

reverse 3 with inactivation
pages 2, 3 with inactivation
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VP
5-12-14

Direct Potable Water Reuse Standard Operating Procedure

Wichita Falls, Texas

CT Calculation Procedure

This SOP supersedes any previous SOP on this topic.

INTRODUCTION

CT's are calculated on a regular interval to ensure the disinfection processes are meeting the required disinfection (long inactivation) of *Giardia lamblia* cysts and viruses. Separate CT calculations are required for each of the two water sources.

The River Road Waste Water Treatment (RRWWTP) plant CT includes disinfection zones beginning at the RRWWTP pumps, through the microfiltration plant and the 2010 SWTP.

The Secondary Reservoir CT begins at the secondary reservoir chlorine dioxide injection point and continues to the Cypress WTP raw water splitter box, and then through the 2010 SWTP.

Each CT set has some separate disinfection zone and some shared disinfection zones defined in the procedure.

The CT forms are saved on the back-right work station in the Operations Booth. @Cypress?

OBJECTIVE

This procedure describes the sample points, data required and the forms used to calculate the CT's. It also describes what indicates pass/fail and what procedures to follow in the case of a CT failure.

PROCEDURE

RRWWTP CT Procedure:

The RRWWTP includes 5 disinfection zones and sample points are as follows:

- D1: Microfiltration flow control vault prior to ferric sulfate injection. (TCEQ-3J)
- D2: Microfiltration/Reverse Osmosis clarifier effluent. (TCEQ-7J)
- D3: Microfiltration combined filter effluent prior to dechlorination. (TCEQ-11J)
- D4: 2010 SWTP combined filter effluent, prior to clearwell chlorine and ammonia injection. (TCEQ-36J)

- D5: Distribution system point of entry. (TCEQ-42J)

Each sample site will require a 1 liter water sample to be collected and tested in the Operations Laboratory for:

- D1: Monochloramine, Temperature (°C) and pH
- D2: Monochloramine, Temperature (°C) and pH
- D3: Monochloramine, Temperature (°C) and pH
- D4: Total Chlorine, Temperature (°C) and pH
- D5: Total Chlorine, Temperature (°C) and pH

Flow at each location will need to be recorded from a SCADA work station.

- Flow at D1 and D2 will be the RRWWTP discharge flow.
- Flow at D3 will be the maximum flow through 1 microfilter.
- Flow at D4 and D5 will be the flow through the 2010 SWTP.

Sample results are to be recorded and logged into the RRWWTP CT STUDY form (see the form attached).

Giardia lamblia requires a minimum of 2.0 log removal and Viruses require a minimum of 5.0 log removal for the CT to pass. ←

Once the values are typed into the CT form, the calculator will automatically calculate *Giardia* and Virus logs and the inactivation ratio.

THE INACTIVATION RATIO MUST BE 1.0 OR GREATER TO PASS THE CT.

Each shift will be responsible for completing a passing CT (4 AM, 12 PM, 8 PM). The lowest CT for the day will be used for compliance in the monthly operating report (See SWMOR SOP).

For CT failure (inactivation ratio less than 1.0):

- The plant then has 4 hours to bring the CT up to an inactivation ratio of 1.0 or greater.
- The water being produced at the point of a CT failure must stop entering the clearwell and ground storage.
- Notify the Operations and Maintenance Supervisor immediately. See Chain of Command or communication for telephone number
- Disinfection process must be adjusted to increase chloramine residuals within the plant.
 - At the conventional plant the pre-chlorine and ammonia should be increased by a 1 mg/L dose.
 - The RRWWTP should be contacted to increase the chlorine injection by a 1 mg/L dose.

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- At the 2008 MF/RO clarifier the chlorine and liquid ammonium sulfate injection should be increased by a 1 mg/L dose.
- Sample collection should increase to every 2 hours at each CT sample collection point until a passing CT is reached.

Enclosure H1: CT STUDY
FOR PUBLIC WATER SYSTEMS THAT ARE USING SURFACE WATER SOURCES
OR GROUND WATER SOURCES UNDER THE INFLUENCE OF SURFACE WATER (cont.)
CT Calculator Worksheet

2.0

PUBLIC WATER SYSTEM NAME: City of Wichita Falls Reuse Project PLANT NAME: 3600WTP to Cypress through MFRO/Conveyance
PWS ID No.: 3435801 Date: _____

DISINFECTION PROCESS PARAMETERS										
APPROVED CT STUDY PARAMETERS						PERFORMANCE STANDARDS				
Parameters	Disinfection Zone					Log Inactivation				
	D1	D2	D3	D4	D5	Glandia		Virus		
Flow Rate (MGD)	7.600	7.600	3.008	10.000	10.000					5.0
T ₉₀ (min)	397.0	223.2	8.6	67.3	228.8					

DISINFECTION PROCESS DATA											
INDIVIDUAL DISINFECTION ZONES										PLANT TOTAL	
Disinfection	Chlorine (mg/L)	Flow (MGD)	Temp (°C)	pH	CT ₉₀	Glandia CT ₉₀	Virus CT ₉₀	Glandia Log	Virus Log	Glandia Log	Virus Log
OLA 01					missing	missing	missing	missing	missing	missing	missing
OLA 02					missing	missing	missing	missing	missing	missing	missing
OLA 03					missing	missing	missing	missing	missing	missing	missing
OLA 04					missing	missing	missing	missing	missing	missing	missing
OLA 05					missing	missing	missing	missing	missing	missing	missing

SUBMITTED BY: _____ Certificate No. and Grade: _____ Date: _____
YOEQ-105-01-103 CT STUDY

H1-11

SR (Secondary Reservoir) CT Procedure:

The SR Includes 3 disinfection zones and sample points are as follows:

- D1A: First sample point on the raw water line from the Secondary Reservoir to the Cypress WTP, inside the fence, on the Northwest end of the Secondary Reservoir. (TCEQ-25J)
- D1B: Second sample point on the raw water line from the Secondary Reservoir to the Cypress WTP, just outside the fence at the Secondary Reservoir. (TCEQ-26J)
- D1C: Third sample point on the raw water line from the Secondary Reservoir to the Cypress WTP, sample spigot located just West of the drive by the Raw Water Splitter Box. (TCEQ-27J)
- D2: 2010 SWTP combined filter effluent, prior to clearwell chlorine and ammonia injection. (TCEQ-36J)
- D3: Distribution system point of entry. (TCEQ-42J)

Each chlorine dioxide sample site will require two 250 mL amber glass containers (specially prepared glassware prepared by the Laboratory is marked for the chlorine dioxide sample collections. Sample containers should be filled to the top with the water sample to avoid trapping air in the container.

Samples for total chlorine will require a 1 liter water sample to be collected and all samples will be tested in the Operations Laboratory for:

- D1A: Chlorine dioxide, Temperature (°C) and pH (if needed)
- D1B: Chlorine dioxide, Temperature (°C) and pH (if needed)
- D1C: Chlorine dioxide, Temperature (°C) and pH
 - If the D1C chlorine dioxide sample is less than 0.05 mg/L, the Operator will then need to collect a D1B chlorine dioxide sample for the CT.
 - If the D1B sample is less than 0.05 mg/L:
 - The Operator will notify the Operations and Maintenance Supervisor and call the Laboratory Staff on-call to check chlorine dioxide generator yields.
 - A D1A sample will also need to be collected for chlorine dioxide testing.
 - If the D1A sample is also less than 0.05 mg/L, the Operations and Maintenance Supervisor, the Maintenance on-call and the Laboratory on-call should be notified to check the chlorine dioxide generators.
- D2: Total Chlorine, Temperature (°C) and pH
- D3: Total Chlorine, Temperature (°C) and pH

Flow at each location will need to be recorded from a SCADA work station.

- Flow at D1a, D1b and D1c will be the Secondary Reservoir flow on the DPR SCADA page.
- Flow at D2 and D3 will be the flow through the 2010 SWTP.

Sample results are to be recorded and logged into the SR CT STUDY form (see the form attached).

Giardia lamblia requires a minimum of 0.5 log removal and Viruses require a minimum of 2.0 log removal for the CT to pass.

Once the values are typed into the CT form, the calculator will automatically calculate *Giardia* and Virus logs and the inactivation ratio.

THE INACTIVATION RATIO MUST BE 1.0 OR GREATER TO PASS THE CT.

Each shift will be responsible for completing a passing CT (4 AM, 12 PM, 8 PM). The lowest CT for the day will be used for compliance in the monthly operating report (See SWMOR SOP).

For CT failure (inactivation ratio less than 1.0):

- The plant then has 4 hours to bring the CT up to an inactivation ratio of 1.0 or greater.
- The water being produced at the point of a CT failure must stop entering the clearwell and ground storage.
- Notify the Operations and Maintenance Supervisor immediately.
- Disinfection process must be adjusted to increase chloramine residuals within the plant.
 - At the conventional plant the pre-chlorine and ammonia should be increased by a 1 mg/L dose.
- Sample collection should increase to every 2 hours at each CT sample collection point until a passing CT is reached.

Enclosure H2: CT STUDY
 FOR PUBLIC WATER SYSTEMS THAT ARE USING SURFACE WATER SOURCES
 OR GROUND WATER SOURCES UNDER THE INFLUENCE OF SURFACE WATER (cont.)
 CT Calculator Worksheet

PUBLIC WATER SYSTEM NAME: Cypress WTP Reuse Project PLANT NAME OR NUMBER: Secondary Reo. Through Cypress Conventional
 PWS ID No.: 2499931 Date: _____

DISINFECTION PROCESS PARAMETERS										
APPLIED CT STUDY PARAMETERS						PERFORMANCE STANDARDS				
Parameters	Schickel Zones					Log Inactivations				
	D1A	D1B	D1C	D2	D3	Giardia Inactivation		Virus		
Flow Rate (MGD)	5.000	5.000	5.000	9.999	9.999	0.5		2.0		
Temp (Fahrenheit)	83.3	74.7	74.7	87.1	88.3					

DISINFECTION PROCESS DATA												
INDIVIDUAL DISINFECTION ZONES										PLANT TOTAL		
Disinfectant	Cl (mg/L)	Flow (MGD)	Temp (F)	pH	CT _{1min}	CT _{2min}	CT _{5min}	Giardia Log	Virus Log	Giardia Log	Virus Log	Inert Ratio
CLGZ D1A					missing	missing	missing	missing	missing			
CLGZ D1B					missing	missing	missing	missing	missing			
CLGZ D1C					missing	missing	missing	missing	missing			
CLGZ D2					missing	missing	missing	missing	missing			
CLGZ D3					missing	missing	missing	missing	missing			

SUBMITTED BY: _____ Certificate No. _____ and Grade: _____ Date: _____
 TCEQ- (05-01-13) 07/2007

H2-10

See associated SOP:

SWMOR SOP

M. Southard

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Revised 5/9/2014

CT Calculation Procedure

Prepared by: [Signature]

Date: 05/09/14

Approved by: [Signature]

Date: 5-9-14

*This SOP is considered effective on the date it is approved. SOP's are to be reviewed and/or updated annually or any time this process has changed.

Reviewed by: _____

Date: _____

Reviewed by: _____

Date: _____

Reviewed by: _____

Date: _____

Reviewed by: _____

Date: _____

Reviewed by: _____

Date: _____

Sign below and date that you have received training on this SOP. By signing you are stating that you understand and will defer to this SOP when applicable.

Printed Name	Signature	Date	Printed Name	Signature	Date
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
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