(Enter Water System Name)

Nitrification Action Plan (NAP)

What is a NAP?

A NAP is a plan for detecting and correcting nitrification, which can destroy total chlorine residuals. **Purpose of NAP:** The purpose of a Nitrification Action Plan (NAP) is to ensure that chloramine disinfection is successful by preventing and/or responding to nitrification.

NAP Sampling: The rule gives the minimum requirements. It may be necessary for PWSs to perform additional sampling to characterize the adequacy of disinfection in their distribution system.

A NAP Includes:

1. A map and list of NAP sample sites representing all sources, entry points, and average and high water age sites within the distribution system;

2. A sampling schedule;

3. Analytical methods and standard operating procedures (SOPs) for sample collection;

4. A table of goals, baselines, and triggers for chemical levels, including 'yellow alert' triggers for when water is slightly off-spec and 'red alert triggers for when nitrification is bad-based on historical data;

5. A list of actions to take in response to yellow or red triggers; and

6. Communication strategies that will allow your system to take needed actions in a timely manner

Table 1. Sample Sites: (Map- Appendix A)

Site # From Map	Address	Sample Tap Location	Water Age	Flush Time (min)*

*Flush time will be for 5 minutes unless calculated and stated otherwise.

Water Age Examples: Low, Average, High, or Storage

Table 2. Sample Schedule:

Analyte	Entry Point	Distribution System		
Total Chlorine	Daily	Daily		
Mono-Chloramine	Daily	Weekly		
Di-Chloramine*	Monthly	Monthly		
Free Ammonia	Daily	Weekly		
Total Ammonia	Daily	Weekly		
Nitrate **	**Weekly	Monthly		
Nitrite **	**Weekly	Monthly		

* dichloramine can be determined using amperometric titration procedures or can be calculated as the difference

between the total chlorine and monochloramine residual.

** nitrate and nitrite monitoring can be reduced to monthly if source and treatment variations indicate minimal variations.

Table 3. Analytical Methods:

Analyte	Method: (Analyzer)	Range	
	Hach SL 1000		
рН	Probe		
Disinfectant			
Total Chlorine	10260 Hach Chemkey	.004-10 mg/L Cl2	(Example)
Monochloramine			
Di-Chloramine			
Free Ammonia			
Nitrification			
Total Ammonia			
Nitrate			
Nitrite			

The sample collection method should ensure that the sample is of water in the main. We will use a method of flushing for 5 minutes at each sample location, if calculated flush are unavailable. This should ensure that the water is from the main. If you don't flush long enough, you could get stagnant water from the service line, and think your main water is worse than it is.

Table 4. Action Plan Template: See attached sheet

Table 5. List of Actions to take in response to yellow and red triggers.

Normal Operations:	Disinfection practices are optimized and nitrification does not appear to be
	evident based on monitoring results. However, proactive and preventive actions
	may be appropriate for maintaining disinfection optimization.

- Yellow Flag Alert: Occurs when monitoring data indicates that nitrification may be occurring in the system and corrective actions are required. Yellow flag levels are somewhat out of the norm, indicating, that nitrification may have started. Some action to get back to normal is needed but is probably a routine type of action like flushing.
- Red Flag Alert: When monitoring data conclusively indicates that nitrification has progressed in the system resulting in depressed disinfectant residuals, elevated nitrite and/or nitrate levels, reduced pH levels and potential taste and odor concern. Red Flag Alerts require immediate remedial actions and the issuance of a precautionary boil order when minimum disinfectant levels are not met. Red flag levels happen when it becomes difficult to maintain a compliant total chlorine residual, and there is a strong possibility that nitrification is the culprit. If routine actions don't get the water back to normal, more intense action will be needed. Like a change from total chlorine to a free chlorine burn. Any water chemistry changes should only be undertaken after consultation with your IEPA Regional office.

Total Chlorine/Monochloramine: Ideally, 100% of total chlorine should be present as monochloramine.

Free Ammonia: Ammonia naturally increases with water age.

- <u>Total Ammonia</u>: The amount of total ammonia at the entry point should mirror the total ammonia in the distribution system.
- <u>Nitrite/Nitrate</u>: The nitrate and nitrite levels at the entry point and the distribution system should always be the same as in the source water. The only thing that can change them is either nitrification, backflow, or cross connection, or source water changes.

Table 6. Contact Info

Position	Name	Phone#

NITRIFICATION ACTION PLAN

Facility Name:

PWS ID #: IL

YELLOW AND RED FLAG TRIGGERS & ACTIONS

Chloramine Effectiveness Sample Suite (adapted from Texas Commission on Environmental Quality)

			Yellow Fla	ıg		Red Flag	
Site	Parameter	Goal	Trigger	Actions		Trigger	Actions
	Total Cl			1)Verify Results			1)Verify Results
	Monochloramine			2)Check & Adjust			2)Check & adjust dose
Entry Point	Dichloramine			→ Until Returned to Normal			→Until return to normal
	Total NH3-N						
	Free NH3-N						
	Total Cl						
	Monochloramine			1)Verify Results			1)Verify Results
Ave. Water Age	Dichloramine			2)Measure nitrite and nitrate			2)Measure nitrite and nitrate
U	Total NH3-N	Α	В	3)Adjust dose		С	3)Adjust dose
	Free NH3-N			4)Identify affected area (check			4)Identify affected area (check
				upstream and downstream)			upstream and downstream)
	Total Cl			5)Flush area			5)Flush area
High	Monochloramine			6)Flush dead ends			6)Flush dead ends
Water Age	Dichloramine			→Till levels return to normal			7)Convert to Free Chlorine
Ū	Total NH3-N	Α	В			С	→Till levels return to normal
	Free NH3-N						
	•				4		
(A) Not to exceed mg	/L monochloramine/5.06						
(B) Not to exceed (m	g/L monochloramine/5.06	5) +0.2.					
(C) Not to exceed (mg	g/L monochloramine/5.06	6) +0.4.					
Nitrite-N (MCL =	1.0 mg/L and Nitrate	-N(MCL = 1	L0.0 mg/L)				
			Yellow Fla	ig		Red Flag	
Site	Parameter	Baseline	Trigger	Actions		Trigger	Actions
	Free NH3-N						
Source	Nitrite NO2-N			1)Verify results			1)Verify results
Water*	Nitrate NO3-N			2)Evaluate cause for source			2)Identify affected area
				change.			3)Flush
Entry Point	Nitrite NO2-N			3)Identify Area			4)Perform free chlorine burn
	Nitrate NO3-N			4)Flush Area			→Till levels return to normal
				5)Flush dead-ends			
Ave. Water Age	Nitrite NO2-N			→Until return to normal			
3	Nitrate NO3-N						
High	Nitrite NO2-N						
Water Age	Nitrate NO3-N						
4	1 1100		1.14.4				

* If source waters have different water chemistry, additional criteria may be needed and should be differentiated in this table. (Modified from Texas Commission of Environmental Quality Form)

NITRIFICATION ACTION PLAN

Facility Name:

PWS ID #: IL

YELLOW AND RED FLAG TRIGGERS & ACTIONS

Chloramine Effectiveness Sample Suite (adapted from Texas Commission on Environmental Quality)

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Yellow Flag Site Parameter Baseline Trigger Actions Site Parameter Baseline Trigger Actions Site Parameter Baseline Trigger Actions Source Nitrite NO2-N Older Older Trigger Actions Source Nitrite NO2-N Older Older Older Older Older Trigger Actions Nitrite NO2-N Older Older Older Older Older Older Older Trigger Actions Actions Source Nitrite NO2-N Older Older Older Older Older Older Older Ave. Water Age Nitrite NO3-N	Nitrite-N (MCL =	1.0 mg/L and Nitrate	-N(MCL = 1	L0.0 mg/L)			
Yellow Flag Site Parameter Baseline Trigger Actions Free NH3-N Image: Colspan="4">Image: Colspan="4">Source Nitrite NO2-N Image: Colspan="4">Image: Colspan="4">Red Flag Source Nitrite NO2-N Image: Colspan="4">Image: Colspan="4">Colspan="4">Red Flag Water Nitrite NO3-N Image: Colspan="4">Image: Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan="4"Colspan="4">Colspan="4"Colspan="4"Colspan="4">Colspan="4"Colspan="4"Colspan="4"Colspan="4">Colspan="4"Co	(adapted from Te	exas Commission on I	Environme	ntal Qualit	y)		
Site Parameter Baseline Trigger Actions Site Parameter Baseline Trigger Actions Free NH3-N Image: Pree NH3-N Iman					·		
SiteParameterBaselineTriggerActionsSourceFree NH3-NImage: Construct on the second of the second				Yellow Fla	g	Red Flag	
Free NH3-N Notrite NO2-N WaterImage: Construct Nitrate NO3-NImage: Construct Nitrate NO3-NImage	Site	Parameter	Baseline	Trigger	Actions	Trigger	Actions
Source WaterNitrite NO2-N Nitrate NO3-NImage: Image:<		Free NH3-N					
Water Nitrate NO3-N Image: Change. Image: Change.<	Source	Nitrite NO2-N			1)Verify results		1)Verify results
Entry Point Nitrite NO2-N Image: Change. 3)Identify Area 4)Perform free chlorine burn Nitrate NO3-N Image: Change. 3)Identify Area 4)Perform free chlorine burn Ave. Water Age Nitrite NO2-N Image: Change. Image: Change. Image: Change. Nitrite NO2-N Image: Change. Image: Change.<	Water	Nitrate NO3-N			2)Evaluate cause for source		2)Identify affected area
Entry Point Nitrite NO2-N Image: Constraint of the constrai					change.		3)Flush
Nitrate NO3-N Image: Constraint of the sector of the	Entry Point	Nitrite NO2-N			3)Identify Area		4)Perform free chlorine burn
Ave. Water Age Nitrite NO2-N Air All All All All All All All All All Al		Nitrate NO3-N			4)Flush Area		→Till levels return to normal
Ave. Water Age Nitrite NO2-N Image: Constraint of the second secon					5)Flush dead-ends		
Nitrate NO3-N Image: Contract of the second secon	Ave. Water Age	Nitrite NO2-N			→Until return to normal		
	3	Nitrate NO3-N					
High Nitrite NO2-N	High	Nitrite NO2-N					
Water Age Nitrate NO3-N	Water Age	Nitrate NO3-N					

* If source waters have different water chemistry, additional criteria may be needed and should be differentiated in this table. (Modified from Texas Commission of Environmental Quality Form)

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NITRIFICATION ACTION PLAN

City of

County, Illinois

PWS ID NO. IL

YELLOW AND RED FLAG TRIGGERS & ACTIONS

Chloramine Effectiveness Sample Suite (adapted from Texas Commission on Environmental Quality)

			Yellow Fla	ag	Red Flag	
Site	Parameter	Goal	Trigger	Actions	Trigger	Actions
	Total Cl	3.5	3.0	1)Verify Results	2.8	1)Verify Results
	Monochloramine	3.5	3.0	2)Check & Adjust	2.8	2)Check & adjust dose
Entry Point	Dichloramine	0.05	0.1	ightarrow Until Returned to Normal	0.2	ightarrowUntil return to normal
	Total NH3-N	0.69	0.8		0.9	
	Free NH3-N	0.01	0.2		0.3	
	Total Cl	2.5	2.0]		
	Monochloramine	5.5	2.0	1)Verify Results	2.0	1)Verify Results
Ave. Water Age	Dichloramine	0.1	0.2	2)Measure nitrite and nitrate	2.0	2)Measure nitrite and nitrate
	Total NH3-N	(A)	(B)	3)Adjust dose	0.2	3)Adjust dose
	Free NH3-N	0.1	0.2	4)Identify affected area (check	(C)	4)Identify affected area (check
				upstream and downstream)	0.3	upstream and downstream)
	Total Cl	1.5	1.2	5)Flush area	1.1	5)Flush area
High	Monochloramine	1.5	1.2	6)Flush dead ends	1.1	6)Flush dead ends
Water Age	Dichloramine	0.1	0.2	→Till levels return to normal	0.2	7)Convert to Free Chlorine
	Total NH3-N	(A)	(B)		(C)	→Till levels return to normal
	Free NH3-N	0.2	0.3		0.4	

(A) Not to exceed mg/L monochloramine/5.06.

(B) Not to exceed (mg/L monochloramine/5.06) +0.2.

(C) Not to exceed (mg/L monochloramine/5.06) +0.4.

Nitrite-N (MCL = 1.0 mg/L and Nitrate-N(MCL = 10.0 mg/L) (adapted from Texas Commission on Environmental Quality)

			Yellow Flag			Red Flag		
Site	Parameter	Baseline	Trigger	Actions		Trigger	Actions	
	Free NH3-N							
Source	Nitrite NO2-N			1)Verify results			1)Verify results	
Water	Nitrate NO3-N			2)Evaluate cause for source			2)Identify affected area	
				change.			3)Flush	
Entry Point	Nitrite NO2-N		0.02	3)Identify Area		0.03	4)Perform free chlorine burn	
	Nitrate NO3-N		?	4)Flush Area		?	→Till levels return to normal	
				5)Flush dead-ends				
Ave. Water Age	Nitrite NO2-N		0.15	→Until return to normal		0.25		
	Nitrate NO3-N		?			?		
]				
High	Nitrite NO2-N		0.2			0.3		
Water Age	Nitrate NO3-N		?]		?		

* If source waters have different water chemistry, additional criteria may be needed and should be differentiated in this table. (Modified from Texas Commission of Environmental Quality Form)

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Raw Source Water NAP Monitoring Record

(Does not apply to consecutive systems)

Nitrification Action Plan For:

7-Digit ID Number

IL

	Dese	cription of Sample Location:	Free NH3-N	Nitrite-N	Nitrate-N	
Date:	5-Digit ID	Local Description	(mg/L)	(mg/L)	(mg/L)	
12/31/2020	00000	Well/Intake Number 0	0.00	0.00	0.00	

	-		

Point of Entry NAP Monitoring Record

Nitrification Action Plan For:

7-Digit ID Number

7-Digit ID Number

IL

Description of Sample Location:

TAP Number

Local Description of Sample Location

				Mono-	Di-				
		Total Cl	Free Cl*	Chloramine	Chloramine	Total NH3-	Free NH3-	Nitrite-N	Nitrate-N
r		(mg/l)	(mg/l)	(mg/l)	(mg/l)	N (mg/l)	N (mg/l)	(mg/l)	(mg/l)
Sample Frequen	су	Daily	burn)	Daily	Monthly	Daily	Daily	Weekly	Weekly
Goal.mg/L						A**			
Yellow Alert Trig	gger, mg/L					B**			
Action Code									
Red Alert Trigge	r, mg/L					C**			
Action Code									
		I							
Date	Ву								
12/31/2019	WBB	4.00	0.00	3.50	0.50	0.00	0.00	0.00	0.00
					0.00				
					0.00				
					0.00				
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Date	Ву	Total Cl	Free Cl	Mono-Cl	Di-Cl	Total NH3	Free NH3	Nitrite	Nitrate
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Point of Entry NAP Monitoring Record

TAP Number

Nitrification Action Plan For:

7-Digit ID Number

7-Digit ID Number

IL

Description of Sample Location:

Local Description of Sample Location

				Mono-	Di-				
		Total Cl	Free Cl*	Chloramine	Chloramine	Total NH3-	Free NH3-	Nitrite-N	Nitrate-N
		(mg/l)	(mg/l)	(mg/l)	(mg/l)	N (mg/l)	N (mg/l)	(mg/l)	(mg/l)
			Daily (during						
Sample Frequen	су	Daily	burn)	Daily	Monthly	Daily	Daily	Weekly	Weekly
Goal.mg/L						A**			
Yellow Alert Trig	gger, mg/L					B**			
Action Code									
Red Alert Trigge	r, mg/L					C**			
Action Code									
		1							
Date	Ву								
12/31/2020	WBB	4.00	0.00	3.50	0.50	0.00	0.00	0.00	0.00
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* Measurement of Free Chlorine need only be completed Daily during a free chlorine burn. Chloraminated water will not contain free chlorine. **(A) Not to exceed mg/L monochloramine/5.06. (B) Not to exceed (mg/L monochloramine/5.06) +0.2. (C) Not to exceed (mg/L monochloramine/5.06) +0.4.

(Modified from Texas Commission of Environmental Quality Form)

Date	Ву	Total Cl	Free Cl	Mono-Cl	Di-Cl	Total NH3	Free NH3	Nitrite	Nitrate
					0.00				
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Average Water Age NAP Monitoring Record

Nitrification Action Plan For:

7-Digit ID Number

7-Digit ID Number

IL

Description of Sample Location:

Site I.D.

Local Description of Sample Location

				Mono-	Di-				
		Total Cl	Free Cl*	Chloramine	Chloramine	Total NH3-	Free NH3-	Nitrite-N	Nitrate-N
		(mg/l)	(mg/l)	(mg/l)	(mg/l)	N (mg/l)	N (mg/l)	(mg/l)	(mg/l)
Sample Frequen	су	Daily	Daily (during burn)	Weekly	Monthly	Weekly	Weekly	Monthly	Monthly
Goal.mg/L						A**			
Yellow Alert Trig	gger, mg/L					B**			
Action Code									
Red Alert Trigge	r, mg/L					C**			
Action Code									
		l							
Date	Ву								
12/31/2019	WBB	4.00	0.00	3.50	0.50	0.00	0.00	0.00	0.00
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* Measurement of	Free Chlorine nee	ed only be com	pleted Daily du	ring a free chlori	ne burn. Chloran	ninated water	will not contair	free chlorine.	

**(A) Not to exceed mg/L monochloramine/5.06. (B) Not to exceed (mg/L monochloramine/5.06) +0.2. (C) Not to exceed (mg/L monochloramine/5.06) +0.4.

Date	Ву	Total Cl	Free Cl	Mono-Cl	Di-Cl	Total NH3	Free NH3	Nitrite	Nitrate
					0.00				
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Average Water Age NAP Monitoring Record

Nitrification Action Plan For:

7-Digit ID Number

7-Digit ID Number

IL

Description of Sample Location:

Site I.D.

Local Description of Sample Location

				Mono-	Di-				
		Total Cl	Free Cl*	Chloramine	Chloramine	Total NH3-	Free NH3-	Nitrite-N	Nitrate-N
		(mg/l)	(mg/l)	(mg/l)	(mg/l)	N (mg/l)	N (mg/l)	(mg/l)	(mg/l)
Sample Frequen	су	Daily	Daily (during burn)	Weekly	Monthly	Weekly	Weekly	Monthly	Monthly
Goal.mg/L						A**			
Yellow Alert Trig	gger, mg/L					B**			
Action Code									
Red Alert Trigge	r, mg/L					C**			
Action Code									
		1							
Date	Ву								
12/31/2019	WBB	4.00	0.00	3.50	0.50	0.00	0.00	0.00	0.00
					0.00				
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* Measurement of	Free Chlorine nee	ed only be com	pleted Daily du	ring a free chlori	ne burn. Chloran	ninated water	will not contair	free chlorine.	

**(A) Not to exceed mg/L monochloramine/5.06. (B) Not to exceed (mg/L monochloramine/5.06) +0.2. (C) Not to exceed (mg/L monochloramine/5.06) +0.4.

Date	Ву	Total Cl	Free Cl	Mono-Cl	Di-Cl	Total NH3	Free NH3	Nitrite	Nitrate
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Distal Point (Oldest Water) NAP Monitoring Record

Nitrification Action Plan For:

7-Digit ID Number

7-Digit ID Number

IL

Description of Sample Location:

Site I.D.

Local Description of Sample Location

				Mono-	Di-				
		Total Cl	Free Cl*	Chloramine	Chloramine	Total NH3-	Free NH3-	Nitrite-N	Nitrate-N
		(mg/l)	(mg/l)	(mg/l)	(mg/l)	N (mg/l)	N (mg/l)	(mg/l)	(mg/l)
Sample Frequen	cv	Daily	Daily (during burn)	Weekly	Monthly	Weekly	Weekly	Monthly	Monthly
Goal.mg/L	,	,		,	,	A**	,	,	,
Yellow Alert Trig	ger, mg/L					B**			
Action Code									
Red Alert Trigge	r, mg/L					C**			
Action Code									
		I							
Date	Ву								
12/31/2020	WBB	4.00	0.00	3.50	0.50	0.00	0.00	0.00	0.00
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Date	Ву	Total Cl	Free Cl	Mono-Cl	Di-Cl	Total NH3	Free NH3	Nitrite	Nitrate
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Distal Point (Oldest Water) NAP Monitoring Record

Nitrification Action Plan For:

Site I.D.

7-Digit ID Number

7-Digit ID Number

IL

Description of Sample Location:

Local Description of Sample Location

				Mono-	Di-				
		Total Cl	Free Cl*	Chloramine	Chloramine	Total NH3-	Free NH3-	Nitrite-N	Nitrate-N
		(mg/l)	(mg/l)	(mg/l)	(mg/l)	N (mg/l)	N (mg/l)	(mg/l)	(mg/l)
Sample Frequen		Daily	Daily (during	Wookly	Monthly	Wookly	Wookly	Monthly	Monthly
		Daily	burny	WEEKIY	wonthy	000000	WEEKIY	wonthy	wontiny
Goal.mg/L						A			
Action Code	gger, mg/L					D			
Red Alert Trigge	r ma/l					 			
Action Code	r, mg/ L					L L			
Action code									
Date	Ву								
12/31/2019	WBB	4.00	0.00	3.50	0.50	0.00	0.00	0.00	0.00
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Date	Ву	Total Cl	Free Cl	Mono-Cl	Di-Cl	Total NH3	Free NH3	Nitrite	Nitrate
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Distal Point (Oldest Water) NAP Monitoring Record

Nitrification Action Plan For:

Site I.D.

7-Digit ID Number

7-Digit ID Number

IL

Description of Sample Location:

Local Description of Sample Location

			Mono-	Di-				
	Total Cl	Free Cl*	Chloramine	Chloramine	Total NH3-	Free NH3-	Nitrite-N	Nitrate-N
	(mg/l)	(mg/l)	(mg/l)	(mg/l)	N (mg/l)	N (mg/l)	(mg/l)	(mg/l)
	Deile	Daily (during		N 4 a sa tila la s	Manalulu i		Manthly	Manthly
	Dally	burn)	weekiy	wonthiy	weekiy	weekiy	wontny	wonthiy
Goal.mg/L					A**			
Yellow Alert Trigger, mg/L					B**			
Action Code								
Red Alert Trigger, mg/L					C**			
Action Code								
Date By]							
12/31/2019 WBB	4 00	0.00	3 50	0.50	0.00	0.00	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00	0.00
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Date	Ву	Total Cl	Free Cl	Mono-Cl	Di-Cl	Total NH3	Free NH3	Nitrite	Nitrate
					0.00				
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Distal Point (Oldest Water) NAP Monitoring Record

Nitrification Action Plan For:

Site I.D.

7-Digit ID Number

7-Digit ID Number

IL

Description of Sample Location:

Local Description of Sample Location

				Mono-	Di-				
		Total Cl	Free Cl*	Chloramine	Chloramine	Total NH3-	Free NH3-	Nitrite-N	Nitrate-N
		(mg/l)	(mg/l)	(mg/l)	(mg/l)	N (mg/l)	N (mg/l)	(mg/l)	(mg/l)
Sample Frequency		Daily	Daily (during burn)	Weekly	Monthly	Weekly	Weekly	Monthly	Monthly
Goal.mg/L						A**			
Yellow Alert Trigger, mg/L						B**			
Action Code									
Red Alert Trigger, mg/L						C**			
Action Code									
Date	Ву								
12/31/2019	WBB	4.00	0.00	3.50	0.50	0.00	0.00	0.00	0.00
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Date	Ву	Total Cl	Free Cl	Mono-Cl	Di-Cl	Total NH3	Free NH3	Nitrite	Nitrate
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