



BIGGS & MATHEYS, INC.

Consulting Engineers

July 31, 2013

Joel Klumpp, Team Leader
Technical Review & Oversight Team MC-159
Texas Commission on Environmental Quality
P.O. Box 13087
Austin, TX 78711-3087

RE: City of Wichita Falls
PWS ID No. 2430001
Temporary Direct Potable Reuse Project
Response to 4th set of TCEQ Questions (7/17/13)

Dear Mr. Klumpp:

On July 17, 2013 the Texas Commission on Environmental Quality (TCEQ) provided us by E-Mail (Attached) a 4th set of questions for the City to answer along with requests for submission of additional information and documentation, as TCEQ continues to review the Temporary Direct Potable Reuse Project (DPRP) proposed for the City of Wichita Falls.

As requested, please find attached our response to each of the questions along with all requested additional information and documentation for your review and comments.

COMMENTS BASED ON FEBRUARY 2013 TECEQ CONCEPT LETTER

Below are questions about information originally found in the February 2013 TCEQ letter responding to the City's concept letter. The italics sections are quotes from the letter and the plain text sections are comments based on the TCEQ's review of the submitted PER.

1. *The City's planned sanitary procedures and disinfection methods must provide for:*
 - o *Returning all four Cypress SWTP's treatment trains to raw surface water source (current) operation status and physically disconnecting the Cypress 2008 RO Membrane Plant's train from the RR WWTP's piping;*

American Water Works Standard (AWWA) C653-03, Sections 1.1 and 4.2 state disinfection is required for all elements of the treatment plant that are in contact with disinfected water under normal plant operations. If the disinfection process is initiated upstream of the filters, all treatment units and piping downstream of the first point of application of a disinfectant shall be disinfected before being placed in service. Section 1.1 of the AWWA standard states that proof that disinfection has been accomplished is provided by the results of bacteriological sampling and testing that shows the absence of coliform organisms. Section 5.1 states that after the disinfection procedure is completed and before the treatment unit or facility is placed in service, two or more samples shall be taken from the unit or facility not less than 30 minutes apart and shall be tested

for the presence of coliform in accordance with the latest edition of Standard Methods for the Examination of Water and Wastewater.

- a. Therefore, the following bullets in the PER's Section 14.o must be revised to include performing a bacteriological test to verify the effectiveness of the cleaning and disinfection procedures:
 - i. The first bullet on Page 26 for the MF/RO Clarifier;
 - ii. The fifth bullet on Page 27 for the 2010 Clarifier; and
 - iii. The sixth bullet on Page 27 for the 2010 Recarbonation Basin.

Response: The City of Wichita Falls still believes that it is within the spirit and logic of the C653-03, in not bacteriologically testing the MF/RO Clarifier, 2010 Clarifier and 2010 Recarbonation Basin. The basis of this decision rooted in the fact that these structures are used in capacities where they are in contact with partially treated water and therefore would be extremely difficult to obtain a negative coliform result. The City further believes that it has demonstrated its due diligence by washing the facilities, and applying a 200 ppm spray of Chlorine to the surfaces, before it is filled with partially treated water and disinfectant. The City is open to further discussion on the matter and since this is related to the return of the Cypress WTP to normal services with lake water, it should not hold up the approval of the DPR, as the return of the SWTP does not impact the functionality of the DPR.

The City performed a bacteriological test on the MF/RO Clarifier to see if it could comply with the TCEQ's request that it pass a bacteriological test before it was returned to service. The clarifier was treating raw water, with chlorine dioxide down the pipeline and chloramines through the clarifier. The City found that it could not pass a bacteriological test. This proves the City's concern that a passing bacteriological test would be difficult to obtain in the clarifiers due to their contact with raw water that just entered the treatment processes and thereby has not had enough time to inactivate the coliform bacteria.

- b. The "Conventional Treatment Plant Facilities" subsection on Page 27 must be amended to include flushing, disinfection and bacteriological sampling of the Splitter Box and associated piping up to the 2010 Clarifier.

Response: The City of Wichita Falls will alter its "Disinfection Plan" to include the flushing and disinfection of the 2010 SWTP Splitter Box. However, the City of Wichita Falls still believes that it is within the spirit and logic of the C653-03, in not bacteriologically testing the 2010 SWTP Splitter Box, as this structure is used in a capacity where it is in contact with non-treated (with the exception of Chlorine Dioxide for part of the year) raw water and therefore would be extremely difficult to obtain a negative coliform result. The City further believes that it has demonstrated its due diligence by washing the facility, and applying a 200 ppm spray of Chlorine to the surfaces, before it is filled with un-treated raw water. The City is open to further discussion on the matter and since this is related to the return of the Cypress WTP to normal services with lake water, it should not hold up the approval of the DPR, as the return of the SWTP does not impact the functionality of the DPR.

The City performed a bacteriological test on the 2010 SWTP Splitter Box to see if it could comply with the TCEQ's request that it pass a bacteriological test before it was returned to service. The Splitter Box was treating raw water, with chlorine dioxide down the pipeline from the Secondary Reservoir. The City found that it could not pass a bacteriological test. This proves the City's concern that a passing bacteriological test would be difficult to obtain in the Splitter Box due its contact with raw water that has just entered the treatment processes and thereby has not had enough time to inactivate the coliform bacteria.

- c. The fourth bullet on Page 27 for the lagoon system (used for temporary storage of the 2008 RO Membrane Plant effluent while the Cypress facility was functioning as a DPR WTP) must be amended to include:
 - i. Complete dewatering, removal of all accumulated sludge, and disposal of the sludge in accordance with all federal and state requirements will be required. Please note that the City may need to have the sludge analyzed for additional chemicals before disposal.

Response: The PER will be amended to reflect this change.

2. Interferences in the analytical method for determining total chlorine residual in treated wastewater can result in the inclusion of constituents that do not provide quantifiable disinfection. In these cases, the measured total chlorine residual could incorrectly indicate a higher inactivation of viruses and Giardia than actually occurred. One method of determining the actual inactivation provided by chloramines is to measure the monochloramine residual and use it to calculate the inactivation for a disinfection zone. The TCEQ routinely requires plants that use chloramines to measure monochloramine, which is the desired disinfectant species.

The Proposed Verification Protocol in Appendix K must be revised to include monitoring the monochloramine residual at the end of each chloramine disinfection zone. This includes the disinfection zones after blending the partial treated RR WWTP effluent with the surface water. It is noted that the reported minimum, maximum and average total chlorine and monochloramine levels in the table on Page 4 of the PER Appendix H support the need to use monochloramine results to verify inactivation.

Please note that the TCEQ cannot accept the use of total chlorine residuals CT calculations when treating the RR WWTP effluent. Failure to monitor the monochloramine residual at the end of each chloramine disinfection zone and use of the value for calculating the inactivation of *Giardia* and virus will result in the Full-Scale Verification Testing Report being unacceptable for supporting the City's request to operate a Direct Potable Reuse (DPR) facility. When an exceptions to operate the proposed DPR facility and send the water to distribution for human consumption is granted, the City will still be required to monitor the monochloramine residuals at the end of all proposed six disinfection zones and use the values for reporting the achieved inactivation of *Giardia* and virus in all six of the disinfection zones.

Response: The City has already altered the Full Scale Verification protocol and re-submitted it to the TCEQ within the "Supplemental Response to 1st Set of TCEQ questions", dated July 25, 2013.

3. *Effective April 1, 2012, the maximum Cryptosporidium removal credit a public water system treating surface water can receive is the lesser of the acceptable Challenge Test log removal credit (LRC_{C-test}) granted by the TCEQ after review of the Challenge Test Report or the removal that can be demonstrated during a direct integrity test (LRC_{DIT}) using a TCEQ-approved test pressure. TCEQ staff are currently reviewing the Challenge Test Report for the US Filter (now owned by Siemens) CMF-S7, Module Part No. 119023, S10V MF membrane modules. This Challenge Test Report for the City's MF membranes was posted on the National Sanitation Foundation's website on December 4, 2012. The TCEQ will notify the City when we have completed the review of the Challenge Test Report and approved an LRC_{C-test} value for the City's MF membranes.*

Please note that the TCEQ still has not received all the necessary data to complete our review of the challenge study. This must be completed prior to the requested exceptions being granted and the TCEQ approving the City's proposed Full-Scale Verification Test Protocol.

Response: The City of Wichita Falls is waiting on an answer from TCEQ on this particular question.

4. *In TCEQ's April 30, 2012 letter, the TCEQ approved direct integrity test (DIT) values for the S10V MF membranes at 3.0-log removal. Because the source of the water has changed, key parameters like temperature, flow, volumetric concentration factor, and the log removal required may change. Please be prepared to resubmit the DIT values with the requests for temporary exceptions for the proposed temporary Cypress DPR WTP. Please note that these DIT values are under review and may be revised.*

TCEQ staff is reviewing the previously-used volumetric concentration factor (VCF) of 1. If this value is increased, the City will need to modify its DIT test procedure for demonstrating the granted log removal for *Cryptosporidium* and *Giardia*.

Response: The City of Wichita Falls is waiting on an answer from TCEQ on this particular question.

5. *The maximum time frames to receive results from grab sample analytical results.*

The time frames were not found in the PER. Please provide this information.

Response: The City of Wichita Falls has compiled the following list of maximum time frames it anticipates to receive analytical results from grab samples.

<u>Analysis</u>	<u>Time from collection to results</u>
pH	11 minutes
Temperature	11 minutes
Turbidity	11 minutes
Total Chlorine Residual	15 minutes
Monochloramine Residual	15 minutes
Free Chlorine Residual	15 minutes
Free Ammonia	15 minutes
Total Alkalinity	15 minutes

Total Alkalinity (Secondary Reservoir)	30 minutes
Total Hardness	15 minutes
Silt Density Index	25 minutes
Chlorine Dioxide Residual (D3)	45 minutes
Chlorine Dioxide Residual (D1 and D2)	60 minutes
Nitrate	60 minutes
Nitrate (Secondary Reservoir)	75 minutes
Nitrite	60 minutes
Chlorite	60 minutes
Total Organic Carbon	60 minutes
TOC (Secondary Reservoir)	75 minutes
Dissolved Organic Carbon	60 minutes
DOC (Secondary Reservoir)	75 minutes
PCR (Cryptosporidium/Giardia) WTP	4.5 hours
PCR (Cryptosporidium/Giardia) WWTP	5.5 hours
Total Suspended Solids	24 hours
TSS (Secondary Reservoir)	24 hours
Total Dissolved Solids	24 hours
TDS (Secondary Reservoir)	24 hours
E. coli	24 hours

6. *The triggers that will be used for shutting down transfer of RR WWTP effluent to the Cypress DPR WTP and Cypress DPR WTP shutdown or alarms and what each of the triggers indicate.*

The following items need to be added to the shutdown and alarms. The levels may need to be determined during the full scale verification testing

a. Turbidity

Response: Turbidity triggers already exists for shutdown at the Cypress Water Treatment Plant. The City does not believe that it is applicable to develop and implement a turbidity trigger for the Wastewater Effluent.

b. TSS

Response: The TSS from the WWTP fluctuates normally. Since the MF/RO Clarifier is designed to reduce the TSS coming from the WWTP, the City does not see a need to establish a shutdown trigger for this particular constituent.

If the TCEQ is referring to a TSS trigger requirement, the City will need more information from the TCEQ on this parameter since it believes that it is taken care of with Turbidity measurements throughout the WTP.

c. Nitrate; and

Response: Nitrate triggers already exists for shutdown at the Cypress Water Treatment Plant. The City does not believe that it is applicable to develop and implement a nitrate trigger for the Wastewater Effluent, since it is 90% removed by the Reverse Osmosis process, the RO process already has a trigger for Nitrate and the water is blended with lake water that is historically low in Nitrate.

d. *Cryptosporidium*, *Giardia* and virus concentrations. (see Item No. 8.k for further detail)

Response: The City concurs with the TCEQ on its *Cryptosporidium*, *Giardia* and Virus concentration within the WWTP Effluent and will alter the list of shutdown triggers to reflect those level established by the TCEQ.

7. *The Concept Paper indicated that the City has established a Water Quality Task Force that is composed of City staff from the Public Works, Public Utilities, and Health Departments. A list of triggers to activate the Water Quality Task Force and conduct an investigation was included. The City will be required to notify the TCEQ Water Supply Division and Abilene Regional Office by email and telephone if an established trigger is reached. TCEQ contacts for these types of notifications are Mr. Joel Klumpp at Joel.Klumpp@tceq.texas.gov or (512) 239-4453 and Mr. Cliff Moore by email at Cliff.Moore@tceq.texas.gov or (325) 698-6115. For notifications outside of normal business hours, call the 24-hour hotline number at (800) 777-3186. Based on the potential acute health risk, the TCEQ will require that the temporary Cypress DPR WTP be immediately shutdown (in addition to conducting an investigation) for:*

- *Occurrence of a confirmed waterborne disease outbreak;*
- *Failure to meet the TCEQ's minimum required disinfection levels for inactivation of pathogens;*
- *Any *E. coli* positive sample in the temporary Cypress DPR WTP plant, entry point, or distribution system; and*
- *Exceeding the maximum TCEQ-approved turbidity level for any treatment process.*

The City will need to include specific customer notification procedures for response to the acute health risk triggers listed above outlined in the February 2013 letter and the additional items listed below.

- Nitrate levels exceeding 10 mg/L at the entry point to distribution;
- Any time a DIT is failed and the unit is returned to service before a subsequent DIT is passed;
- An increase in WWTP effluent vs. raw water ratio above the 50/50 blend;
- Inability to maintain a minimum disinfectant residual at any bacteriological sample site; and
- Exceeding the MCL for any drinking water standard listed in 30 TAC Chapter 290, Subchapter F.

The "systemic loss of total chlorine residual at bacteriological sampling points within the distribution system" is not considered to be sufficiently protective of public health. Therefore, the third bullet on Page 23 of the PER under "Water purification triggers for a WQTF meeting" must be replaced with:

The inability to maintain a minimum total chlorine residual of 0.5 mg/L at any bacteriological sample point in the distribution system.

Response: The City of Wichita Falls agrees with and will implement the first four bullets of question 7, as they relate to the triggering of the Water Quality Task Force and the shutdown of the Emergency DPR. The City would like to clarify that it will only trigger the WQTF if the turbidity of an entire treatment process, e.g. all 2010 SWTP Gravity Filters, and not a single unit within a treatment process, e.g. the 2010 Filter A.

The City further agrees to comply with all 30TAC, 290 rules as they relate to how customers are to be notified. However, the City is opposed to publically notifying when a DIT is failed and the unit is returned to service before a subsequent DIT is passed, for several reasons. First, as part of it's normal operating procedure, the City does not allow any MF unit to be returned to service unless a subsequent DIT is passed. Second, this process is significantly upstream of numerous other treatment process barriers that would be available to counter any such lapse in protocol. The City respectfully requests the TCEQ reconsider this requirement.

The City agrees with the change in syntax for the Bacteriological Sample location Total Chlorine Residual and will make that change to the PER.

8. *In addition, the City has proposed monitoring triggers for the proposed temporary DPR WTP to initiate shutdown of the DPR WTP. The City shall be required to notify the TCEQ Water Supply Division and Abilene Regional Office by telephone if an established trigger is reached. TCEQ contacts for these types of notifications are Mr. Joel Klumpp at Joel.Klumpp@tceq.texas.gov or (512) 239-4453 and Mr. Cliff Moore by email at Cliff.Moore@tceq.texas.gov or (325) 698-6115. For notifications outside of normal business hours, call the 24-hour hotline number at (800) 777-3186. Additional DPR WTP monitoring triggers that the City should include, but are not limited to, the following:*

- *A MF membrane unit that fails a DIT must be removed from service until it passes a DIT;*
- *An individual MF membrane unit's filtrate turbidity level exceeds 0.100 nephelometric turbidity units (NTUs) for two consecutive five-minute readings; and*
- *An individual granular media filter's turbidity level exceeds 0.150 NTUs for two consecutive fifteen-minute readings.*

The City must provide copies of an Operations & Maintenance Manual and Monitoring Plan for the DPR WTP that **includes all alarm and shutdown triggers**. Please address each of the following in the PER submittal's Section 8.0 on Pages 15 and 16 regarding the City's proposed shutdown triggers for the DPR WTP:

Response: The City would like to clarify the first 3 clear bullets within question 8. None of these would warrant the shutdown of the entire DPR, but rather the malfunctioning unit for investigation/resolution.

DIT: As standard procedure, all MF filters that fail a 0.65 DIT is removed from service and the problem is fixed by maintenance staff, before it is returned to service by passing a DIT.

Individual MF Filtrate Turbidity: The City has had previous discussions with the TCEQ, in which it thought it was agreed to by both parties that the requirement of 0.100 NTU on the MF Filtrate was too low (0.150 NTU was applicable) and the requirement for it to be in 2 subsequent 5 minute readings was too much (15 minute readings were applicable). Therefore, the City is proposing to utilize a 0.150 NTU in 2 consecutive 15 minute periods.

- 1) The MF treatment process is significantly upstream of numerous other treatment process barriers that would be available to counter any such performance. This would be more applicable if the MF treatment process was the last barrier in the DPR Plant, but it is actually one of the first.
- 2) Any individual MF unit that would be performing at a reduced level (e.g. 0.15 NTU for 2 subsequent 15 minute periods), would be taken off-line and investigated, while another MF unit was placed in service. Therefore, there is no need to shutdown the entire DPR.

Individual granular Filter Turbidity: Any individual granular filter that would be performing at a reduced level (e.g. 0.15 NTU for 2 subsequent 15 minute periods), would be taken off-line and investigated, while another granular filter was placed in service. Therefore, there is no need to shutdown the entire DPR.

- a. Amend the list to include a paragraph that the violation of any secondary drinking water standard will require the immediate notification of the TCEQ Water Supply Division.

Response: The PER will be amended to reflect this change.

- b. Amend the list to include a paragraph for the maximum residual disinfectant levels (MRDL) for total chlorine and chlorine dioxide levels specified in 30 TAC §290.110(b)(3) and (5), respectively.

Response: The City does not understand this particular requirement. This is for a maximum disinfectant leaving the plant. The regulatory value is an average for the month. This should not constitute a shutdown.

- c. Amend the list to include a paragraph for the following shutdown triggers for virus concentrations:
 - i. A virus concentration greater than 22.2 most probable number per liter (MPN/L) in the RR WWTP effluent; or

Response: The PER will be amended to reflect this change.

- ii. A virus concentration greater than 2.22×10^{-7} MPN/L in the entry point to distribution.

Response: This level of concentration cannot be determined with existing laboratory methods. The City requests the TCEQ develop different language for this requirement, such as, "if X, Y and Z are being met then it is anticipated that the DPR is achieving a level of 2.22×10^{-7} MPN/L viruses at the entry point to distribution".

- d. "Chlorine" paragraph:
 - i. Amend the bulleted list to include the failure of the chlorine dioxide disinfection equipment for the raw Secondary Reservoir surface water disinfection as a trigger for automatic shutdown;

Response: The PER will be amended to reflect this change.

- ii. In the first bullet, change "low/no chlorine residuals" to "low/no monochloramine residual;"

Response: The PER will be amended to reflect this change.

- iii. In the second bullet, change the reference to "chlorine" residual in the distribution to "total chlorine;" and

Response: The PER will be amended to reflect this change.

- iv. In the third bullet, change the reference to "chlorine" residual to "monochloramine" residual entering the distribution system drops below 3.0 mg/L.

Response: Since the regulations for disinfectant residuals entering the Distribution system revolve around Total Chlorine, the City requests that the TCEQ change the reference from "Monochloramine" to "Total Chlorine".

- e. "Turbidity" paragraph:
 - i. Please define the term "tap turbidity" used in the first and second bullets, how this term relates to the federal and state defined "human consumption," and specify where the samples will be taken.

Response: "tap turbidity" is the turbidity taken just prior to the treated water entering the distribution system and prior to the first customer.

- ii. If the City intends to receive extra log removal credit for operating the Conventional 2010 SWTP gravity media filters at an individual filter effluent of ≤ 0.15 NTU and/or combined filter effluent of ≤ 0.15 NTU, then the PER's Section 8, Page 15, "Turbidity" paragraph, third bullet on IFE turbidity must be revised to state:

"Notify Supervisors if all any gravity media filter's individual filter effluent turbidity readings are over 0.315 NTU for two consecutive 15-minute intervals, the filter must be taken offline and the cause of filter breakthrough determined and corrective actions taken before the filter can be placed back in service."

Response: The PER will be amended to reflect these changes.

- f. "Microfiltration" paragraph:
 - i. Add a bullet specifying that a MF unit that has failed a TCEQ approved DIT can not be returned to service until it passes a TCEQ approved DIT;

Response: The PER will be amended to reflect this change.

- ii. Revise the first bullet to read that if a MF unit's IFE turbidity level exceeds 0.100 NTU for two consecutive 5-minute readings, the MF unit must be taken offline and pass a DIT before being returned to service; and

Response: The City requests that the Individual MF requirement of 0.100 NTU for two consecutive 5-minute periods be re-evaluated and adjusted to 0.150 NTU for two consecutive 15 minute periods. See discussion, above, for Question 8, "Individual MF Filtrate Turbidity".

- iii. Revise the second bullet to read if the CFE turbidity level for all of the MF units exceeds 0.100 NTU for two consecutive 5-minute readings, the DPR WTP must be taken offline.

Response: The City requests that the CFE requirement be changed from 0.100 NTU for two consecutive 5-minute periods to 0.150 NTU for 2 consecutive 15 minute periods. Requiring 5-minute readings is in direct conflict with the TCEQ's recommended minimum sampling frequency for the Full Scale Verification Protocol, which only requires 15 minute sampling for Microfiltration CFE.

g. "Reverse Osmosis" paragraph:

- i. Both bullets should clearly identify that the criteria applies to the RO units' feed water; and

Response: The PER will be amended to reflect this change.

- ii. Please provide a description and schematic of how the reference bypass can be accomplished. Include the cross-connection control protection to be utilized.

Response: The PER will be amended to reflect this change.

h. "Nitrate" paragraph:

- i. The TCEQ agrees that based on the acute health threat of nitrate, the TCEQ cannot allow water above the MCL to enter the distribution system. The nitrate level should also be monitored further upstream in the treatment process to alert the City to high levels and allow the plant to be shut down earlier. This will prevent large volumes of water with an unacceptable nitrate level from accumulating within the treatment basins and 10.0-MG GST.

Response: The PER will be amended to reflect this change.

- ii. The first bullet needs to be revised to read:

“Nitrate of 10 ppm in the conventional plant POE will require a shutdown of ~~reuse~~ the DPR WTP.” (This includes the both the MF/RO 2008 SWTP and Conventional 2010 SWTP.)

TCEQ also strongly recommends adding a high nitrate alarm to the RR WWTP effluent. The level can be set based on the nitrate removal found during the full-scale verification testing.

Response: The PER will be amended to reflect this change.

- iii. Since the DPR WTP cannot be operated without the RO membrane units in operation, the second bullet must be revised to read:

“Nitrate of 10 ppm in RO permeate will required shutdown of ~~RO train~~ the DPR WTP.”

Response: The PER will be amended to reflect this change.

However, the City request the latitude to determine a higher level of shutdown trigger for Nitrate than 10 ppm in the RO permeate, based on the fact that the RO permeate will be blended with 50% surface water that is low in Nitrate thereby blending it down to an acceptable level. The City is currently experiencing Nitrate in the Raw Surface Water at a concentration of 0.30 ppm (as Nitrogen). Using this value as a baseline, the RO Permeate could theoretically possess Nitrate concentrations of 19.7 ppm (as Nitrogen) before it exceeded the 10 ppm Nitrate (as Nitrogen) MCL at the Point of Entry to the Distribution System.

Additionally, the City would like to clarify in all future correspondence that the Nitrate concentrations will be reported and regulated “as Nitrogen”.

- i. “Coliform” paragraph:
- i. Add a bullet specifying the DPR WTP must be shutdown if there is a detected *E. coli* concentration (> 0.0 organisms/L) at the entry point to distribution.

Response: The PER will be amended to reflect this change.

- j. “THM/HAA” disinfection byproduct paragraph needs to be expanded and amended to include an automatic shutdown trigger for the chlorite MCL specified in 30 TAC §290.114(a).

Response: The PER will be amended to reflect this change.

- k. "Cryptosporidium/Giardia" paragraph:
 - i. The DPR WTP (Cypress 2008 MF/RO and Conventional 2010 SWTPs) must be shut down if onsite or offsite monitoring report the following concentrations in the RR WWTP effluent:
 - A. A *Giardia* concentration greater than 70.0 cysts/L; **or**

Response: The PER will be amended to reflect this change.

- B. A *Cryptosporidium* greater than 9.48 oocysts/L.

Response: The PER will be amended to reflect this change.

- ii. The DPR WTP (Cypress 2008 MF/RO and Conventional 2010 SWTPs) must be shut down if onsite or offsite monitoring report the following concentrations in the water entering the distribution:
 - A. A *Giardia* concentration greater than 7.000×10^{-6} cysts/L; **or**
 - B. A *Cryptosporidium* greater than 2.999×10^{-5} oocysts/L.

Response: The City is in receipt of the TCEQ's follow-up rewrite of this question. It has cleared up the majority of the City's concerns. However, the City does request that the TCEQ consider the following alterations to the rewrite.

ii. The *Giardia* and *Cryptosporidium* levels in water from the DPR WTP at the point of entry (POE) ~~entry point (EP)~~ to the distribution for human consumption must remain below detection limits of **at-zero** cysts/L and oocysts/L respectively as indicated by analyses performed by either off-site ~~or on-site~~ methods. Since the on-site method of PCR is only capable of detecting DNA and not actual cysts/oocysts, if this method detects DNA, then an off-site collection will be made immediately (within minutes) and the results expedited from the off-site laboratory. If the off-site results confirm the presence of viable *Giardia* or *Cryptosporidium*, then the DPR is to be shutdown.

A minimum of 15 liters (L) of water from the DPR facility should be collected to be analyzed using Method 1623. The volume of water and levels for the on-site method will be determined after analysis of the data provided during the full scale verification test.

During the verification testing and during the full scale operation, if *Giardia* or *Cryptosporidium* are detected in the EP off-site sample results, the TCEQ will require the DPR WTP to be shut down, inspected and, if necessary, repaired. The City must resample and received a non-detect on **at least one the repeat samples**.

*Please note that the TCEQ's minimum required 7.0-log combined inactivation and removal for *Giardia* and 5.5-log removal for *Cryptosporidium* are only protective of public health if the DPR WTP's water at the EP does not contain:*

1. A *Giardia* concentration greater than 7.000×10^{-6} cysts/L; or
2. A *Cryptosporidium* concentration greater than 2.999×10^{-5} oocysts/L.

Since it is not practical to measure concentrations down to these levels, the TCEQ acknowledges that they have been met if the following parameters have been achieved and not exceeded:

- a. Demonstrated CT Credits with disinfectants.
- b. Demonstrated MF & Gravity Filter performance of turbidities not exceeding 0.150 NTU.
- c. Blend ratios did not exceed 50:50.
- d. Concentrations of organisms in the WWTP Effluent did not exceed the limits set by TCEQ.
- e. Demonstration by off-site analysis less than detection limit of cysts/oocysts in the water entering the Distribution system.
- f. ??????

- l. "Identified Waterborne Pathogen Outbreak" paragraph: Must be amended to include the above noted TCEQ contacts.

Response: The PER will be amended to reflect this change.

9. *Per discussion at the project meeting on January 18, 2013, the City plans to:*

- *Explore direct integrity testing of the Hydranautics RO membranes at the DPR WTP in order to receive pathogen removal credit; and*
- *Contact Hydranautics to inquire if third-party challenge testing of their RO membranes has been conducted in accordance with the 40 CFR §141.719(b)(2) and the EPA's Membrane Filtration Guidance Manual.*

Provide Hydranautics' answers to the above questions. Include any documentation received.

Response: See Attachment (Hydranautics E-Mail Communications)

The City has been in contact with Hydranautics and requested information on any Challenge Testing that has been performed on the ESPA2 & ESPA4 RO membranes. The City has attached the replies it has received from Hydranautics for TCEQ review. Additionally, the City has explored the Daily Integrity Test issue with Jim Lozier, P.E. (CH2MHill) and his suggestions, as well as others in the RO field was to utilize Sulfate as the DIT surrogate. The City has performed initial testing of the first and second stages of the RO skids and found that they are capable of 1.5 log removal of Sulfate, consistently. Finally, the City is in discussions with NSF on the cost and time required to perform a Challenge Test for the RO membranes. As this data becomes available, the City will share with the TCEQ.

As you can see, it is the intent of the City to continue to pursue all avenues available with the RO Manufacturers, the Academic Community and the Regulatory Bodies to get some form of removal credit approved for Reverse Osmosis membranes. Any assistance that the TCEQ can offer in this endeavor would be most appreciated.

10. City staff also indicated during the January 18, 2013 meeting that the City has been using a “real-time” analytical method for monitoring *Cryptosporidium* oocysts levels in the RR WWTP. Please provide the following:

- Detailed information on the analytical method and quality assurance/quality control methods being used
- Test equipment required;
- Staff training required; and
- Laboratory accreditation (such as through the EPA, National Environmental Laboratory Accreditation Conference, etc.) available for the analytical method.

The TCEQ commends the City for taking this approach to the DPR project, and requests that information regarding these initiatives be included in the City’s next submittal to the TCEQ.

As requested above, include this information with your revised PER Submittal. Please also include any information about the confirmed accuracy of the method chosen. Note that the onsite monitoring for *E.coli*, *Giardia* and *Cryptosporidium* specified in Table A of the TCEQ’s Minimum Monitoring and Reporting of Water Qualities and Flow Rates emailed to the City was based on the City conducting onsite monitoring. In addition, the City must be able to verify that the concentrations of pathogens in the RR WWTP effluent and water being treated has not exceeded a concentration that has been approved for the DPR WTP to remove and inactivate before being discharged to the distribution for human consumption.

If the City cannot present an acceptable method for “real time” onsite monitoring, then the TCEQ may require that the DPR WTP provide a removal and inactivation protocol that achieves removal and inactivation based on reported national and international worst case concentrations in WWTP effluents; or the storage of treated water until offsite laboratory results are received before the water treated by the proposed DPR WTP can be released into distribution for human consumption.

Response: The method of “real-time”, “on-site” monitoring that the City has referenced for *Giardia* and *Cryptosporidium* analysis is not an approved method by EPA. Therefore, none of the data that the TCEQ has requested exists. The City continues to evaluate the rtPCR method for its application in the DPR project, with varying results. As the City refines this lab analysis for use with the DPR, it will keep the TCEQ apprised of its progress and any setbacks.

Additionally, the City has only considered using this method as a “process control” and not a regulatory reporting method, or a shutdown trigger method; due to the method being new, untried, unapproved and susceptible to interferences/errors. The City does request that the TCEQ continue to work with the City in developing how this technology is ultimately and affectively utilized in the DPR project.

As you have additional questions please provide those in a timely manner for our response.

Sincerely,

BIGGS & MATHEWS, INC.

A handwritten signature in black ink, reading "Kerry D. Maroney". The signature is fluid and cursive, with the first name "Kerry" being the most prominent.

Kerry D. Maroney, P.E.
President

Cc: Russell Schreiber, P.E.
Public Works Director
City of Wichita Falls, Texas

Daniel Nix
Public Utilities Operations Manager
City of Wichita Falls, Texas