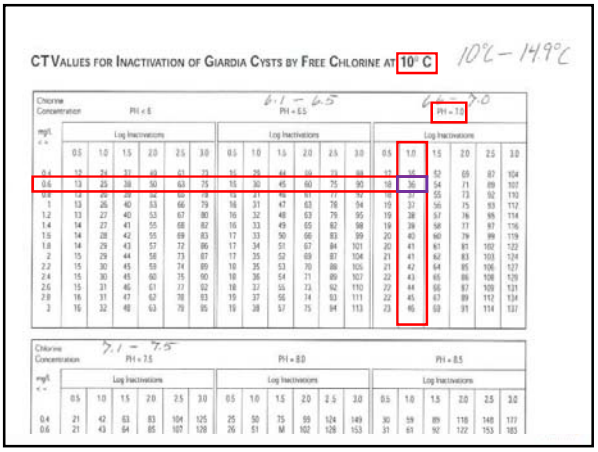
How to use the EPA CT tables (cont.)

- Use the 0.5 log inactivation column if your plant is rated at 2.5 log removal for *Giardia*
- All others use the 1.0 log inactivation column
- Note: unfiltered surface water must achieve the 3-log inactivation through disinfection



How to use the EPA CT tables (cont.)

- Match your free chlorine residual on the far left column
- If in between, then round up
  - Rounding chlorine residual up is more conservative because as chlorine residual increases at a given pH, more CT is required
- The point where it intersects with the log inactivation column is the $CT_{required}$
  - Example: free chlorine residual is 0.6 ppm



In review:

- temp of 12°C,
- pH of 6.8,
- free chlorine residual of 0.6
  - $CT_{required}$ = **36**
- Remember…
  - $CT_{achieved}$ must be > $CT_{required}$

(CT achieved = chlorine concentration x contact time)

Exercise #5

- Using EPA CT tables to calculate CTs required

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 1st 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? ____
What was the CT achieved? ____
Were CTs met? ____

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

CT parameters measured at the 1st 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? ____
What was the CT achieved? ____
Were CTs met? ____

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

CT parameters measured at the 1st 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? ____
What was the CT achieved? ____
Were CTs met? ____

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 1st 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 #3: Membrane filter plant (2.5-log)

CT parameters measured at the 1st 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**

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

CT parameters measured at the 1st 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**

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[1]

	Log Inactivation					
	2.0-log		3.0-log		4.0-log	
Temperature (C)	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

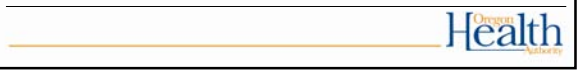
CT parameters measured at the 1st user as follows:
•Temperature: 10° C
•pH: 7.0

What log inactivation is required for viruses in surface water? ____

What are the CTs required for viruses that day? ____

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

What does this tell you about meeting the CT requirements for viruses compared to meeting the CT requirements for giardia?



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[1]

	Log Inactivation					
	2.0-log		3.0-log		4.0-log	
Temperature (C)	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

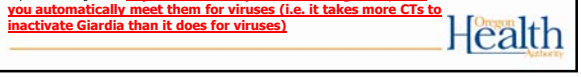
CT parameters measured at the 1st user as follows:
•Temperature: 10° C
•pH: 7.0

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)**



Filling out the monthly surface water quality report form

OHA - Drinking Water Program – Surface Water Quality Data Form - *Giardia* Inactivation

System Name: ID #: WTP-: Month/Year: Log Requirement (Circle One): 0.5 / 1.0 / 2.0 / 2.5 / 3.0 / 4.0

Date / Time	Minimum Cl_2 Residual at 1st User (C) [a]	Contact Time (T)	Actual CT	Temp	pH	Required CT	CT Met? [b]	Peak Hourly Demand Flow
	[ppm or mg/L]	[minutes]	C X T	[° C]		Use tables	Yes / No	[GPM]
1 /								
2 /								
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9 /								
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So here's our reporting form (available for download on our website…)
Every day you must calculate the CTs required using the tables and record it on this form.
So let's enter our data from the example into the form starting w/ temp…

OHA - Drinking Water Program – Surface Water Quality Data Form - *Giardia* Inactivation

System Name: ID #: WTP-: Month/Year: Log Requirement (Circle One): 0.5 / 1.0 / 2.0 / 2.5 / 3.0 / 4.0

Date / Time	Minimum Cl_2 Residual at 1st User (C) [a]	Contact Time (T)	Actual CT	Temp	pH	Required CT	CT Met? [b]	Peak Hourly Demand Flow
	[ppm or mg/L]	[minutes]	C X T	[° C]		Use tables	Yes / No	[GPM]
1 /				12				
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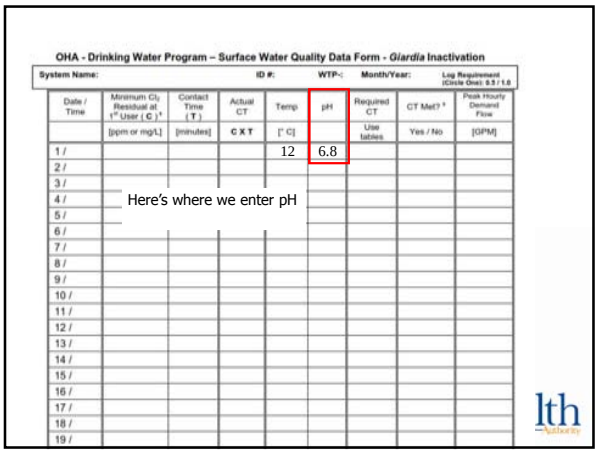
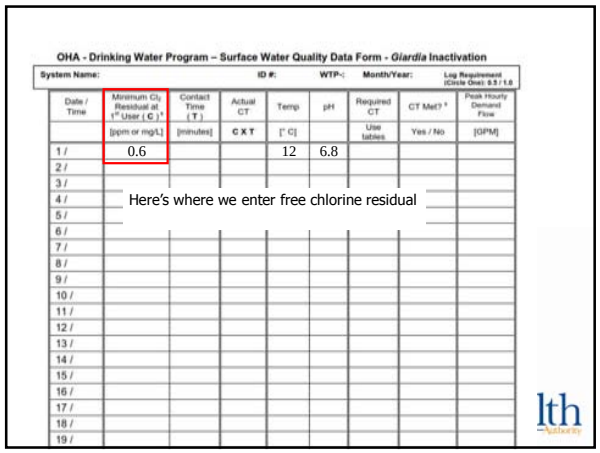
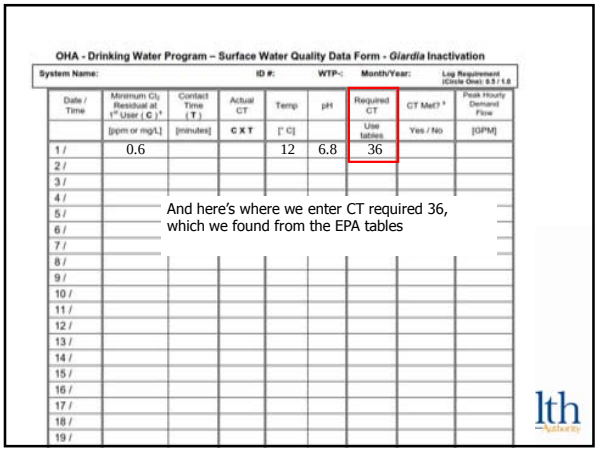
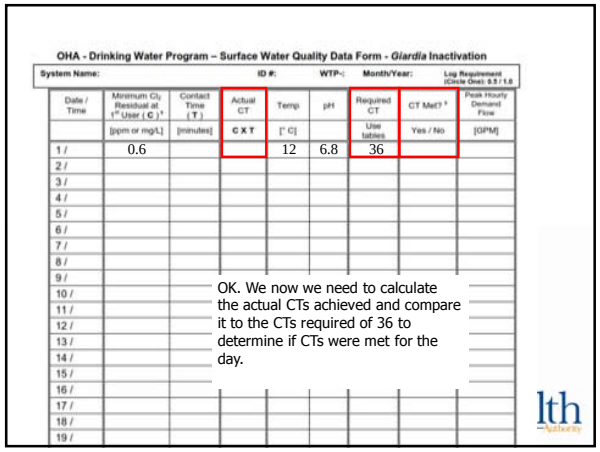
Here's where we enter temp









Filling out the monthly surface water quality report (cont.)

- Remember:
  - CT achieved = Chlorine **C**oncentration x Contact **T**ime
- We know the free chlorine residual at the first user is 0.6 ppm
- Contact Time (T) obtained from a disinfection *tracer study*
  - Example: tracer study shows our contact time to be 110 minutes

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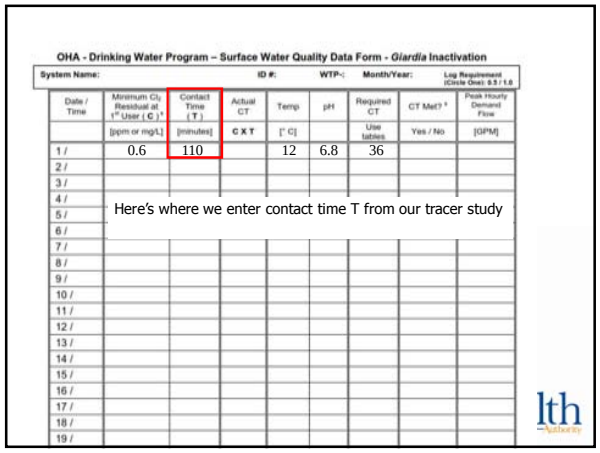

OHA - Drinking Water Program – Surface Water Quality Data Form - *Giardia* Inactivation

System Name: ID #: WTP-: Month/Year: Log Requirement (Circle One): 0.5 / 1.0

Date / Time	Minimum Cl_2 Residual at 1st User (C) [ppm or mg/L]	Contact Time (T) [minutes]	Actual CT C X T	Temp [° C]	pH	Required CT Use tables	CT Met? Yes / No	Peak Hourly Demand Flow [GPM]
1 /	0.6	110		12	6.8	36		
2 /								
3 /								
4 /								
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16 /								
17 /								
18 /								
19 /								

So free chlorine residual C of 0.6 ppm times 110 minutes of contact time T = ?

OHA - Drinking Water Program – Surface Water Quality Data Form - *Giardia* Inactivation

System Name: ID #: WTP-: Month/Year: Log Requirement (Circle One): 0.5 / 1.0

Date / Time	Minimum Cl_2 Residual at 1st User (C) [ppm or mg/L]	Contact Time (T) [minutes]	Actual CT C X T	Temp [° C]	pH	Required CT Use tables	CT Met? Yes / No	Peak Hourly Demand Flow [GPM]
1 /	0.6	110	66	12	6.8	36		
2 /								
3 /								
4 /								
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6 /								
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17 /								
18 /								
19 /								

CT achieved by the plant is 66. So now we compare this to CT required.

OHA - Drinking Water Program – Surface Water Quality Data Form - *Giardia* Inactivation

System Name: ID #: WTP-: Month/Year: Log Requirement (Circle One): 0.5 / 1.0

Date / Time	Minimum Cl_2 Residual at 1st User (C) [ppm or mg/L]	Contact Time (T) [minutes]	Actual CT C X T	Temp [° C]	pH	Required CT Use tables	CT Met? Yes / No	Peak Hourly Demand Flow [GPM]
1 /	0.6	110	66	12	6.8	36		
2 /								
3 /								
4 /								
5 /								
6 /								
7 /								
8 /								
9 /								
10 /								
11 /								
12 /								
13 /								
14 /								
15 /								
16 /								
17 /								
18 /								
19 /								

In order for CTs to be met, CTactual must be greater than CTrequired, which it is.

OHA - Drinking Water Program – Surface Water Quality Data Form - *Giardia* Inactivation

System Name: ID #: WTP-: Month/Year: Log Requirement (Circle One): 0.5 / 1.0

Date / Time	Minimum Cl_2 Residual at 1st User (C) [ppm or mg/L]	Contact Time (T) [minutes]	Actual CT C X T	Temp [° C]	pH	Required CT Use tables	CT Met? Yes / No	Peak Hourly Demand Flow [GPM]
1 /	0.6	110	66	12	6.8	36	Yes	
2 /								
3 /								
4 /								
5 /								
6 /								
7 /								
8 /								
9 /								
10 /								
11 /								
12 /								
13 /								
14 /								
15 /								
16 /								
17 /								
18 /								
19 /								

So in the CT MET column we write YES. CTs were met for this day.

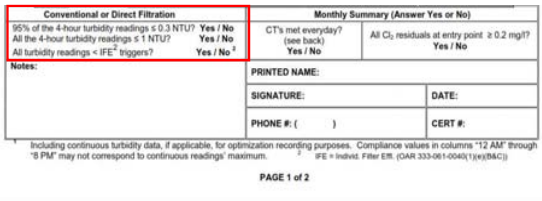
Common mistakes:

- Rounding errors:
  - Must round down for temperature
  - Must round up for pH
  - Must round up for free chlorine residual
- Bad formulas in excel spreadsheets:
  - Make sure you understand your formula
  - Wilkes Equation not allowed, must use Regression Equation

Common mistakes (continued):

- Not calculating CT's daily
  - Don't wait until the end of the month to do the calculations because if you discover you didn't meet CT's, it's too late!
- If adjusting contact time according to flow rate, use the demand flow, not the plant flow.
- Failure to answer questions at bottom of form correctly (or at all)
- Always answering "Yes" to the questions at the bottom of the form without actually looking at the numbers

Conventional or Direct: Answer all the yes/no questions



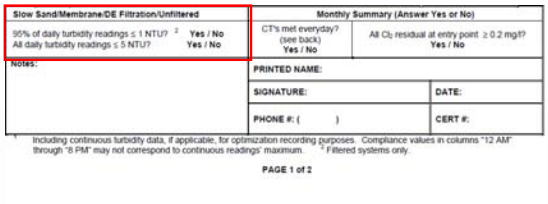
Conventional or Direct Filtration		Monthly Summary (Answer Yes or No)	
95% of the 4-hour turbidity readings ≤ 0.3 NTU? Yes / No All the 4-hour turbidity readings ≤ 1 NTU? Yes / No All turbidity readings < IFE[2] triggers? Yes / No [3]		CT's met everyday? (see back) Yes / No	All Cl_2 residuals at entry point ≥ 0.2 mg/l? Yes / No
Notes:		PRINTED NAME:	
		SIGNATURE:	DATE:
		PHONE #: ( )	CERT #:

[1] Including continuous turbidity data, if applicable, for optimization recording purposes. Compliance values in columns "12 AM" through "8 PM" may not correspond to continuous readings' maximum. [2] IFE = Individ. Filter Eff. (OAR 333-061-0040(1)(ex)(B&C))

PAGE 1 of 2

Slow Sand/Membrane/DE/Unfiltered

Answer all the yes/no questions

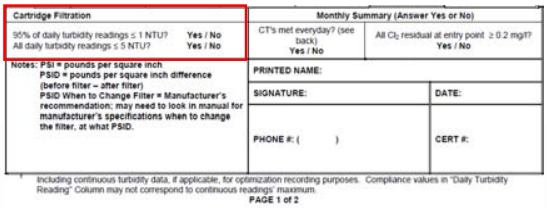


Slow Sand/Membrane/DE Filtration/Unfiltered		Monthly Summary (Answer Yes or No)	
95% of daily turbidity readings ≤ 1 NTU? [2] Yes / No All daily turbidity readings ≤ 5 NTU? Yes / No		CT's met everyday? (see back) Yes / No	All Cl_2 residual at entry point ≥ 0.2 mg/l? Yes / No
Notes:		PRINTED NAME:	
		SIGNATURE:	DATE:
		PHONE #: ( )	CERT #:

[1] Including continuous turbidity data, if applicable, for optimization recording purposes. Compliance values in columns "12 AM" through "8 PM" may not correspond to continuous readings' maximum. [2] Filtered systems only.

PAGE 1 of 2

Cartridge/Bag Answer all the yes/no questions

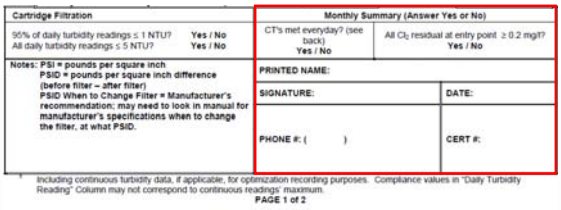


Cartridge Filtration		Monthly Summary (Answer Yes or No)	
95% of daily turbidity readings ≤ 1 NTU? Yes / No All daily turbidity readings ≤ 5 NTU? Yes / No		CT's met everyday? (see back) Yes / No	All Cl_2 residual at entry point ≥ 0.2 mg/l? Yes / No
Notes: PSI = pounds per square inch PSID = pounds per square inch difference (before filter – after filter) PSID When to Change Filter = Manufacturer's recommendation; may need to look in manual for manufacturer's specifications when to change the filter, at what PSID.		PRINTED NAME:	
		SIGNATURE:	DATE:
		PHONE #: ( )	CERT #:

[1] Including continuous turbidity data, if applicable, for optimization recording purposes. Compliance values in "Daily Turbidity Reading" Column may not correspond to continuous readings' maximum.

PAGE 1 of 2

Everyone needs to fill out the CT section!



Cartridge Filtration		Monthly Summary (Answer Yes or No)	
95% of daily turbidity readings ≤ 1 NTU? Yes / No All daily turbidity readings ≤ 5 NTU? Yes / No		CT's met everyday? (see back) Yes / No	All Cl_2 residual at entry point ≥ 0.2 mg/l? Yes / No
Notes: PSI = pounds per square inch PSID = pounds per square inch difference (before filter – after filter) PSID When to Change Filter = Manufacturer's recommendation; may need to look in manual for manufacturer's specifications when to change the filter, at what PSID.		PRINTED NAME:	
		SIGNATURE:	DATE:
		PHONE #: ( )	CERT #:

[1] Including continuous turbidity data, if applicable, for optimization recording purposes. Compliance values in "Daily Turbidity Reading" Column may not correspond to continuous readings' maximum.

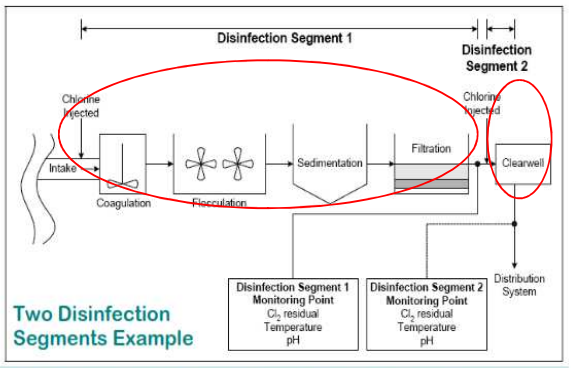
PAGE 1 of 2

Multiple CT segments

- A "CT segment" is the point between which chlorine is injected and free chlorine residual is measured
- Treatment plants can have multiple CT segments (i.e. multiple chlorine injection points)
- Multiple CT segments can be added together in order to meet CTs
- Do not add contact times "T" together!
  - Why? Chlorine, temp, pH may change throughout the process

Multiple CT segments (cont.)

- Must calculate log inactivation ratios for each segment and add ratios together
  - Inactivation ratio = $\frac{C1T1_{actual}}{CT1_{reqd}} + \frac{C2T2_{actual}}{CT2_{reqd}}$
- Modify reporting form: add column for log inactivation ratios (sum must be >1)
  - Not to be confused with 1-log inactivation



Total inactivation = ∑ log inactivation from each disinfection segment

What to do when things go wrong:

Such as:

- Treatment interruptions
- CTs not met
- Turbidity exceeds regulatory limits

What to do:

- Call your regulatory contact at the drinking water program
- Check out the BMPs on the DWS website in the "Water System Operations" section

In Summary:

- In order to verify adequate disinfection is taking place, we need to calculate CT achieved (CT_{actual})
- EPA reviewed many disinfection studies in order to create CT Tables that specify minimum CT requirements needed to achieve specific log reduction levels for *Giardia* ($CT_{required}$)
- CT_{actual} must be equal to or greater than $CT_{required}$

Things you should do:

- Check how T is calculated at your plant
- Do all treatment plant operators understand it?
- Review spreadsheet equation for CTs (if applicable)
- Write an SOP for CT determination
- Arrange for a tracer study if necessary

Exercise #6

- Filling out the monthly surface water quality operating report

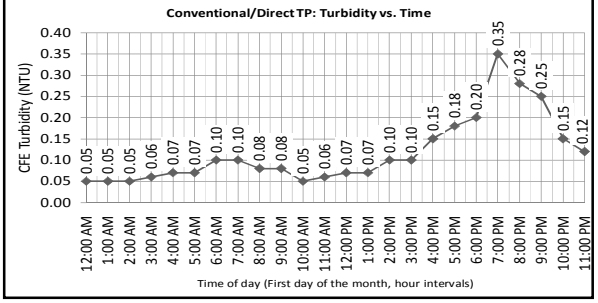
Exercise #6: Filling out the monthly surface water report

Example #1: Conventional or direct filter plant

Turbidity

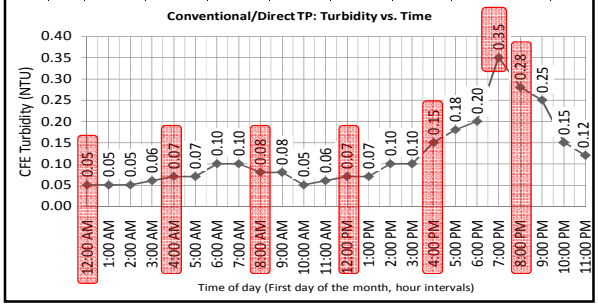
•Use the data in the graph to record the 4-hour daily turbidities on the first day of the month of the Conventional/Direct Filtration monthly reporting form.

•What number should be entered in the "Highest Reading of the Day (NTU)" column?



Exercise #6: Filling out the monthly surface water report **Example #1: Conventional or direct filter plant**

DAY	12 AM [NTU]	4 AM [NTU]	8 AM [NTU]	NOON [NTU]	4 PM [NTU]	8 PM [NTU]	Highest Reading of the Day[1] [NTU]
1	0.05	0.07	0.08	0.07	0.15	0.28	0.35



Exercise #6: Filling out the monthly surface water report

Example #1: Conventional or direct filter plant

Turbidity

•Let's say your plant runs 24 hours a day and you have turbidity readings filled in for every 4-hour interval for all 31 days of the month. How many readings could you have that were > 0.3 NTU? (95% of readings should be ≤ 0.3 NTU)

•What should you do if you answer "no" to the turbidity question "All readings ≤ 1 NTU?" on the bottom of the form?
- a. Call the state
- b. Issue a boil water notice
- c. Issue a public notice within 30 days
- d. Both a & c

•What should you do if you answer "no" to the turbidity question "All readings < IFE triggers?" on the bottom of the form?
- a. Call the state
- b. Issue a boil water notice
- c. Issue a public notice within 30 days
- d. Both a & c

Exercise #6: Filling out the monthly surface water report

Example #1: Conventional or direct filter plant

Turbidity

•Let's say your plant runs 24 hours a day and you have turbidity readings filled in for every 4-hour interval for all 31 days of the month. How many readings could you have that were > 0.3 NTU and still meet the requirement of 95% of readings being ≤ 0.3 NTU?
You could have 9 readings above 0.3 NTU
(6 readings/day x 31 days = 186 readings total. 5% x 186 = 9.3)

•What should you do if you answer "no" to the turbidity question "All readings ≤ 1 NTU?" on the bottom of the form? **a**
- a. Call the state
- b. Issue a boil water notice
- c. Issue a public notice within 30 days
- d. Both a & c

•What should you do if you answer "no" to the turbidity question "All readings < IFE triggers?" on the bottom of the form? **a**
- a. Call the state
- b. Issue a boil water notice
- c. Issue a public notice within 30 days
- d. Both a & c

Exercise #6: Filling out the monthly surface water report

Example #1: Conventional or direct filter plant

CT Calculations (assume 2.5-log conventional plant)

•Use the following parameters to calculate the CTs achieved at the plant and fill it in on the form on first day of the month:
Free chlorine residual: 0.6 ppm
Contact time: 100 minutes

•Use the following parameters to calculate the CTs required using the EPA tables from Exercise 5 and fill it in on the form:
Temp: 12°C
pH: 7.2

•Are CTs met at the plant for this day?

Exercise #6:
Example #1: Conventional or direct filter plant CT Calculations (assume 2.5-log conventional plant)

•Use the following parameters to calculate the CTs achieved at the plant and fill it in on the form on first day of the month:
Free chlorine residual: 0.6 ppm Contact time: 100 minutes
•Use the following parameters to calculate the CTs required using the EPA tables from Exercise 5 and fill it in on the form:
Temp: 12°C pH: 7.2

Date / Time	Minimum Cl_2 Residual at 1st User (**C**) [ppm or mg/L]	Contact Time (**T**) [min]	Actual CT **C X T**	Temp [° C]	pH	Required CT	CT Met? Yes / No	Peak Hourly Demand Flow [GPM]
1 /	0.6	100	60	12	7.2	21	Yes	2000

•Are CTs met at the plant for this day? **Yes**
CT achieved (60) > CT required (21)

Exercise #6:
Example #1: Conventional or direct filter plant
CT Calculations (assume 2.5-log conventional plant)

•Let's say the Peak Hourly Demand Flow for the day was 2000 gpm. If the Peak Hourly Demand Flow during the tracer study was 1750 gpm, is this a problem? Why or why not?

•What should you do if you answer "no" to either of the CT questions on the turbidity side of form?

•"CTs met at all times?"
- a. Call the state
- b. Issue a boil water notice
- c. Issue a public notice within 30 days
- d. Both a & c

•"Residual at EP ≥ 0.2 ppm at all times?"
- a. Call the state
- b. Issue a boil water notice
- c. Issue a public notice within 30 days
- d. Both a & c

Exercise #6:
Example #1: Conventional or direct filter plant

CT Calculations (assume 2.5-log conventional plant)

•Let's say the Peak Hourly Demand Flow for the day was 2000 gpm. If the Peak Hourly Demand Flow during the tracer study was 1750 gpm, is this a problem? Why or why not?
Yes this is a problem – flow cannot exceed 10% of tracer study flow. 10% x 1750 gpm = 175 gpm. 1750 + 175 = 1925 gpm. Therefore flow cannot be >1925 gpm or else a new tracer study is needed.

•What should you do if you answer "no" to either of the CT questions on the turbidity side of form?

•"CTs met at all times?" **a**
a. Call the state
b. Issue a boil water notice
c. Issue a public notice within 30 days
d. Both a & c

•"Residual at EP ≥ 0.2 ppm at all times?" **a**
a. Call the state
b. Issue a boil water notice
c. Issue a public notice within 30 days
d. Both a & c

Example #2: Slow sand, Membrane, or DE filter plant (2-log)
Turbidity

•Use the data in the graph to record the daily CFE turbidity on the first day of the month of the Slow Sand/Membrane/DE Filtration monthly reporting form. Which 4-hour column should it be recorded in? Why?

•What number should be entered in the "Highest Reading of the Day (NTU)" column?

DAY	12 AM [NTU]	4 AM [NTU]	8 AM [NTU]	NOON [NTU]	4 PM [NTU]	8 PM [NTU]	Highest Reading of the Day [NTU]
1							
2							

Example #2: Slow sand, Membrane, or DE filter plant (2-log)
Turbidity

•Use the data in the graph to record the daily CFE turbidity on the first day of the month of the Slow Sand/Membrane/DE Filtration monthly reporting form. Which 4-hour column should it be recorded in? Why?
Any of the columns is fine to use. Most people use the column that is closest to the time they observed the turbidity.

•What number should be entered in the "Highest Reading of the Day (NTU)" column? **1.2 NTU**

DAY	12 AM [NTU]	4 AM [NTU]	8 AM [NTU]	NOON [NTU]	4 PM [NTU]	8 PM [NTU]	Highest Reading of the Day [NTU]
1			**0.2**				**1.2**
2							

Example #2: Slow sand, Membrane, or DE filter plant (2-log)
Turbidity

•Let's say your plant runs everyday and you have turbidity readings filled in once a day for all 31 days of the month. How many readings could you have that were > 1 NTU and still meet the requirement of 95% of readings being ≤ 1 NTU?

•What should you do if you answer "no" to the turbidity question "All readings ≤ 5 NTU?" on the bottom of the form?
a. Call the state
b. Issue a boil water notice
c. Issue a public notice within 30 days
d. Both a & c

Example #2: Slow sand, Membrane, or DE filter plant (2-log)
Turbidity

•Let's say your plant runs everyday and you have turbidity readings filled in once a day for all 31 days of the month. How many readings could you have that were > 1 NTU and still meet the requirement of 95% of readings being ≤ 1 NTU?
Only 1 (5% of 31 readings = 1.6)

•What should you do if you answer "no" to the turbidity question "All readings ≤ 5 NTU?" on the bottom of the form? **a**
a. Call the state
b. Issue a boil water notice
c. Issue a public notice within 30 days
d. Both a & c

Example #2: Slow sand, Membrane, or DE filter plant (2-log)
CT Calculations

•Use the following parameters to calculate the CTs achieved at the plant and fill it in on the form on first day of the month:
Free chlorine residual: 0.3 ppm
Contact time: 60 minutes

•Use the following parameters to calculate the CTs required using the EPA tables from Exercise 5 and fill it in on the form:
Temp: 9°C
pH: 7.8

•Are CTs met at the plant for this day?

Example #2: Slow sand, Membrane, or DE filter plant (2-log)
CT Calculations

•Use the following parameters to calculate the CTs achieved at the plant and fill it in on the form on first day of the month:
Free chlorine residual: 0.3 ppm
Contact time: 60 minutes

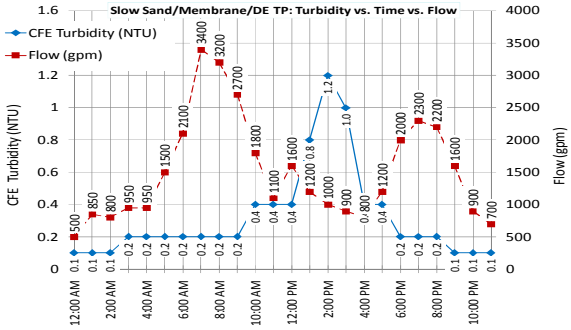
•Use the following parameters to calculate the CTs required using the EPA tables from Exercise 5 and fill it in on the form:
Temp: 9°C
pH: 7.8

•Are CTs met at the plant for this day? **No - CT achieved (18) is < CT required (66)**

Date / Time	Minimum Cl_2 Residual at 1st User (**C**) [ppm or mg/L]	Contact Time (**T**) [minutes]	Actual CT **C X T**	Temp [° C]	pH	Required CT Use tables	CT Met? Yes / No	Peak Hourly Demand Flow [GPM]
1 /	0.3	60	18	9	7.8	66	No	

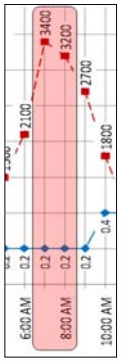
Example #2: Slow sand, Membrane, or DE filter plant (2-log)
CT Calculations

•What number should be entered in the "Peak Hourly Demand Flow" column?



Exercise #6, Example #2 Slow Sand - Peak Hour Demand

Time	Flow Reading (gpm)	Running hourly average demand of flow readings (gpm)
12:00 AM	500	
1:00 AM	850	675
2:00 AM	800	825
3:00 AM	950	875
4:00 AM	950	950
5:00 AM	1500	1225
6:00 AM	2100	1800
7:00 AM	**3400**	2750
8:00 AM	**3200**	**3300** <= Peak Hour Demand
9:00 AM	2700	2950
10:00 AM	1800	2250
11:00 AM	1100	1450
12:00 PM	1600	1350
1:00 PM	1200	1400
2:00 PM	1000	1100
3:00 PM	900	950
4:00 PM	800	850
5:00 PM	1200	1000
6:00 PM	2000	1600
7:00 PM	2300	2150
8:00 PM	2200	2250
9:00 PM	1600	1900
10:00 PM	900	1250
11:00 PM	700	800



Example #2: Slow sand, Membrane, or DE filter plant (2-log)
CT Calculations

•What number should be entered in the "Peak Hourly Demand Flow" column? **3300 gpm. Average of flows between 7 am and 8 am.**

Date / Time	Minimum Cl_2 Residual at 1st User (**C**) [ppm or mg/L]	Contact Time (**T**) [minutes]	Actual CT **C X T**	Temp [° C]	pH	Required CT Use tables	CT Met? Yes / No	Peak Hourly Demand Flow [GPM]
1 /	0.3	60	18	9	7.8	66	No	**3300**

Example #2: Slow sand, Membrane, or DE filter plant (2-log)
CT Calculations

•What should you do if you answer "no" to either of the CT questions on the turbidity side of form?

"CTs met at all times?"
a. Call the state
b. Issue a boil water notice
c. Issue a public notice within 30 days
d. Both a & c

"Residual at EP ≥ 0.2 ppm at all times?"
a. Call the state
b. Issue a boil water notice
c. Issue a public notice within 30 days
d. Both a & c

Example #2: Slow sand, Membrane, or DE filter plant (2-log)
CT Calculations

•What should you do if you answer "no" to either of the CT questions on the turbidity side of form?

"CTs met at all times?" **a**
a. Call the state
b. Issue a boil water notice
c. Issue a public notice within 30 days
d. Both a & c

"Residual at EP ≥ 0.2 ppm at all times?" **a**
a. Call the state
b. Issue a boil water notice
c. Issue a public notice within 30 days
d. Both a & c

Emerging Issues

Emerging Issues

- Climate change and water supply
- Harmful algae blooms
- www.healthoregon.org/dwp

News & “Hot Topics”

Climate Change and Water Supply

- Earlier and heavier snowpack runoff
- Increasing variability of storm frequency and intensity
- Weather extremes already evident (drought in some States, heavy rain/flooding in others 2011-2012)
- Increased variability in water quality; can affect both surface and groundwater systems.
- Changes in rainfall patterns affect all systems
- Rising sea levels could lead to salt water intrusion or flooding

Harmful algae blooms

- Produce toxins that can be harmful
- Occur in warm, slow moving water
- Increasing in frequency and duration
  - happening more or better reporting?
  - more people, more nutrients, warmer water
- Best management practices on our website
- http://public.health.oregon.gov/HealthyEnvironments/DrinkingWater/Operations/Treatment/Pages/algae.aspx

www.healthoregon.org/dwp

- News
- Hot Topics

RESOURCES FOR OPERATORS

Tools & Resources

- For surface water systems: www.healthoregon.org/dwp

Click on "Water System Operations" on left-side menu list, then "Surface Water Treatment"

  - Monthly Surface Water Quality Report form template
  - Tracer Study form

- Surface Water Treatment Rule guidance manual, Appendix C: Determination of Disinfectant Contact Time

Tools & Resources (continued)

- EPA Rules http://water.epa.gov/lawsregs/rulesregs/sdwa/currentregulations.cfm
- AWWA http://www.pnws-awwa.org
- OAWU http://www.oawu.net/
- Circuit Rider http://public.health.oregon.gov/HealthyEnvironments/DrinkingWater/Operations/Pages/circuitrider.aspx

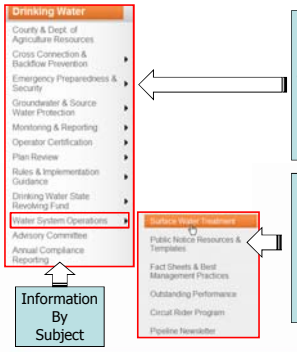
QUESTIONS?

- Call your technical services contact at the State.
- State Drinking Water Services
  - General Info: (971) 673-0405

Information Available Online

www.healthoregon.org/dwp

Information By Subject



1. Cross Connection & Backflow Info
2. Emergency Preparedness & Security
3. GW & Source Water Protection
4. Monitoring & Reporting
5. Operator Certification
6. Plan Review
7. Rules & Implementation Guidance
8. SDW Revolving Loan Fund

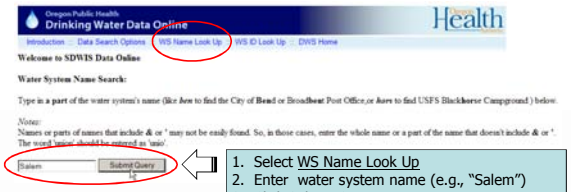
9. Water System Operations
   - **Surface Water Treatment**
   - Public Notice Resources
   - Fact Sheets & Best Practices
   - Outstanding Performance
   - Circuit Rider Program
   - Pipeline Newsletter

Drinking Water Data Online

Many data search options are available

Find Your Water System

WS Name Look Up

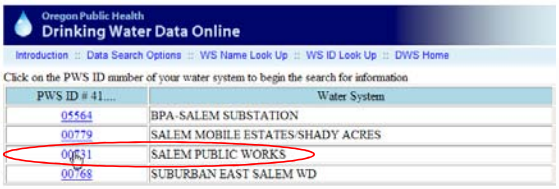


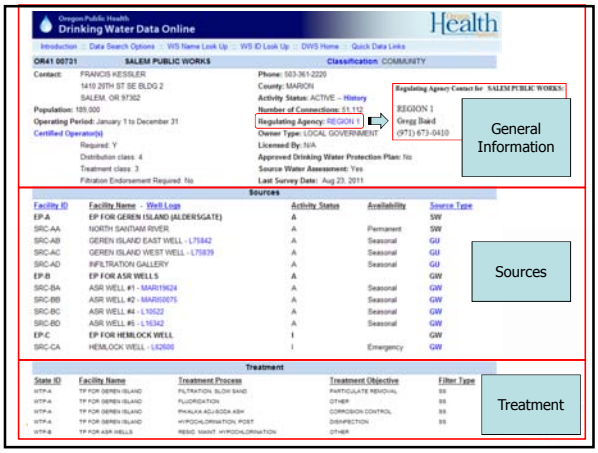
1. Select WS Name Look Up
2. Enter water system name (e.g., "Salem")
3. Click Submit Query

Note: You also could have used WS ID Look Up and entered the ID# for Salem (00731)

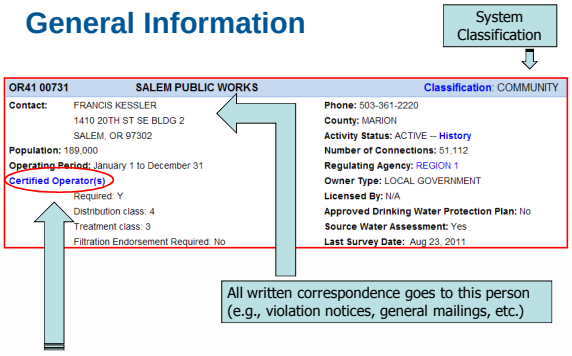
Select Your Water System

Select the Water System by
Clicking on the PWS ID#

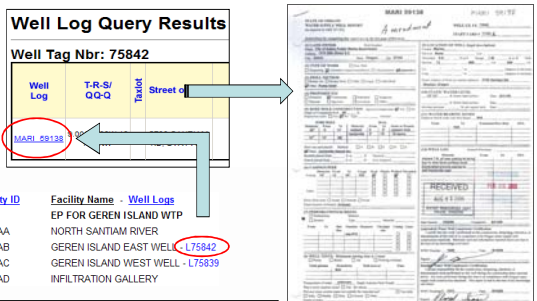




General Information

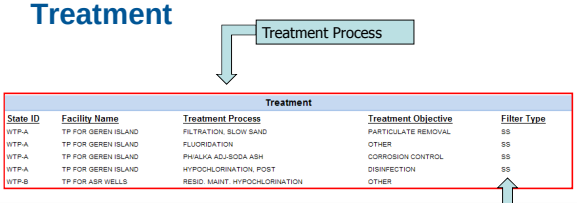


Sources



Clicking on a Well ID allows you to view well logs and data from the Oregon Water Resources Department

Treatment



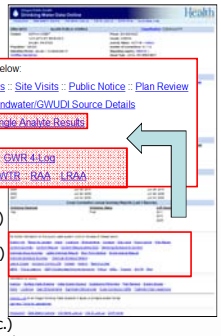
Filter Type:
SS = Slow Sand
CT = Cartridge
BG = Bag
CF = Conventional Filtration
DF = Direct Filtration
MF = Membrane Filtration
UF = Unfiltered

Sampling Schedules

Sampling Schedules:

1. Sampling Schedule for Coliform
   - Includes repeat schedules
2. Chemical Schedule Summary
   - Required chemical sampling
3. Chemical Schedule Details - progress report on chemical sampling
4. Lead & Copper
   - clicking "More Info" at the bottom of the tap sample results allows you to see tap sample schedules, minimum water quality parameters to meet, and major milestones

Sampling Data



1. Coliform Summary (by month)
2. Coliform Results (by sample, results before 2002)
3. Chemical Group Summary (VOC, SOC)
4. Latest Chemical Results (individual contaminants)
5. Latest Chemical Results (sorted by date)
6. Entry Point Detects (detections only)
7. Single Analyte Results (individual contaminants)
8. Lead & Copper & Corrosion Control (L&C, pH, etc.)
9. Nitrates, Arsenic, Radionuclides, DBPs, TOC & Alkalinity
10. Turbidity (maximum daily turbidity)
11. SWTR (results from the bottom of the monthly SW report)
12. RAA & LRAA (DBP running annual average results)

Alerts, Contacts & Site Visits

1. Alerts - Sample results that require State/County/Dept of Ag staff to respond
2. Contacts – Document alert follow-ups and other significant correspondence
3. Site Visits – Document surveys and treatment plant inspections

Violations, Enforcements & Public Notices

1. Violations
   - Also shows related enforcement actions
   - Systems should strive to see "Returned to Compliance"
   - System score should be less than 11 and as close to 0 as possible
2. Enforcements
   View pdf copies of original Administrative Orders and Bilateral Compliance Agreements as well as their status
3. Public Notice
   - Notices required
   - Notices delivered

Plan Review Information

1. Project ID and Name
2. Date Plans Received
3. Date Preliminary Approval was Granted
   (no conditions)
4. Date Conditional Approval was Granted
   (required items not shown on submitted plans)
5. Date Abandoned (project was not completed)
6. Final Approval Date (approval for use)
7. Reviewer (initials of State staff engineer reviewing the plans)

System Info & Report For Lenders

1. System Info
   - Main water system information page (already covered)
2. Report for Lenders
   - Provides proof that the water supply is under regulatory oversight
   - Satisfies lending institutions