

Comments Based on the February 2013 TCEQ 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 14.0 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.
- 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.
- 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.

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

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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.

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.

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*.

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.

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

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- b. TSS
- c. Nitrate; and
- d. *Cryptosporidium*, *Giardia* and virus concentrations. (see Item No. 8.k for further detail)

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:*

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

- o Nitrate levels exceeding 10 mg/L at the entry point to distribution;
- o Any time a DIT is failed and the unit is returned to service before a subsequent DIT is passed;
- o An increase in WWTP effluent vs. raw water ratio above the 50/50 blend;
- o Inability to maintain a minimum disinfectant residual at any bacteriological sample site; and
- o 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.

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*

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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:

- 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.
- 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.
- 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
 - ii. A virus concentration greater than 2.22×10^{-7} MPN/L in 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;
 - ii. In the first bullet, change "low/no chlorine residuals" to "low/no monochloramine residual;"
 - iii. In the second bullet, change the reference to "chlorine" residual in the distribution to "total chlorine;" and
 - iv. In the third bullet, change the reference to "chlorine" residual to "monochloramine" residual entering the distribution system drops below 3.0 mg/L.
- 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.
 - 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:

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~~“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.”~~

f. “Microfiltration” paragraph:

- i. Add a bullet specifying that a MF unit that has failed a TCEQ approved DIT cannot be returned to service until it passes a TCEQ approved DIT;
- 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
- 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.

g. “Reverse Osmosis” paragraph:

- i. Both bullets should clearly identify that the criteria applies to the RO units’ feed water; and
- ii. Please provide a description and schematic of how the reference bypass can be accomplished. Include the cross-connection control protection to be utilized.

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.

- 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.

- 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.”~~

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.

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- 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).
- 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:
 1. A *Giardia* concentration greater than 70.0 cysts/L; **or**
 2. A *Cryptosporidium* greater than 9.48 oocysts/L.
 - 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:
 1. A *Giardia* concentration greater than 7.000×10^{-6} cysts/L; **or**
 2. A *Cryptosporidium* greater than 2.999×10^{-5} oocysts/L.
- l. "Identified Waterborne Pathogen Outbreak" paragraph: Must be amended to include the above noted TCEQ contacts.
9. *Per discussion at the project meeting on January 18, 2013, the City plans to:*
- o *Explore direct integrity testing of the Hydranautics RO membranes at the DPR WTP in order to receive pathogen removal credit; and*
 - o *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.
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:*
- o *Detailed information on the analytical method and quality assurance/quality control methods being used*
 - o *Test equipment required;*
 - o *Staff training required; and*
 - o *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.

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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.

07-17-2013