



Texas Commission on Environmental Quality

Protecting Texas by Reducing and Preventing Pollution

June 27, 2014

Mr. Russell Schreiber, P.E., Director of Public Works
City of Wichita Falls
P.O. Box 1431
Wichita Falls, Texas 76307-1431

Re: City of Wichita Falls – PWS ID No. 2430001
Revised Approval for Use of Chloramines
Wichita County, Texas
RN 600129316 | CN 105598759

Dear Mr. Schreiber,

On May 31, 2012, the Texas Commission on Environmental Quality (TCEQ) issued the City of Wichita Falls (City) public water system the most recent exception to use chloramines as a disinfectant in accordance with the requirements specified in Title 30 of the Texas Administrative Code (30 TAC) §290.42(e)(3)(G). The TCEQ has updated the monitoring requirements for public water systems that distribute chloraminated water. As part of our review of the City's proposed direct potable reuse project, we are **granting** approval to continue the use of chloramines as a disinfectant under the following updated conditions:

- 1) **Notification:** We note that the City has been distributing chloraminated water for many years. Consequently, public notice of the use of chloramines will be required only for new customers. Each of the City's new customers, both retail and wholesale, must be notified of the use of chloramine disinfectant at least 14 days prior to providing this treated water to the customers. This notification must contain the exact wording included in Enclosure 1 of this letter: *Sample Language for Notification Upon Changing from Free Chlorine to Chloramines*.
- 2) **Distribution Residual:** Please note the minimum distribution residual shall be maintained at 0.5 milligrams per liter (mg/L) chloramine residual (measured as total chlorine). When using chloramines, maintain a total chlorine residual of at least 0.5 mg/L (measured as total chlorine) throughout the distribution system, including the far reaches of the distribution system, at all times, as specified in 30 TAC §290.110. When using free chlorine to shock the system, maintain a free chlorine residual of at least 0.2 mg/L.
- 3) **Periodic testing:** Monochloramine, total chlorine, free ammonia and nitrite/nitrate levels need to be tested periodically to ensure that an adequate disinfectant residual is being maintained and nitrification is not occurring in the distribution system. Nitrification can result in loss of residual, regrowth of bacteria, odor problems, and elevated nitrate/nitrite levels that may exceed the safe levels, putting infants at risk. Consequently, systems using chloramines must meet the following requirements as a condition of the exception:

The plant must obtain a test kit(s) or use a laboratory procedure that can measure the following:

- a) Free Ammonia—Acceptable analytical methods are EPA 350.1 and SM 4500-NH₃-G.
- b) Monochloramine—The kit or procedure must have the ability to distinguish between monochloramine and other forms of total chlorine using methods SM4500-Cl-D, -F, and -G.
- c) Total Chlorine—See 30 TAC §290.110(d)(2), effective November 8, 2012 for acceptable analytical methods.
- d) Free Chlorine—The water system must have the ability to measure free chlorine when the water system switches from chloramines to free chlorine during a “burnout.” See 30 TAC §290.110(d)(1), effective November 8, 2012 for acceptable analytical methods.
- e) Nitrite/Nitrate—You must either obtain a kit for measuring nitrite and nitrate OR identify a laboratory that can perform nitrite and nitrate analysis and can provide you with results within 48 hours of sample delivery. Acceptable analytical methods are EPA 300.0, 300.1 and SM 4110 B.

The water system must, at a minimum, measure and record the following^a:

	At Entry Point(s) to the Distribution System	In the Distribution System	Downstream of any Chlorine or Ammonia Injection Points
Free Ammonia	Weekly	At least monthly ^c	Weekly and before and after adjusting the chlorine or ammonia feed rate
Mono- chloramine	Weekly	At least monthly ^c	Weekly and before and after adjusting the chlorine or ammonia feed rate
Total Chlorine	Weekly	Daily ^d	Weekly and before and after adjusting the chlorine or ammonia feed rate
Nitrite and Nitrate	As needed to set baseline, then quarterly ^b	At least quarterly, and in response to action level triggers	Routine sampling not required ^b

a. If levels are below disinfectant Action Levels, or over nitrite/nitrate or other Base Line levels, more frequent monitoring will be needed.

b. Different requirements apply to the City's Direct Potable Reuse Water Treatment Plant (DPR WTP). For DPR WTP requirements, see the approval letters specifically for that plant. However, when the City is no longer treating wastewater effluent at the Cypress Water Treatment Plant, these requirements will apply to that facility.

c. When collecting a routine sample such as a bacteriological or disinfectant residual sample. The free ammonia and monochloramine should be measured at the same time.

d. Total chlorine must be collected daily (based upon the size of the system and source of water) at locations representing the entire distribution system in accordance with 30 TAC §290.110.

- 4) **Nitrification action plan:** You must set system-specific action levels to detect and prevent nitrification. If concentrations are inconsistent with system-specific action levels, corrective action shall be taken. For examples of corrective actions, please see Enclosure 2: *Monitoring Plan Alert and Action Levels*. You must document in writing the system-specific plan for monitoring free ammonia, monochloramine, total chlorine, and nitrite/nitrate; and the levels for taking corrective action. This information shall be maintained as a part of the systems

monitoring plan [30 TAC §290.121] and provided to operators and to the TCEQ upon request.

Additional information is available on the TCEQ web page, ***Controlling Nitrification in Chloraminating Water Systems:***

www.tceq.texas.gov/drinkingwater/disinfection/nitrification.html

- 5) **Record retention:** Records of monochloramine, total chlorine, ammonia, nitrite, and nitrate monitoring described above must be maintained with the system's disinfectant records for a period of three years and made available to the TCEQ staff upon request as specified in 30 TAC §290.46(f)(3)(B).
- 6) **Notification of reversion to free chlorine:** The TCEQ monitors disinfection byproduct (DBP) levels at all public water systems. The City may find that it needs to revert back to free chlorine periodically to control the levels of nitrifying bacteria in its distribution system. This reversion process, if accomplished in a month or less, does not reflect normal operating conditions and may result in temporary increases in DBP levels. Consequently, the TCEQ may adjust a system's DBP monitoring schedule during these events. To ensure that DBP samples are not collected under abnormal operating conditions, you must notify us of any temporary reversion back to free chlorine. These notices should be issued in the following manner:
 - a) The notice should state the date that the system will begin distributing water with a free chlorine residual as well as the anticipated duration of the event.
 - b) The notice to TCEQ should be sent via email to DBP@tceq.texas.gov, fax to (512) 239-6050, phone at (512) 239-4691, or correspondence to:

Drinking Water Quality Team (MC 155)
Texas Commission on Environmental Quality
P.O. Box 13087
Austin, Texas 78711-3087

Public water systems that wholesale chloraminated water are required to notify wholesale customers in writing or via fax that they are temporarily switching to free chlorine at least 14 days before the reversion begins.

- 7) **Chlorine and Ammonia Feed Points:** In order for chloramines to provide a stable disinfectant residual, the manner in which they are injected should allow adequate mixing. Chlorine is normally fed prior to ammonia in order to allow inactivation of viruses and to avoid production of N-nitroso-dimethylamine (NDMA), a disinfection byproduct. After chlorine injection, mixing should occur prior to ammonia injection. This may be accomplished by a static in-line mixer, or by at least five minutes of detention time in turbulent flow. A sampling location should be provided after chlorine injection and mixing, but prior to ammonia injection. A sampling location should be provided after ammonia injection and mixing to represent the fully-formed chloramine levels. The TCEQ understands that the City's DPR WTP is subject to special monitoring and reporting conditions related to the use of pre-formed chloramines established through the DPR WTP exception approval letter. For DPR WTP requirements, see the approval letters specifically for that plant. However, when the City is no longer directly treating wastewater effluent at the Cypress Water Treatment Plant, these requirements for addition of chlorine prior to ammonia will apply.

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All liquid chemicals must have approved containment, all chemical injection solutions must be absent of any cross connections or potential for back flow, and the system must have documentation that the TCEQ has either approved the disinfection facilities, or allowed those facilities to be constructed without written approval. Additionally, all chemical storage and feed facilities must comply with 30 TAC §290.42(f)(2). All chemicals used must be certified under American National Standards Institute/National Sanitation Foundation (ANSI/NSF) Standard 60. This is consistent with the requirement that all chemicals used in treatment of water supplied by public water systems must conform to ANSI/NSF Standard 60 for direct additives. Conformance with these standards must be obtained by certification of the product by an organization accredited by ANSI as specified in 30 TAC §290.42(j).

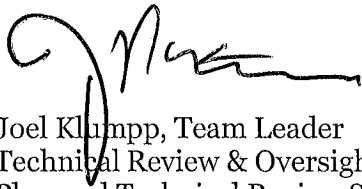
All exceptions are subject to periodic review and may be revoked or amended if warranted. A copy of this letter and all related monitoring data must be maintained with the water system's records for as long as this exception is in effect. These records must be made available to TCEQ staff upon request.

Please note that this exception is not intended to waive compliance with any other TCEQ requirement in 30 TAC Chapter 290. This exception cannot be used as a defense in any enforcement action resulting from noncompliance with any other requirement of 30 TAC Chapter 290.

If you have questions concerning this letter, or if we can be of additional assistance, please contact Mr. David Simons, P.E., by e-mail at david.simons@tceq.texas.gov, or by telephone at (512) 239-3154, or by correspondence at the following address:

Technical Review & Oversight Team (MC 159)
Texas Commission on Environmental Quality
P.O. Box 13087
Austin, Texas 78711-3087

Sincerely,



Joel Klumpp, Team Leader
Technical Review & Oversight Team
Plan and Technical Review Section
Water Supply Division
Texas Commission on Environmental Quality

JPK/dfs

Enclosures

Enclosure 1: Public Notice Materials

Enclosure 2: Monitoring Plan Alert and Action Levels

cc: Honorable Glenn Barham, Mayor, City of Wichita Falls, P.O. Box 1431, Wichita Falls, TX 76307-1431

Mr. Russell Schreiber, P.E.

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BLIND COPIES:

bcc: TCEQ Abilene Regional Office – R3

Enclosure 1: Public Notice Materials

A public water system (PWS) must notify its customers, in writing, at least 14 days prior to commencing the use of chloramines. This notification must contain the Sample Language for Notification Upon Changing from Free Chlorine to Chloramines included below. The notification should be provided to the news media, renal disease facilities, dialysis clinics, hospitals, physicians, local health departments, etc.

Sample Language for Notification Upon Changing from Free Chlorine to Chloramines

“On <Date>, the <Water System Name> will be changing the disinfectant that we use from chlorine to chloramines. This change is intended to benefit our customers by reducing the levels of disinfection byproducts (DBPs) in the system, while still providing protection from waterborne disease.

However, the change to chloramines can cause problems to persons dependent on dialysis machines. A condition known as hemolytic anemia can occur if the disinfectant is not completely removed from the water that is used for the dialysate. Consequently, the pretreatment scheme used for the dialysis units must include some means, such as a charcoal filter, for removing the chloramine prior to this date. Medical facilities should also determine if additional precautions are required for other medical equipment. In addition, chloraminated water may be toxic to fish. If you have a fish tank, please make sure that the chemicals or filters that you are using are designed for use in water that has been treated with chloramines. You may also need to change the type of filter that you use for fish tanks.”

OPTIONAL: *“When the chloraminated water first flushes out the chlorinated water there may be a slight taste and odor, and possibly discoloration for a short period of time. This will not compromise the safety of the water.”*

Spanish Language for Notification Upon Changing from Free Chlorine to Chloramines

“El <Date>, el <Water System Name> cambiará el desinfectante de cloro que usamos a otro de cloramina. El propósito de este cambio es beneficiar a nuestros clientes reduciendo los niveles de los productos secundarios relacionados a la desinfección (DBPs) en el sistema, proporcionando al mismo tiempo la protección contra las enfermedades originadas por los gérmenes del agua.

No obstante, el cambio a cloramina puede causar problemas a las personas cuya vida depende de las máquinas de diálisis. Si el desinfectante no es completamente eliminado del agua que se usa para la diálisis, puede conducir a una anemia hemolítica. Por lo tanto, el esquema de tratamiento previo usado por las unidades de diálisis debe incluir algunos medios, tales como filtros de carbón, para eliminar la cloramina antes de esta fecha. Las instituciones médicas deben determinar si otros equipos médicos también pueden requerir precauciones adicionales. Además, el agua con cloramina podría ser tóxica para los peces. Si tiene un tanque para peces, asegúrese de que los filtros o los productos químicos que están siendo usados están diseñados para ser usados en agua que ha sido tratado con cloramina. También puede ser necesario cambiar el tipo de filtro que usa para el tanque.”

OPCIONAL: *“Al tiempo de la primera aspección del agua cloraminada, se puede percibir por periodos cortos de tiempo algún sabor, olor y posiblemente alguna pérdida del color del agua. Esto no compromete la seguridad del agua.”*

Important notes:

1. The PWS may not begin using chloramines prior to the date shown in the notice.
2. The TCEQ does not currently require the PWS to include the name or contact number of a PWS employee that the customers can contact if they have questions. However, several systems have included this additional information as a courtesy to its consumers.

Some PWSs find it beneficial to periodically convert back to free chlorine for 21-28 days once or twice each year. This procedure can minimize the growth of nitrifying bacteria and make it easier to maintain an adequate chloramine residual during the rest of the year. If the PWS wishes to use this procedure, it must notify the TCEQ and any wholesale customer prior to making this type of temporary switch. The TCEQ also suggests that the PWS notify its customers just days before making the temporary change because this procedure occasionally results in slight changes in the taste and odor of the water. However, it does not have to reissue the public notice described above.



Texas Commission on Environmental Quality
CERTIFICATION of DELIVERY of PUBLIC NOTICE to CUSTOMERS

Public Water System (PWS) Name: _____

PWS I.D. (7-digit number required): _____

Date of Change to Chloramines: _____

I, _____, certify that the following information is true and accurate: (signature)

- The public water system named above has distributed the Public Notice (PN) for changing the disinfectant to chloramines at least 14 days prior to the change by mail or direct delivery to bill-paying customers; **and**
- The information contained in this public notification is correct and complies with required public notification condition in the letter authorizing the public water system to use chloramines; **and**
- The above system has made an adequate good-faith effort to reach non-bill-paying consumers by appropriate methods as follows (check all that apply):

_____ Posting the PN on the Internet at www. _____

_____ Mailing the PN to postal patrons within the service area that do not receive a bill

_____ Advertising the PN in news media

_____ Publication of PN in local newspaper

_____ Posting the PN in public places

_____ Delivery of multiple copies to single bill addresses serving several persons

_____ Delivery to community organizations

Date of Delivery to Customers: _____

Certified by: Name (print): _____

Title: _____

Phone No: _____ Date: _____

Signature: _____

Send one copy of this completed form and one copy of the Public Notification that you delivered to your customers to:

Plan and Technical Review Section - Mail Code 159
Texas Commission on Environmental Quality
P. O. Box 13087
Austin, Texas 78711-3087

Enclosure 2: Monitoring Plan Alert and Action Levels

Note: This is intended to help you develop a system-specific flow chart for your system. You need to set system specific baseline and action levels and responses. If you don't understand the reason for a change or corrective action recommended by this flow chart, review your training and/or contact the TCEQ to request on-site assistance.

Setting Baseline & Action Levels

Monitor daily/weekly at sites representative of distribution system (in milligrams per liter (mg/L)) for disinfectants and ammonia:

- Total Available Chlorine (**TAC** or “combined” chlorine)
- Monochloramine (“**Mono**”)
- Free Available Ammonia (**FAA**)

Set **Action Levels (ALs)** for each disinfection chemical:

►**AL-1:** Normal operating level.

Exceeding an AL-1 triggers follow up with additional sampling and possibly dose change.

►**AL-2:** Moderately off-spec water.

Exceeding the AL-2 triggers additional sampling and moderate corrective action such as flushing or changing chemical feed.

►**AL-3:** Potential risk, potential violation.

Exceeding the AL-3 triggers immediate corrective action, additional sampling, and potential notification of customers

Monitor weekly/monthly at entry point and representative distribution site(s):

- Nitrite (**NO₂**) (& Nitrate (**NO₃**)) (*Labs do these tests together*)
- Heterotrophic Plate Count (on R2A agar) (**HPC**) measured in colony-forming units per milliliter (cfu/mL) (*Recommendation, not requirement*)

Determine **Baselines (BLs)**—the system-specific background level for naturally occurring nitrate, nitrite and HPC. The BL will be the level one trigger (like AL-1) for nitrite, nitrate, and HPC.

►**BL:** Baseline. The normal, naturally occurring level of a constituent.

►**AL-2:** Moderately off-spec water. Triggers moderate action.

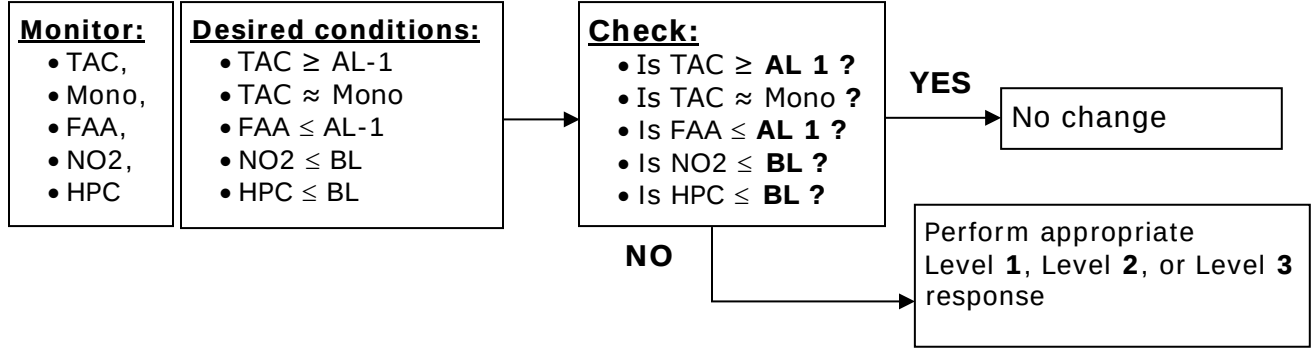
►**AL-3:** Potential risk, potential violation. Triggers immediate correction

EXAMPLE Chloramine Alert and Action Levels

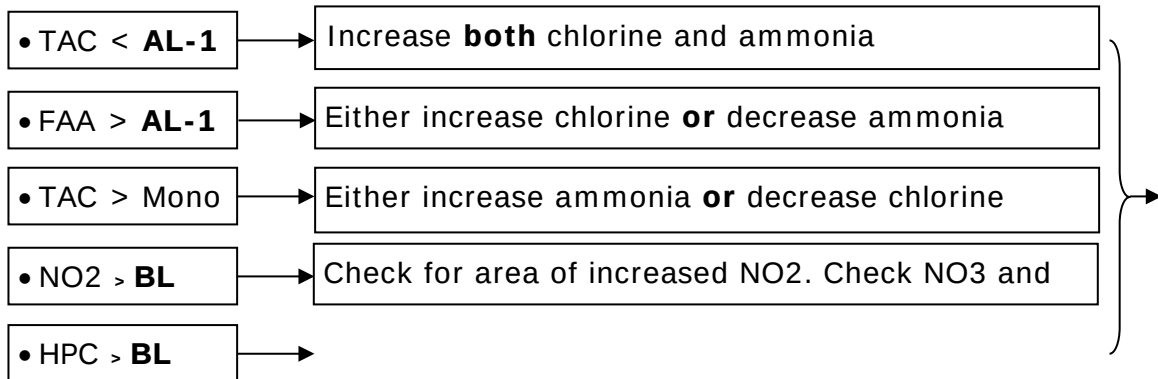
Parameter	Target at EP	Target in Distribution	AL-1: Alert	AL-2: Action Needed	AL-3: Violation Possible
TAC (mg/L)	≥ 2 mg/L	≥ 1.6 mg/L	1.4 mg/L	1 mg/L	0.5 mg/L
NO₂ (mg/L)	At baseline	At baseline	0.1 mg/L over baseline	0.2 mg/L over baseline	0.4 mg/L over baseline
FAA (mg/L)	~0.1 mg/L	~ 0.3 mg/L	0.5 mg/L	1 mg/L	2 mg/L
HPC (mg/L)*	< 100 cfu/mL	< 100 cfu/mL	> 100 cfu/mL	> 200 cfu/mL	> 500 cfu/mL

* HPC is recommended, but not required. HPC varies a great deal between systems.

This is an example. You must develop system-specific levels and procedures.

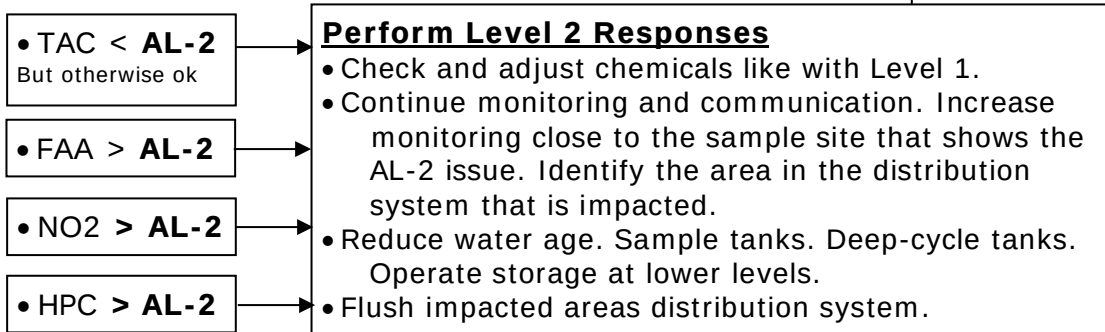


Level 1 Conditions Level 1 Responses

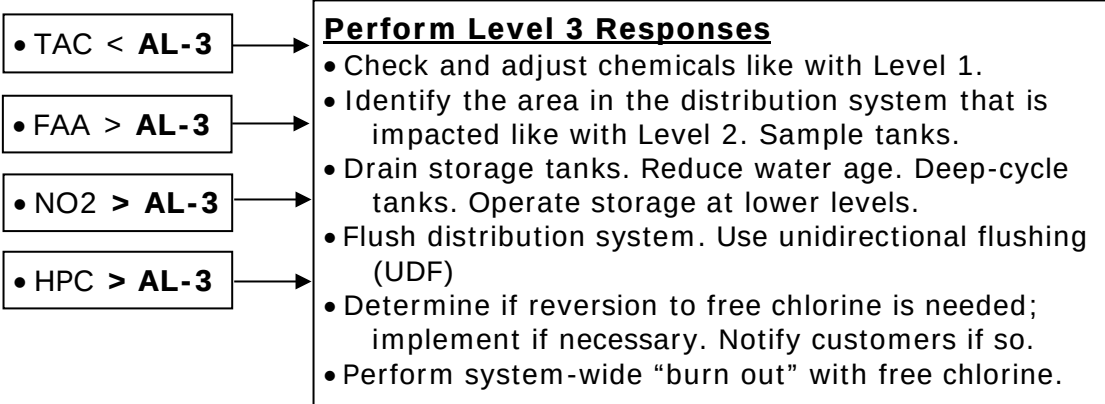


Are levels back to normal? If so, done. If not, repeat / increase

Level 2 Conditions Level 2 Responses



Level 3 Conditions Level 3 Responses



The following table is provided for your convenience, to record your site-specific Alert, Action, and Base Line levels:

BLANK Chloramine Alert and Action Levels

Parameter	Target at EP	Target in Distribution	AL-1: Alert	AL-2: Action Needed	AL-3: Violation Possible
TAC (mg/L)					0.5 mg/L
NO ₂ (mg/L)					
FAA (mg/L)					
HPC (mg/L)*					

* Remember, HPC is recommended, but not required. HPC varies a great deal between systems.

** You can use this blank table to document your system-specific levels.

Table 1. Critical Control Parameters for Chloramination

Parameter	Level or ratio	Reason
Total chlorine (TAC)	0.5 mg/L	Minimum regulatory limit.
Ratio of total chlorine to Monochloramine (TAC:Mono)	Plus or minus 10%	If most of the chlorine is present as monochloramine (as desired), the levels of total chlorine and monochloramine should be almost equal—within 10% is good.
Ratio of total chlorine to Free ammonia (TAC:FAA)	2 to 3 times	If the total chlorine is 2 to 3 times the free ammonia, it means there is an effective disinfectant residual present to help control potential nitrifying organisms.
Free available ammonia (as nitrogen) (FAA)	Low	Industry recommendations range from 0 to 0.3 mg/L free ammonia. Some systems operate with as much as 0.5 mg/L. The more ammonia that is present, the more 'food' available for nitrifying organisms. NOTE: Most test equipment can only measure up to 0.55 mg/L. If you measure 0.55 mg/L, you must dilute the sample and calculate the actual concentration.
	Present	When there is a little bit of free ammonia present, it indicates that monochloramine is the dominant species, as desired.
Free chlorine (FCL)	Very low/absent	Most methods show a very small amount of free chlorine in every test—a "drop." The level should not be over about 0.1 mg/L, or it is recommended that the method be checked for accuracy. Letting a sample sit--for example to allow bubbles to dissipate--can give falsely high free chlorine readings
Nitrite (NO ₂ -)	Equal to baseline	Most source water contains trace amounts of nitrite or nitrate, or both. Low levels are not of concern, but if levels within the distribution system are greater than the baseline levels, it can indicate either nitrification or intrusion of fecal matter. A change of 0.1 to 0.2 or 15% should be followed up on with additional sampling to verify whether nitrification is occurring.
Nitrate (NO ₃ -)		

Entry Point Nitrite/Nitrate Data

The TCEQ requires periodic nitrite and nitrate monitoring for all public water systems. You may be able to use the entry point nitrite and nitrate levels from this compliance monitoring as your Base Line levels, particularly if the entry point represents a single well.

If your entry point(s) represent water from more than one well, you will need to do monitoring determine the contribution of nitrite and nitrate from each source. Then, if you have an unusual nitrite or nitrate reading in the distribution system, you will be able to tell if it is due to a particular well or other source.

The TCEQ's data for your system is available on-line on our Drinking Water Watch web site at:

dww.tceq.state.tx.us/DWW/

Data management

At a minimum, you must record the measured distribution system levels by hand and keep those data sheets. A blank example of a chloramine data sheet is provided below:

Blank Example of a Chloramine Data Sheet

PWS Name _____						Operator name _____		
(Target Free Chlorine = _____ mg/L)						Date _____		
Location Address	Total Chlorine	Mono-chlor-amine	Free Ammo-nia	Free Chlor-ine	Mono: Total %	Trigger Exceeded? Y / N	Nitrite / Nitrate (if triggered, note date and time of collection)	
							Nitrite	Nitrate

Note – this data sheet may work better if you format it in “landscape” instead of “portrait.”

You may be able to track the data better and optimize your system by recording it in a computer spreadsheet program like Microsoft Excel or Corel QuattroPro. The benefit of those programs is that they can be used to do calculations of the percent of monochloramine, the ratio of total chlorine to ammonia, and other useful calculations.

Record retention

You must retain your distribution monitoring for at least three years, and have it available for the TCEQ's Regional Investigators to look at during their visits. If you use an electronic record keeping system, you should be able to provide printouts to the TCEQ upon request. Other considerations for electronic recordkeeping include:

- Back up. You should routinely back up your data. Computer glitches can lose your data.
- Organization: You should give files unique names that clearly specify the data they contain, like the specific month and year. A good example of a file name is “2014-March-ChloramineData.xlsx.” An example of a bad file name is “data.xlsx.”