

Bryan W. Shaw, Ph.D, *Chairman*
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Zak Covar, *Executive Director*



PWS/2430001/CO/10-15-2013/Exception
PWS/2430001/CO/10-15-2013/Plan Ltr

Texas Commission on Environmental Quality

Protecting Texas by Reducing and Preventing Pollution

October 15, 2013

Mr. Kerry D. Maroney, P.E.
Biggs & Mathews, Inc.
2500 Brook Avenue
Wichita Falls, Texas 76301

Re: City of Wichita Falls - Public Water System ID No. 2430001
Addendum I:
Requests for Modifications to TCEQ Conditions for Granted Temporary
Exceptions
Requests for Modifications to TCEQ Amendments for a Direct Potable Reuse
Full-Scale Verification Test Protocol
Addendum J: Full-Scale Verification Test Protocol – Minimum Monitoring and
Reporting of Water Qualities and Flow Rates.
Addendum K: TCEQ July 29, 2013 E-mail
Wichita County, Texas
RN 105598759; CN 600129316

Dear Mr. Maroney:

On September 20, 2013, the Texas Commission on Environmental Quality (TCEQ) received your letter dated September 23, 2013 by e-mail regarding the City of Wichita Falls (City) proposed Cypress Direct Potable Reuse (DPR) Water Treatment Plant (WTP). Your letter requested modifications to the temporary exception conditions and to the Full-Scale Verification Test Protocol (Protocol) in the TCEQ's September 5, 2013 letter. On September 13, 2013, you and City staff met with TCEQ Water Supply Division staff in Austin to discuss the TCEQ's September 5, 2013 letter and enclosures. Based on discussions during the September 13, 2013 meeting, your letter of September 23, 2013 contains written requests for modifications of the conditions in the TCEQ's September 5, 2013 letter.

This letter will henceforth be referred to as the TCEQ's September 5, 2013 letter's Addendum I, and should be referenced in the City's Full-Scale Verification Report as such. It solely clarifies those sections in the TCEQ September 5, 2013 letter and its Enclosure A specifically referenced below.

Attached Addendum J completely replaces the September 5, 2013 letter's Enclosure A: Full-Scale Verification Test Protocol- Minimum Monitoring and Reporting of Water Qualities and Flow Rates in its entirety. All monitoring changes approved in Addendum I are shown highlighted in yellow in Addendum J. Please note that all previous highlighting of cells shown in replaced Table A of Enclosure A has been removed from Addendum J. The only cells highlighted in Addendum J are those changed as a result of the TCEQ's further review after the meeting held in Austin on September 13, 2013 and discussed below in Addendum I. Those items previously indicated in Enclosure A and since deleted remain in Addendum J, but are represented struck through and highlighted in yellow. Also, modified descriptions, clarifications, additional parameters to be monitored for, and new monitoring frequencies are highlighted in yellow. All numbering in Addendum J for unchanged parameters is the same as was used in Enclosure A, except for additions, which were inserted at the end of the applicable monitoring location and distinguished with a new identification number. Any monitoring location previously designated in the TCEQ's September 5, 2013 letter by the capital letter "A" is represented in Addenda I and J by the capital letter "J;" for example, the sampling location referred to previously as TCEQ-1A is re-named TCEQ-1J in Addendum J as of the date of this letter and addenda.

Addendum I

In this addendum—Addendum I—we have organized our responses in the same order, and under the same headings, as the City's letter dated September 23, 2013. No implication of approval, agreement, or changes is intended or made based on the wording of the headings.

TCEQ Responses to City of Wichita Falls September 23, 2013 Letter

Items under heading "September 5, 2013 Conditional Letter of Approval Comments:" in the City's letter dated September 23, 2013

Based on the TCEQ Water Supply Division staff's review, we have the following responses:

1. The City questioned the TCEQ's requirement that the microfiltration (MF) membrane unit be taken out of service when its filtrate turbidity level is greater than 0.100 nephelometric turbidity units (NTU) for two consecutive five-minute readings, be repaired as necessary, and pass a TCEQ-approved direct integrity test (DIT) before being placed back in service treating RR WWTP effluent for human consumption. The City has incorrectly understood the TCEQ's past references to guidance and rules for MF membranes with regards to the proposed DPR WTP. The point was the questionable protection of public health when operating a MF membrane unit treating surface water, much less WWTP effluent, at greater than 0.100 NTU for two consecutive five-minute readings.

The TCEQ **will not modify** this continuous, on-line indirect integrity test limit in Condition Nos. 6(b), 23 and 24 in our September 5, 2013 letter for automatically removing a MF membrane unit used in the City's proposed temporary DPR WTP from service. Even when operators are on-site at the proposed DPR WTP, if the filtrate turbidity level for a MF membrane unit is greater than 0.100 NTU for two consecutive five-minute readings, that MF membrane unit must be removed from service. Operators must then perform the necessary repairs to the MF membrane unit and/or calibrate the monitoring equipment and the MF membrane unit must pass a TCEQ-approved direct integrity test (DIT) before placing the MF membrane unit back in service.

The City will need to make all physical and operational changes necessary to comply with Condition Nos. 6(b), 23 and 24 in the September 5, 2013 letter during the Full-Scale Verification Test and temporary six-month operation of the Cypress DPR WTP. The City should also ensure that the on-line FilterTrak laser turbidimeters are properly installed and calibrated to prevent incorrect readings from air bubbles or other monitoring equipment problems.

2. No response is required.
3. The City requested clarification language for Condition No. 11 to be modified to include the language from the TCEQ's July 29, 2013 e-mail from Ms. Marlo Berg. Since the City has discussed this with TCEQ staff in the past and the TCEQ has clarified the TCEQ's meaning for the specified wording in the referenced email, there is **no need to modify** the wording in our September 5, 2013 letter. However, we have attached the referenced e-mail as Addendum K to our September 5, 2013 letter for documentation that the e-mail does apply.
4. The City requested that the TCEQ acknowledge that the three enclosed engineering drawings (Sheets 4, 5 and 6 of 7) meet the TCEQ's Condition No. 12(g) for the gravity media filter backwash supply during the Full-Scale Verification Test.

The TCEQ **agrees that the City's proposed modifications** shown on your three September 23, 2013 enclosed engineering drawings comply with the TCEQ Condition No. 12(g) to isolate the existing Cypress backwash supply pumps, other SWTPs, and storage tanks from the partially treated RR WWTP effluent, and to use only filtered water from the 2010 SWTP filters during the Full-Scale Verification Test. The use of the water from the 2010 Clearwell will simulate the proposed temporary, six-month DPR WTP operation. Therefore, your proposed drawings are adequate to meet Condition No. 12(g) of our September 5, 2013 letter.

5. No response is required.
6. The City expressed displeasure with the TCEQ's justification for the approved log removal credit assigned to the Siemens Memcor (previously distributed by US Filter) S10V MF membranes based on the Challenge Test Log Removal Value (LRV_{C-Test}) in Condition No. 20 in our September 5, 2013 letter.

The City did not provide any documentation or data that would support a change to this condition. To protect public health, the requirements for the TCEQ to approve a log removal credit for a DPR WTP cannot be less stringent than those required by federal rule for membranes to be used in a SWTP. Therefore, without a new TCEQ-acceptable Challenge Test Report, the TCEQ **cannot consider modifying** the TCEQ-approved log removal credit of 2.8-log for *Giardia* and *Cryptosporidium* based on the LRV_{C-Test} value for the Siemens Memcor S10V MF membranes.

Please note that the previously granted log removal credit was based on the TCEQ-approved DIT Log Removal Value (LRV_{DIT}) for membranes installed to treat surface water prior to April 1, 2012. As the TCEQ has informed the City when the City first proposed the Cypress DPR WTP treatment process, the *Giardia* and *Cryptosporidium* log removal credits for the Siemens Memcor S10V MF membranes would be based on the lower of a TCEQ-approved Challenge Test LRV (LRV_{C-Test}) or a TCEQ approved LRV_{DIT} .

Also, LRV_{C-Test} and LRV_{DIT} are vendor specific and not type specific (i.e., MF versus ultrafiltration). In addition, LRV_{DIT} s are design and site-specific. The log removal credit a system can receive will always be based on the lower of the TCEQ approved LRV_{C-Test} and a TCEQ-approved LRV_{DIT} , not the higher.

Items under heading “A. Items Requiring TCEQ Action” in the City’s September 23, 2013 letter

The TCEQ has the following responses:

1. The TCEQ has indicated in Addendum J that monitoring for lead under TCEQ-1J-22 is **conditional, not required**, if the analytical method used for lead under TCEQ-1J-15 for “full metal scan” is acceptable by the U.S. Environmental Protection Agency (EPA) for determining compliance with the drinking water requirements. If the laboratory conducting the full metal scan does not use an EPA-acceptable analytical method for drinking water samples, then the City **will be required** to collect samples in accordance with TCEQ-1J-22 for lead and to submit those samples to a laboratory for analysis using an EPA-acceptable analytical method for drinking water samples.
2. As discussed and requested in your letter, the TCEQ **has changed** all of the references for bromate monitoring to bromide. The following TCEQ Sample Sets were modified to require bromide monitoring rather than bromate monitoring:
 - a. TCEQ-1J-25;
 - b. TCEQ-20J-20;
 - c. TCEQ-21J-12;
 - d. TCEQ-23J-12;
 - e. TCEQ-28J-15; and
 - f. TCEQ-29J-7.

Please note that monitoring for bromate at monitoring location TCEQ-2J-10 was deleted, not changed. This was due to the fact that it was not a TCEQ requirement to begin with. However, to verify that the 2010 SWTP Clearwell's effluent during the verification testing will meet all drinking water standards and does not exceed the maximum contaminant level (MCL) for bromate, the TCEQ **has added bromate** under TCEQ-40J-37 to be monitored once a week along with the other regulated disinfection byproducts at this monitoring location.

3. The City stated that they had not understood that Enclosure B with the TCEQ's March 4, 2013 e-mail was a list of unregulated chemical and microbiological emerging contaminants of concern that the TCEQ *recommended*—not required—for monitoring. Because of this misunderstanding, the City had included these contaminants in the City's submitted Protocol. During the September 13, 2013 meeting and in your letter, the City requested that most of these contaminants be deleted from Enclosure A for monitoring during the verification testing. As you will note in Addendum J, the TCEQ **has deleted** the following monitoring:
 - a. TCEQ-1J-27 through TCEQ-1J-35;
 - b. TCEQ-10J-19 and TCEQ-10J-20;
 - c. TCEQ-20J-26 through TCEQ-20J-34;
 - d. TCEQ-23J-21 through TCEQ-23J-29;
 - e. TCEQ-28J-22 and TCEQ-28J-23; and
 - f. TCEQ-40J-27 through TCEQ-40J-35.

It is noted that the City will collect total culturable viruses and perchlorate samples during the verification testing.

4. As requested, the TCEQ **clarified** Addendum J for TCEQ-10J-2 "Effluent flow rate (gpm)" and TCEQ-10J-4 "Selected MF unit's effluent flow rate (gpm)." As noted in the September 13, 2013 meeting, TCEQ-10J-2 was intended to represent the combined MF membrane units' flow rate. Since this is the wrong location for measuring this flow rate, the TCEQ has deleted TCEQ-10J-2 flow measurement and added it to TCEQ 11J as Sample No. 7 "Combined MF units' effluent flow rate (gpm)."
5. The City requested that the TCEQ justify the requirement for monitoring the silt density index (SDI) at location TCEQ-10J-11, and that the TCEQ eliminate that monitoring requirement. The TCEQ **did not delete** SDI monitoring requirement for TCEQ-10J-11 at the effluent of the MF membrane unit or at TCEQ-9J-2 at the influent to the MF membrane unit.

The TCEQ's technical explanation of this requirement is as follows. It is noted that SDI is an indicator of the potential fouling for RO membranes and not MF membranes. However, MF membranes are an industry-accepted method for reducing the SDI of the feed water for RO membranes in order to prevent premature fouling of the RO membranes. Premature fouling of RO membranes can result in loss of production, more frequent cleaning, and early replacement due to irreversible fouling. The monitoring results at locations TCEQ-9J-2 and TCEQ-10J-11 can be used by the City and the TCEQ to verify that the MF membranes are achieving an acceptable SDI reduction during the verification testing when treating the new source water—RR WWTP effluent.

6. The City requested that the TCEQ consider changing the monitoring frequency of nitrate at location TCEQ-16J-5, TDS at location 16J-6, and TSS at location 16J-7 to once a day, rather than every four hours. The TCEQ **did not change** the monitoring frequency from four hours to once per day.

Due to the acute health threat for nitrate and TSS and TDS being indicators of the effectiveness of treatment, the TCEQ will need a large data set to demonstrate that spikes in actual and potential chemical contaminants and periodic failures of treatment are not occurring during a day.

Please note that the City may use TCEQ-acceptable on-line monitors for nitrate, TDS and TSS. Also, conductivity can be used in lieu of TDS as long as the City uses an acceptable calculation for converting the conductivity to TDS and submits both values for each four-hour sample result.

7. The City requested that the TCEQ justify the requirement for monitoring alkalinity at locations TCEQ-20J-15 and TCEQ-22J-7 and requested that the TCEQ delete the monitoring requirement for the alkalinity level in the RO membrane permeate before Lagoon No. 3 at TCEQ-20J-15 and in the RO membrane permeate at Lagoon No. 3's effluent before blending with the raw surface water at TCEQ-22J-7.
 - a. The TCEQ **did not delete** the requirement to monitor alkalinity once per week in the RO permeate under TCEQ-20J-15. The TCEQ will need complete water quality data for the RO membrane permeate to determine the efficiency of the RO membrane.
 - b. The TCEQ **deleted** the requirement to monitor alkalinity once per week under TCEQ-22J-7.
8. The TCEQ **changed** the temperature monitoring frequency for TCEQ-23J-3 to once per day.
9. The TCEQ **changed** the pH monitoring frequency for TCEQ-23J-4 to once per day. As noted in Addendum J, the City **may use** the measured pH levels from TCEQ-23J-4 monitoring location for TCEQ-24J-2.
10. For the TCEQ-24J Begin Secondary Reservoir raw water (RW) DZ 1 monitoring location, the TCEQ **changed** the pH and temperature monitoring frequency from once every four hours to once per day in Addendum J.
11. The TCEQ **did not change** the monitoring frequencies for chlorine dioxide, pH and temperature from once every four hours to once per day for the end of RW DZ 2 and RW DZ 3 for TCEQ-25J-1, -2 and -3 and TCEQ-26J-1, 2, and 3, respectively. This data is associated with the adequacy of disinfection, and is therefore critical for determining whether any variation in that adequacy may occur.

As previously discussed in conference calls between the City and the TCEQ, the City must report the lowest inactivation achieved from the six (6) daily four-hour sample sets at all disinfection zones when completing pages 4 and 5 of the Surface Water Monthly Operating Report (SWMOR).

12. The TCEQ has **changed** the monitoring at locations TCEQ-20J-36, -27J-8, and -28J-4 in Addendum J to include chlorite monitoring.
13. The TCEQ agrees that the City may use the corresponding four-hour pH and temperature readings from monitoring locations TCEQ-36J-5 and 36J-6, respectively, for TCEQ-38J7 and 38J-8, respectively. Please note that the TCEQ **changed** the description for TCEQ-36J monitoring location to correctly designate the end of blended disinfection zone 4 (Blended DZ 4) as being after the Conventional 2010 SWTP combined filter effluent (CFE) and prior to the downstream chlorine injection point.
14. The City asked TCEQ to justify why it was requesting mNTU & NTU measurements for Turbidity at location TCEQ40A. In response, the TCEQ was giving City the option on which method to use at this location as was noted in Footnote 3. The TCEQ **deleted** the units of measurement for milli-turbidity at location TCEQ-40J3 in Addendum J after the City reported that they would be using a turbidimeter that records turbidity in NTU.
15. The TCEQ **did not change** the sampling frequency for TDS in Addendum J at location TCEQ-40J-5 so the required frequency remains every 15 minutes. However, it is noted that an on-line monitoring device may be used to collect this data and transmit it to operators through a supervisory control and data acquisition (SCADA) system. It is not anticipated that manual sample collection should be required.
16. The City requested that the TCEQ reduce the required disinfectant monitoring at locations TCEQ-41J and TCEQ-42J from once every eight hours to daily. The TCEQ **did not change** that required monitoring frequency in Addendum J for these monitoring locations. The inactivation must be calculated each time that the disinfectant monitoring occurs. The sample-set values associated with the lowest inactivation must be entered on the SWMOR, pages 4 and 5. All of the eight-hour data collected during the Full Scale Verification Test must be submitted with the Report in order to document that the sample set with the lowest inactivation was reported on the SWMOR, and to confirm the accuracy of the City's hypothesis that the disinfection level is adequate.

Regarding the CT Study, please note if a location is noted as being a disinfection zone end point monitoring location, that location must be sampled. For example, if the CT Study says there are three (3) zones, even if a disinfectant is added only in the first zone, the residual must be routinely measured and recorded in all three disinfection zones. It is unacceptable to not monitor at a point identified as a disinfection zone endpoint in the City's CT Study. This data is collected to comply with the benchmarking requirements initiated by the EPA under the Interim Enhanced Surface Water Treatment Rule (promulgated by the EPA on December 16, 1998).. During the future temporary six-month use of the DPR WTP, failure of the plant to meet the inactivation requirements for a four-hour period will be recognized as a treatment technique violation.

Items under the heading “B. Items Agreed Upon by both Parties” in the City’s letter dated September 23, 2013

1. The TCEQ **agrees** that the flow measurement referenced at location TCEQ-1J-1 will be collected at a location after the RR WWTP Chlorine Contact Basin, and Addendum J has been modified to include this change.
2. The TCEQ **agrees** that the City may conduct weekly TOC and alkalinity analyses on-site in lieu of submitting to an off-site laboratory with National Environmental Laboratory Accreditation Program approval as noted in Addendum J. The City shall provide a current Monitoring Plan documenting the laboratory methods on the Laboratory Approval Form, consistent with 30 TAC §290.121.
3. The TCEQ **agrees** that the free ammonia sample referenced at location TCEQ-2J-1 should be collected prior to the chlorine contact basin. Addendum J correctly reflects this requirement by indicating that the free ammonia for TCEQ 2J will be collected at location TCEQ-1J-37 (added) and also reported for location TCEQ-2JA-1. Please note that although the City’s letter references ammonia sampling without distinguishing between pre- or post-chlorination monitoring, the TCEQ makes no alteration to the free ammonia sample (after chlorination) referenced at monitoring location TCEQ-2J-6, and no change has been made to Addendum J at this monitoring location.
4. The TCEQ **agrees** that the temperature measurement required for location TCEQ-4J-2 is likely to be essentially the same as that at location TCEQ-3J-6, and that the reading at location TCEQ-3J-6 may be also reported under location TCEQ-4J-2. Addendum J reflects this.
5. The TCEQ **agrees** that the influent flow rate to the clarifier will be the flow rate of the effluent from the upstream RR WWTP chlorine contact basin. Therefore, Addendum J has been modified to reflect that the clarifier influent flow rate under location TCEQ-5J-1 will be measured at location TCEQ-1J-1. However, the City cannot operate the DPR WTP if there is a leak in the RR WWTP pipeline as the flow rates at these two locations would not be the same. However, the TCEQ **disagrees** that the clarifier’s influent flow rate and effluent flow rate will be the same since the City will be removing sludge from the clarifier. Therefore, the City must monitor the clarifier effluent flow rate and report it under TCEQ-6J-1 as indicated in Addendum J.
6. The City requested to collect pH and temperature measurements at TCEQ-10J—a selected microfiltration membrane—and report them for TCEQ-11J—the combined microfiltration effluent, since the detention time between these locations is low. The TCEQ notes that the combined microfiltration effluent, not the selected MF membrane unit’s filtrate, represents the end of disinfection zone WW DZ3. Therefore, the TCEQ modified the description of monitoring location TCEQ-11J to reflect this. The actual temperature and pH is to be measured at location TCEQ-11J, but **agrees** to the City recording the pH and temperature for monitoring location TCEQ-11J can be recorded and reported for monitoring location TCEQ-10J as indicated in Addendum J.

7. After review of Engineering Drawing 4-M-2, the TCEQ **disagrees** that the silt density index (SDI) at monitoring location TCEQ-13J and TCEQ-16J should be the same. The City is injecting sulfuric acid and antiscalant in between these two monitoring locations. Since SDI is a measurement for potential fouling of RO membranes and both of these chemicals are used to control fouling of RO membranes, Addendum J indicates the City must monitor the SDI at both TCEQ-13J, prior to the chemical injection point, and TCEQ-16J, after the in-line static mixer.
8. Since antiscalants change the pH level of the water being treated, the TCEQ **does not agree** that the pH level after the sulfuric acid injection, but prior to antiscalant injection, would be the same after the antiscalant injection point.

It was the intent of the TCEQ to review data for the change in pH levels due to the sulfuric acid alone. Monitoring the pH only after the antiscalant injection will not provide this information. However, our review of Engineering Drawing 4-M-2 indicates there is only 18 inches between the sulfuric acid and antiscalant injection points on the 24-inch diameter pipe. Because of the short length and diameter of the pipe, there is a strong probability that the sulfuric acid will not be completely mixed with all of the water in the 24-inch diameter pipeline and the chemical reaction completed before the antiscalant is injected so simultaneous chemical reactions will occur. Since the current physical limitation of these two chemical injection points will not allow for monitoring of the sulfuric acid effect alone on the water quality, the TCEQ **has deleted** the pH monitoring for TCEQ 14J monitoring location in Addendum J.

9. The TCEQ **agrees** to the City monitoring the temperature and pH at TCEQ-23J-3 and TCEQ-23J-4, respectively, and also entering the data for the pH and temperature monitoring under TCEQ-24J-2 and TCEQ-24J-3 as indicated in Addendum J.
10. After review of Engineering Drawing 1-M-7, the TCEQ **does not agree** with the City that monitoring the fluoride level for the Conventional 2010 SWTP combined filters' effluent (CFE) under TCEQ-37J-1 should be conducted at monitoring location TCEQ-35J. Monitoring location TCEQ-35J is for the individual filter effluent (IFE) for the single gravity media filter selected for verification testing, not the CFE.

The TCEQ **agrees** to the City monitoring the fluoride level of the CFE prior to fluoride addition at monitoring location TCEQ-36J End Blended DZ 4 and entering the results with the data for TCEQ-37J as indicated in Addendum J.

The TCEQ noted that fluoride injection occurs at the same location as chlorine and ammonia injection for the beginning of Begin Blended DZ 5 within the 2010 SWTP Clearwell for the TCEQ-38J monitoring location. Our review of past submitted flow diagrams had caused the TCEQ staff to believe the fluoride injection point was upstream of the chlorine and ammonia addition at the Conventional 2010 SWTP Clearwell, not at the same location inside the clearwell as shown on Engineering Drawing 1-M-7. The City's Full Scale Verification Study Report must document the exact chemical injection locations with accurate, as-built drawings and—if necessary to provide clear, understandable information—photographs.

11. The TCEQ **agrees** to notify the City of any new upcoming regulations for unregulated chemical and microbiological emerging contaminants of concern and proposed changes for any currently regulated chemical MCLs and/or microbiological treatment techniques as soon as staff become aware of these changes.

At this time, it is impossible for either the TCEQ or the City to know what EPA may change or at what level a substantiated public health risk might be set. Neither the TCEQ nor the City can know if the City's proposed DPR treatment process will provide the continuous protection of public health required by any possible change in EPA regulations. Furthermore, the TCEQ must adopt and enforce EPA drinking water regulations to maintain primacy. Failure to adopt or enforce these EPA regulations can result in the EPA taking enforcement action against public water systems in Texas. Also, the TCEQ is charged under Texas Health & Safety Code §341.0315 to ensure that public water systems are supplying a safe and adequate quantity of drinking water.

If the City conducts the Full-Scale Verification Test in accordance with our September 5, 2013 letter, Enclosures B-H, Addendums I, J and K and the required data demonstrates that public health will be continuously protected during operation of the proposed temporary DPR WTP; the TCEQ **agrees** that the City should not have to restart the Full-Scale Verification Test. However, the TCEQ cannot agree that events outside our control will not result in the City having to conduct the verification testing for a longer duration or install additional treatment equipment. Such events include (but are not limited to) power and equipment failures, failure of chemical treatment, failure to produce a safe water quality that meets all of the chemical drinking water standards, or failure to meet the TCEQ's site-specific required minimum removal and inactivation of microbiological contaminants.

Please be aware that all exceptions are subject to the TCEQ's periodic review and may be revoked or revised if the TCEQ finds that the conditions under which an exception was granted have changed or the granting of the exception has resulted in a potential health risk.

If you have any questions concerning Addendums I, J or K or need further assistance regarding the conditions for the temporary exceptions, Protocol and Report, please contact Mr. James "Red" Weddell by e-mail at james.weddell@tceq.texas.gov or by telephone at (325) 481-8056 or by correspondence at the following address:

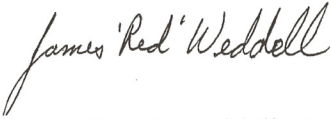
Technical Review & Oversight Team - MC 159
Texas Commission on Environmental Quality
P.O. Box 13087
Austin, Texas 78711-3087

Mr. Kerry D. Maroney
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October 15, 2013

If you have any questions or need further assistance regarding the TCEQ's review of the Preliminary Engineering Report and approval to construct, please contact Vera Poe at (512) 239-6988 or by e-mail at vera.poe@tceq.texas.gov or by correspondence at the following address:

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

Sincerely,



James "Red" Weddell, P.E.
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Texas Commission on Environmental Quality

LB/VP/JSW/av

Attachments: Addendum J: Full-Scale Verification Test Protocol Minimum Monitoring and Reporting of Water Qualities and Flow Rates (Version: 2430001-10152013)
Addendum K: TCEQ July 29, 2013 E-mail

cc: Honorable Glenn Barham, Mayor, City of Wichita Falls, P.O. Box 1431, Wichita Falls, TX 76307-1431
Mr. Darron Leiker, City Manager, 1300 7th Street Room, Wichita Falls, TX 76301
Mr. Russell Schreiber, P.E., Director of Public Works, City of Wichita Falls, P.O. Box 1431, Wichita Falls, TX 76307
Mr. Daniel K. Nix, Utilities Operations Manager, City of Wichita Falls, P.O. Box 1431, Wichita Falls, TX 76307

Addendum J

Full-Scale Verification Test Protocol Minimum Monitoring and Reporting of Water Qualities and Flow Rates

Addendum J

Full-Scale Verification Testing Protocol Minimum Monitoring and Reporting of Water Qualities and Flow Rates

Addendum J with Table J amends the TCEQ's September 5, 2013 letter to the City of Wichita Falls and replaces Enclosure A with Table A in its entirety.

Minimum required water quality monitoring for chemical and microbiological constituents and monitoring frequencies during the direct potable reuse (DPR) Full-Scale Verification Test are listed and marked with a check (✓) in Table J below. These minimum required parameters and specified monitoring frequencies have been selected for the City's Full-Scale Verification Test so that the TCEQ can verify the continuous protection of public health by the removal and/or inactivation of chemical and microbiological contaminants through the different proposed treatment processes at the tested flow rates and operating parameters. Please note:

- **Struck out chemical constituents, operating parameters, sampling frequencies and clarification additions indicated by yellow highlights** are changes based on Addendum I.
- **Continuous 5-minute, 15-minute, 2-hour, 4-hour, and daily (and anytime the flow rate changes) monitoring frequencies** are to be conducted on-site using a TCEQ acceptable method. This includes using on-line monitors.
- **Weekly total organic carbon (TOC) and alkalinity and all twice per week analyses** can be either conducted on-site by City staff using a TCEQ acceptable method or analyzed off-site at a TCEQ acceptable laboratory. Twice per week sample collections are to be conducted at a consistent frequency no closer than three days apart.
- **Except for weekly TOC and alkalinity monitoring (as noted above), all samples collected weekly (once every 7 days) and at longer frequencies** are to be submitted to an off-site NELAP accredited laboratory for drinking water analysis.
- **Analyses marked for both on-site and off-site monitoring** are required for quality control to verify the accuracy of the onsite monitoring equipment/method and are to be collected as split samples when the off-site samples are collected.
- **In lieu of monitoring the total dissolved levels (TDS) levels, the City may monitor and report the conductivity level with the corresponding calculated TDS level using the industry accepted equation.**

Addendum J
Full-Scale Verification Test Protocol
Minimum Monitoring and Reporting of Water Qualities and Flow Rates

Table J

	Continuous, every						Twice per week	Once every 7 days	Startup, every 30 days & end
	5-min.	15-min.	2-hrs.	4-hrs.	Once per day	Once per day & anytime the flow rate changes			
TCEQ Sample Set (TCEQ)-1J: River Road Wastewater Treatment Plant (RR WWTP) Effluent (at RR WWTP chlorine injection box after second clarification & prior to WW DZ 1 chlorine injection point before the RR WWTP Chlorine Contact Basin)									
1. DPR transmission pipeline flow rate (gpm) (to be monitored at the RR WWTP Chlorine Contact Basin's effluent)		✓							
2. Turbidity (NTU)		✓							
3. Temperature (°C)		✓							
4. Escherichia coli (E. coli) enumeration					✓ ¹				✓ ²
5. Giardia (cysts/L) enumeration					✓ ¹				✓ ²
6. Cryptosporidium (oocysts/L) enumeration					✓ ¹				✓ ²
7. 5-day Carbonaceous biochemical oxygen demand (CBOD5, mg/L)					✓				
8. Total suspended solids (TSS, mg/L)					✓				
9. Daily flow rate (gpd)					✓				
10. Nitrate (mg/L)					✓ ¹				✓ ²
11. Total dissolved solids (TDS, mg/L)								✓	
12. Alkalinity (mg/L) (to be conducted on-site)								✓	
13. Total organic carbon (TOC, mg/L) (to be conducted on-site)								✓	
14. Dissolved organic carbon (DOC, mg/L)								✓	
15. Full metal scan (mg/L, arsenic, barium, cadmium, chromium, copper, lead, manganese, mercury, nickel, selenium, silver, zinc)								✓	
16. Algae counts (CFU/L)									✓
17. Chemicals listed in §290.106(b) Inorganic Chemicals ³									✓
18. Chemicals listed in §290.107(b) Organic Chemicals ³									✓
19. Chemicals listed in §290.108(b)(1) (radium 226, radium 228, uranium, gross alpha activity)									✓
20. Chemicals listed in §290.108(b)(2) & 40 CFR §141.66(d) (gross beta particle & photon radioactivity, tritium, strontium 90)									✓
21. Chemicals listed in §290.118(b) Secondary Chemicals									✓
22. Lead (ug/L) (As long as TCEQ-1J-15 analysis for lead includes an acceptable EPA drinking water analytical method.)									✓

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Addendum J
Full-Scale Verification Test Protocol
Minimum Monitoring and Reporting of Water Qualities and Flow Rates

Table J

	Continuous, every						Twice per week	Once every 7 days	Startup, every 30 days & end
	5-min.	15-min.	2-hrs.	4-hrs.	Once per day	Once per day & anytime the flow rate changes			
23. Total trihalomethanes (TTHM, report the species: chloroform, dichlorobromomethane, dibromochloromethane, bromoform) (ug/L)								✓	
24. Haloacetic acids (group of 5) (HAA5, report the species: monochloroacetic acid, dichloroacetic acid, trichloroacetic acid, monobromoacetic acid, dibromoacetic acid) (ug/L)								✓	
25. Bromate Bromide (mg/L)								✓	
26. Total culturable viruses (MPN/L)									WF
27. Enterovirus (CFU/L)									WF
28. Norovirus (CFU/L)									WF
29. N-Nitroso-dimethylamine (NDMA, ng/L)									WF
30. N-Nitroso-pyrrolidine (NPYR, ng/L)									WF
31. Pharmaceuticals (ug/L)									WF
32. Hormones (ng/L)									WF
33. Personal care products (ng/L)									WF
34. Fluorinated alkyl acids (PFOS, PFOA, PFNA, PFHxS, PFHpA, & PFBS) (ng/L)									WF
35. Sucralose (ug/L)									WF
36. Perchlorate (ug/L)									WF
37. Free ammonia (mg/L)				✓					
TCEQ-2J: Begin Wastewater (WW) Disinfection Zone (DZ) 1 (before RR WWTP Chlorine Contact Basin)									
1. Free ammonia level before chlorine injection (mg/L) (from TCEQ-1J-37.)				✓					
2. Free chlorine dosage (mg/L)				✓					
3. Total chlorine residual after chlorine injection (mg/L)				✓					
4. Monochloramine residual after chlorine injection (mg/L)				✓					
5. Free chlorine residual after chlorine injection (mg/L)				✓					
6. Free ammonia level after chlorine injection (mg/L)				✓					

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	5-min.	15-min.	2-hrs.	4-hrs.	Once per day	Once per day & anytime the flow rate changes			
7. pH level at monochloramine residual monitoring tap				✓					
8. Water temperature at monochloramine residual monitoring tap (°C)				✓					
9. Quantity of chlorine used (pounds per day, ppd)					✓				
10. Bromate (mg/L)								-WF	
TCEQ-3J: End WW DZ 1 (end of RR WWTP effluent transmission line at Cypress 2008 MF/RO SWTP's Flow Control Vault & prior to existing 12-inch gate valve)									
1. Total chlorine residual (mg/L)		✓							
2. Monochloramine residual (mg/L)		✓							
3. Free chlorine residual (mg/L)		✓							
4. Free ammonia level (mg/L)		✓							
5. pH level at monochloramine monitoring tap		✓							
6. Water temperature at monochloramine monitoring tap (°C)		✓							
TCEQ-4J: 2008 MF/RO SWTP's Static Mixers and Coagulant Addition (at Cypress 2008 MF/RO SWTP's Flow Control Vault)									
1. Influent alkalinity level (mg/L)				✓					
2. Influent water temperature (°C) (from TCEQ-3J-6)				✓					
3. Coagulant dosage (mg/L)				✓					
4. Quantity of coagulant used (gpd)					✓				
5. <i>Escherichia coli</i> (<i>E. coli</i>) enumeration					✓ ¹				✓ ²
6. <i>Giardia</i> (cysts/L)					✓ ¹				✓ ²
7. <i>Cryptosporidium</i> (oocysts/L)					✓ ¹				✓ ²
TCEQ-5J: Begin WW DZ 2 (at 2008 MF/RO SWTP's radial flow clarifier's flocculator with chlorine and ammonia injection)									
1. Influent flow rate (gpm) (from TCEQ-1J-1)		✓							
2. Free chlorine dosage (mg/L)				✓					
3. Ammonia dosage (mg/L)				✓					
4. Total chlorine residual, after ammonia injection (mg/L)				✓					
5. Monochloramine residual, after ammonia injection (mg/L)				✓					
6. Free chlorine residual, after ammonia injection (mg/L)				✓					

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	5-min.	15-min.	2-hrs.	4-hrs.	Once per day	Once per day & anytime the flow rate changes			
7. Free ammonia level, after ammonia injection (mg/L)				✓					
8. pH level at monochloramine residual monitoring tap				✓					
9. Water temperature at monochloramine residual monitoring tap(°C)				✓					
10. Quantity of chlorine used (ppd)					✓				
11. Quantity of ammonia used (ppd)					✓				
TCEQ-6J: 2008 MF/RO SWTP Radial Flow Clarifier (flocculation & clarification)									
1. Effluent flow rate (gpm) (clarifier influent flow rate minus blowdown flow rate)		✓							
2. Settled water turbidity level (NTU)			✓						
3. Effluent pH level				✓					
4. Calculated flocculator hydraulic detention time (Based on influent flow rate, mins.)						✓			
5. Calculated clarifier surface overflow rate (gpm/sf)						✓			
6. Effluent TOC (mg/L) (to be conducted on-site)								✓	
7. Effluent DOC (mg/L)								✓	
TCEQ-7J: End WW DZ 2 (at 2008 MF/RO SWTP's radial flow clarifier's effluent pipe)									
1. Total chlorine residual (mg/L)		✓							
2. Monochloramine residual (mg/L)		✓							
3. Free chlorine residual (mg/L)		✓							
4. Free ammonia level (mg/L)		✓							
5. pH level at monochloramine monitoring tap		✓							
6. Water temperature (°C) at monochloramine monitoring tap		✓							
TCEQ-8J: Begin WW DZ 3 (at MF membrane units' feed trough)									
1. Free chlorine dosage rate (mg/L)				✓					
2. Ammonia dosage rate (mg/L)				✓					
3. Total chlorine residual, after ammonia injection (mg/L)				✓					
4. Monochloramine residual, after ammonia injection (mg/L)				✓					

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	5-min.	15-min.	2-hrs.	4-hrs.	Once per day	Once per day & anytime the flow rate changes			
5. Free chlorine residual, after ammonia injection (mg/L)				✓					
6. Free ammonia level, after ammonia injection (mg/L)				✓					
7. Water temperature at monochloramine residual monitoring tap (°C)				✓					
8. pH level at monochloramine residual monitoring tap				✓					
9. Quantity of chlorine used (ppd)					✓				
10. Quantity of ammonia used (ppd)					✓				
TCEQ-9J: Selected MF Membrane Unit (at influent to selected MF units' feed trough/tank)									
1. Inlet pressure, head on bottom of membranes' feed side (psi)		✓							
2. Influent silt density index (SDI)					✓				
TCEQ-10J: Selected MF Membrane Unit Filtrate Quality (after vacuum pump & prior to blending with any other MF filtrate)									
1. Effluent turbidity (mNTU)	✓								
2. ~~Effluent flow rate (gpm)~~ (moved to TCEQ-11J-7)		✓							
3. Outlet pressure, vacuum (psi)		✓							
4. Selected MF unit's effluent flow rate (gpm)		✓							
5. Temperature (°C) (from TCEQ-11J-6)		✓							
6. pH level (from TCEQ-11J-5)		✓							
7. Calculated average transmembrane pressure (TMP, psi)				✓					
8. Calculated average flux rate (gallons per square-foot per day, gfd)				✓					
9. Calculated average specific flux rate (gfd/psi) at measured temperature				✓					
10. Calculated average specific flux (gfd/psi) normalized to 20° C				✓					
11. SDI					✓				
12. Alkalinity (mg/L) (to be conducted on-site)								✓	
13. TOC (mg/L) (to be conducted on-site)								✓	
14. DOC (mg/L)								✓	
15. <i>Escherichia coli</i> (<i>E. coli</i>) enumeration									WF

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	5-min.	15-min.	2-hrs.	4-hrs.	Once per day	Once per day & anytime the flow rate changes			
16. <i>Giardia</i> (cysts/L) enumeration									WF
17. <i>Cryptosporidium</i> (oocysts/L)									WF
18. Total culturable viruses (MPN/L)									WF
19. Enterovirus (CFU/L)									WF
20. Norovirus (CFU/L)									WF
TCEQ-11J: End WW DZ 3 (at selected MF membrane unit's filtrate piping & prior to combined MF filtrate pipe)									
1. Total chlorine residual (mg/L)		✓							
2. Monochloramine residual (mg/L)		✓							
3. Free chlorine residual (mg/L)		✓							
4. Free ammonia level (mg/L)		✓							
5. pH level at monochloramine residual monitoring tap		✓							
6. Water temperature at monochloramine residual monitoring tap (°C)		✓							
7. Combined MF units' effluent flow rate (gpm)		✓							
TCEQ-12J: Sodium Bisulfite Feed System									
1. Sodium bisulfite dosage (mg/L)				✓					
2. Quantity of sodium bisulfite used (ppd)					✓				
TCEQ-13J: Break Tank (RO membrane feed water tank)									
1. Effluent flow rate (gpm)		✓							
2. Water level (feet)				✓					
3. Calculated hydraulic detention time (using effluent flow rate, mins.)						✓			
4. Effluent free chlorine residual (mg/L)				✓					
5. Effluent total chlorine residual (mg/L)				✓					
6. SDI					WF				

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Addendum J
Full-Scale Verification Test Protocol
Minimum Monitoring and Reporting of Water Qualities and Flow Rates

Table J

	Continuous, every						Twice per week	Once every 7 days	Startup, every 30 days & end
	5-min.	15-min.	2-hrs.	4-hrs.	Once per day	Once per day & anytime the flow rate changes			
TCEQ-14J: Sulfuric Acid Feed System									
1. Sulfuric acid dosage (mg/L)				✓					
2. pH level after injection				✓					
3. Quantity of sulfuric acid used (gpd)					✓				
TCEQ-15J: Antiscalant Feed System									
1. Antiscalant dosage (mg/L)				✓					
2. Quantity of antiscalant used (gpd)					✓				
TCEQ-16J: Selected RO Membrane Unit Feed Water (after selected RO unit feed pump & prior to selected RO unit)									
1. Influent flow rate (gpm)		✓							
2. Influent turbidity (mNTU)		✓							
3. Inlet pressure (psi)				✓					
4. Temperature (° C)				✓					
5. Nitrate (mg/L)				✓					√ ²
6. TDS (mg/L)				✓					
7. TSS (mg/L)				✓					
8. SDI					✓				
9. pH level					✓				
10. Hardness as calcium carbonate (mg/L)					✓				
11. Alkalinity (mg/L) (to be conducted on-site)					✓				
12. TOC (mg/L) (to be conducted on-site)								✓	
13. DOC (mg/L)								✓	
14. Nitrite (mg/L)									✓
15. Silica (mg/L)									✓

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TCEQ-17J: First Stage RO Membranes									
1. Temperature (°C)					✓				
2. Flow rate (gpm) at measured temperature					✓				
3. Calculated total flux rate (gfd) at measured temperature					✓				
4. Calculated maximum (or average) net driving pressure (psi)					✓				
5. Calculated specific flux rate (gfd/psi) normalized to 20° C					✓				
TCEQ-18J: Second Stage RO Membranes									
1. Temperature (°C)					✓				
2. Flow rate (gpm) at measured temperature					✓				
3. Calculated total flux rate (gfd) at measured temperature					✓				
4. Calculated maximum (or average) net driving pressure (psi)					✓				
5. Calculated specific flux rate (gfd/psi) normalized to 20° C					✓				
TCEQ-19J: Selected RO Membrane Unit Reject Water Quality (at effluent of RO unit's concentrate piping)									
1. Flow rate (gpm)		✓							
2. Pressure (psi)		✓							
3. TDS (mg/L)					✓				
4. Free ammonia (mg/L)					✓				
5. Nitrate (mg/L)					✓				
6. pH level							✓		
7. Turbidity (NTU)							✓		
8. Temperature (°C)							✓		
9. CBOD5 (mg/L)							✓		
10. Full metal scan (mg/L, arsenic, barium, cadmium, chromium, copper, lead, manganese, mercury, nickel, selenium, silver, zinc)							✓		

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	5-min.	15-min.	2-hrs.	4-hrs.	Once per day	Once per day & anytime the flow rate changes			
TCEQ-20J: Selected RO Membrane Unit Permeate Quality (at selected RO unit permeate piping & prior to blending with other RO units' permeate)									
1. Flow rate per unit (gpm)		✓							
2. TDS (mg/L)		✓							
3. Effluent pressure (psi)		✓							
4. Temperature (°C)				✓					
5. pH level				✓					
6. Maximum daily TDS (mg/L)					✓				
7. Calculated average flux rate (gfd) at measured temperature					✓				
8. Calculated average net driving pressure (psi)					✓				
9. Calculated average specific flux rate (gfd/psi) normalized to 20° C					✓				
10. Nitrate (mg/L)					✓ ¹				✓ ²
11. Nitrite (mg/L) if nitrite is detected in RO membrane feed water					✓ ¹				✓ ²
12. Escherichia coli (E. coli) enumeration					✓ ¹				✓ ²
13. Giardia (cysts/L)					✓ ¹				✓ ²
14. Cryptosporidium (oocysts/L)					✓ ¹				✓ ²
15. Alkalinity (mg/L) (to be conducted on-site)								✓	
16. TOC (mg/L) (to be conducted on-site)								✓	
17. DOC (mg/L)								✓	
18. TTHM (ug/L)								✓	
19. HAA5 (ug/L)								✓	
20. Bromate Bromide (mg/L)								✓	
21. Chemicals listed in §290.106(b) Inorganic Chemicals ³									✓
22. Chemicals listed in §290.107(b) Organic Chemicals ³									✓
23. Chemicals listed in §290.108(b)(1) and §290.108(b)(2) & 40 CFR §141.66(d)									✓
24. Chemicals listed in §290.118(b) Secondary Chemicals									✓

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	5-min.	15-min.	2-hrs.	4-hrs.	Once per day	Once per day & anytime the flow rate changes			
25. Total culturable viruses									WF
26. Enterovirus (CFU/L)									WF
27. Norovirus (CFU/L)									WF
28. N-Nitroso-dimethylamine (NDMA, ng/L)									WF
29. N-Nitroso-pyrrolidine (NPYR, ng/L)									WF
30. Pharmaceuticals (µg/L)									WF
31. Hormones (ng/L)									WF
32. Personal care products (ng/L)									WF
33. Fluorinated alkyl acids (PFOS, PFOA, PFNA, PFHxS, PFHpA, & PFBS; ng/L)									WF
34. Sucralose (µg/L)									WF
35. Perchlorate (ug/L)									WF
36. Chlorite (mg/L)					WF				
TCEQ-21J: Calculated %-Removal (based on RR WWTP effluent quality & the RO membrane unit's permeate quality prior to discharge to waste Lagoon 3)									
1. Nitrite removal (%; if detected in RO feed water)					✓				
2. Nitrate removal (%)					✓				
3. TDS removal (%)					✓				
4. TOC removal (%)								✓	
5. DOC removal (%)								✓	
6. Removal of inorganics (%)									✓
7. Removal of organics (%)									✓
8. Removal of all radionuclides (%)									✓
9. Removal of secondary chemicals (%)									✓
10. TTHM removal (%)								✓	
11. HAA5s removal (%)								✓	
12. Bromate Bromide removal (%)								✓	

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TCEQ-22J: Temporary RO Permeate Lagoon Effluent (at waste Lagoon No. 3 recycle pump station & before blending with Secondary Reservoir source water)									
1. Flow rate (gpm)		√							
2. Turbidity (NTU)				√					
3. pH level				√					
4. Temperature (oC)				√					
5. Nitrate (mg/L)					√ ¹				√ ²
6. Free ammonia level (mg/L)					√				
7. Alkalinity (mg/L)								√	
8. TOC (mg/L)								√	
9. DOC (mg/L)								√	
TCEQ-23J: Raw Secondary Reservoir Source Water Quality (prior to chlorine dioxide injection)									
1. Flow rate (gpm)		√							
2. Turbidity (NTU)		√							
3. Temperature (°C)		√			√				
4. pH				WF	WF				
5. TDS (mg/L)					√				
6. TSS (mg/L)					√				
7. Daily flow rate (gpd)					√				
8. Nitrate (mg/L)					√ ¹				√ ²
9. Alkalinity (mg/L) (to be conducted on-site)								√	
10. TOC (mg/L) (to be conducted on-site)								√	
11. DOC (mg/L)								√	
12. Bromate Bromide (mg/L)								√	
13. Chemicals listed in §290.106(b) Inorganic Chemicals ³									√
14. Chemicals listed in §290.107(b) Organic Chemicals ³									√

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3 Please assure that the laboratory monitors for all of the inorganic and organic compounds. Compounds that some labs do not include, but are required are: asbestos, cyanide, endotoxin, diquat, glyphosate, asbestos, and the dioxins.

Addendum J
Full-Scale Verification Test Protocol
Minimum Monitoring and Reporting of Water Qualities and Flow Rates

Table J

	Continuous, every						Twice per week	Once every 7 days	Startup, every 30 days & end
	5-min.	15-min.	2-hrs.	4-hrs.	Once per day	Once per day & anytime the flow rate changes			
15. Chemicals listed in §290.108(b)(1) and §290.108(b)(2) & 40 CFR §141.66(d)									✓
16. Chemicals listed in §290.118(b), Secondary Chemicals									✓
17. <i>Escherichia coli</i> (<i>E. coli</i>) enumeration					✓ ¹				✓ ²
18. <i>Giardia</i> (cysts/L)					✓ ¹				✓ ²
19. <i>Cryptosporidium</i> (oocysts/L)					✓ ¹				✓ ²
20. Total culturable viruses (MPN/L)									WF
21. Enterovirus (CFU/L)									WF
22. Norovirus (CFU/L)									WF
23. N-Nitroso dimethylamine (NDMA, ng/L)									WF
24. N-Nitroso pyrrolidine (NPYR, ng/L)									WF
25. Pharmaceuticals (µg/L)									WF
26. Hormones (ng/L)									WF
27. Personal care products (ng/L)									WF
28. Fluorinated Alkyl Acids (PFOS, PFOA, PFNA, PFHxS, PFHpA, & PFBS; ng/L)									WF
29. Sucralose (ug/L)									WF
30. Perchlorate (ug/L)									WF
TCEQ-24J: Begin Secondary Reservoir raw water (RW) DZ 1 (at chlorine dioxide injection point on Secondary Reservoir raw water transmission pipe)									
1. Chlorine dioxide dosage (mg/L)				✓					
2. pH level (from TCEQ-23J-4)				✓	✓				
3. Temperature (°C) (from TCEQ-23J-3)				✓	✓				
4. Quantity of chlorine dioxide used (ppd)					✓				
TCEQ-25J: End RW DZ 1 (at 1st monitoring point on raw Secondary Reservoir transmission pipe 400 feet from chlorine dioxide injection point)									
1. Chlorine dioxide residual (mg/L)				✓					
2. pH level				✓					
3. Temperature (°C)				✓					

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	5-min.	15-min.	2-hrs.	4-hrs.	Once per day	Once per day & anytime the flow rate changes			
TCEQ-26J: End RW DZ 2 (begins at end of RW DZ 1 and ends at 2 nd monitoring point on raw Secondary Reservoir transmission pipe 900 feet from chlorine dioxide injection point)									
1. Chlorine dioxide residual (mg/L)				√					
2. pH level				√					
3. Temperature (°C)				√					
TCEQ-27J: End RW DZ 3 (begins at end of RW DZ 2 & ends prior to tee for blending waste Lagoon No. 3 effluent at 3 rd monitoring point on raw Secondary Reservoir transmission pipe 6,500 feet from chlorine dioxide injection point)									
1. Flow rate (gpm)		WF							
2. Chlorine dioxide residual (mg/L)				√					
3. pH level				√					
4. Temperature (°C)				√					
5. Turbidity (NTU)				WF					
6. Total alkalinity (mg/L as CaCO ₃)					WF				
7. Nitrate (mg/L)					WF				
8. Chlorite (mg/L)					WF				
TCEQ-28J: Cypress Splitter Box Effluent (blended partially treated RR WWTP effluent from waste Lagoon No. 3 with Secondary Reservoir source water)									
1. Combined flow rate (gpm)				√					
2. Turbidity (NTU)				√					
3. pH				√					
4. Temperature (°C)				WF					
5. <i>E. coli</i> enumeration					√ ¹				√ ²
6. <i>Giardia</i> (cysts/L)					√ ¹				√ ²
7. <i>Cryptosporidium</i> (oocysts/L)					√ ¹				√ ²
8. Nitrate (mg/L)					√ ¹				√ ²
9. Water color					√				
10. Odor (threshold odor number)					√				
11. TOC (mg/L) (to be conducted on-site)								√	

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Addendum J
Full-Scale Verification Test Protocol
Minimum Monitoring and Reporting of Water Qualities and Flow Rates

Table J

	Continuous, every						Twice per week	Once every 7 days	Startup, every 30 days & end
	5-min.	15-min.	2-hrs.	4-hrs.	Once per day	Once per day & anytime the flow rate changes			
12. DOC (mg/L)								✓	
13. TTHM (mg/L)								✓	
14. HAA5 (mg/L)								✓	
15. Bromate Bromide (mg/L)								✓	
16. Chemicals listed in §290.106(b) Inorganic Chemicals ³									✓
17. Chemicals listed in §290.107(b) Organic Chemicals ³									✓
18. Chemicals listed in §290.108(b)(1) radionuclides									✓
19. Chemicals listed in §290.108(b)(2) & 40 CFR §141.66(d) manmade radionuclides									✓
20. Chemicals listed in §290.118(b) Secondary Chemicals									✓
21. Total culturable viruses (MPN/L)									WF
22. Enterovirus (CFU/L)									WF
23. Norovirus (CFU/L)									WF
24. Chlorite (mg/L)					WF				
TCEQ-29J: Calculated % Change in Water Quality (between RO membrane unit permeate, prior to discharging to waste Lagoon No. 3 and the Splitter Box's effluent blended water quality)									
1. Nitrate change as % reduction (-) or % increase (+)					√ ¹				√ ²
2. Chlorite change as % reduction (-) or % increase (+)					WF				
3. TOC change as % reduction (-) or % increase (+)								✓	
4. DOC change as % reduction (-) or % increase (+)								✓	
5. TTHM change as % reduction (-) or % increase (+)								✓	
6. HAA5 change as % reduction (-) or % increase (+)								✓	
7. Bromate Bromide change as % reduction (-) or % increase (+)								✓	

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	5-min.	15-min.	2-hrs.	4-hrs.	Once per day	Once per day & anytime the flow rate changes			
TCEQ-30J: Begin Blended partial treated RR WWTP & Secondary Reservoir waters (Blended) DZ 4 (at chlorine & ammonia injection after Cypress Splitter Box and before 2010 Rapid Mix)									
1. Free chlorine dosage (mg/L)				✓					
2. Ammonia dosage (mg/L)				✓					
3. Total chlorine residual, after ammonia injection (mg/L)				✓					
4. Monochloramine residual, after ammonia injection (mg/L)				✓					
5. Free chlorine residual, after ammonia injection (mg/L)				✓					
6. Free ammonia residual, after ammonia injection (mg/L)				✓					
7. pH level at monochloramine residual monitoring tap				✓					
8. Water temperature at monochloramine monitoring tap (°C)				✓					
9. Quantity of chlorine used (ppd)					✓				
10. Quantity of ammonia used (ppd)					✓				
TCEQ-31J: Conventional 2010 SWTP Rapid Mix and Coagulant Addition									
1. Influent alkalinity level (mg/L)				✓					
2. Coagulant dosage (mg/L)				✓					
3. Quantity of coagulant used (gpd)					✓				
TCEQ-32A: Conventional 2010 SWTP Flocculation & Clarification (Accelerator solids-contact flocculation and clarification)									
1. Effluent flow rate (gpm)		✓							
2. Settled water turbidity (NTU)			✓						
3. Cationic polymer dosage (mg/L)				✓					
4. Lime feed rate (gpm)				✓					
5. Quantity of cationic polymer used (gpd)					✓				
6. Quantity of lime used (ppd)					✓				
7. Calculated flocculator hydraulic detention time (mins.)						✓			
8. Calculated clarifier surface overflow rate (gpm/sf)						✓			
9. Effluent TOC (mg/L) (to be conducted on-site)								✓	
10. Effluent DOC (mg/L)								✓	

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	5-min.	15-min.	2-hrs.	4-hrs.	Once per day	Once per day & anytime the flow rate changes			
TCEQ-33J: Conventional 2010 SWTP Recarbonation Basin									
1. Carbon dioxide dosage (mg/L)					✓				
2. Effluent pH level					✓				
3. Quantity of carbon dioxide used (ppd)					✓				
TCEQ-34J: Blended Phosphate Addition System (after Conventional 2010 SWTP Recarbonation Basin and prior to gravity media filters)									
1. Blended phosphate dosage (mg/L)					✓				
2. Quantity of blended phosphate used (gpd)					✓				
TCEQ-35J: Selected Conventional 2010 SWTP Gravity Media Filter (selected individual filter effluent (IFE))									
1. Selected individual filter's effluent (IFE) turbidity level (NTU)		✓							
2. Selected IFE flow rate (gpm)				✓					
3. Combined filters' effluent water flow rate (gpm) (moved to TCEQ-36J-7)				WF					
4. Calculated selected IFE hydraulic loading rate for selected filter (gpm/sf)						✓			
TCEQ-36J: End Blended DZ 4 (at effluent of selected after Conventional 2010 SWTP combined filter effluent (CFE) and prior to downstream chlorine injection point)									
1. Total chlorine residual (mg/L)		✓							
2. Monochloramine residual (mg/L)		✓							
3. Free chlorine residual (mg/L)		✓							
4. Free ammonia level (mg/L)		✓							
5. pH level at monochloramine residual monitoring tap		✓							
6. Water temperature (°C) at monochloramine residual monitoring tap		✓							
7. Combined filters' effluent (CFE) water flow rate (gpm)				✓					
TCEQ-37J: Fluoride Adjustment System (after Conventional 2010 SWTP filters and prior to chlorine injection point)									
1. Fluoride level, pre-fluosilicic injection (mg/L) (can be monitored at TCEQ-36J monitoring location)					✓				
2. Fluosilicic acid dosage (mg/L)					✓				
3. Quantity of fluosilicic acid used (gpd)					✓				

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	5-min.	15-min.	2-hrs.	4-hrs.	Once per day	Once per day & anytime the flow rate changes			
TCEQ-38J: Begin Blended DZ 5 (at chlorine injection prior to Conventional 2010 SWTP Clearwell)									
1. Free chlorine dosage (mg/L)				✓					
2. Ammonia dosage (mg/L)				✓					
3. Total chlorine residual, after ammonia injection (mg/L)				✓					
4. Monochloramine residual, after ammonia injection (mg/L)				✓					
5. Free chlorine residual, after ammonia injection (mg/L)				✓					
6. Free ammonia level, after ammonia injection (mg/L)				✓					
7. pH level at monochloramine residual monitoring tap (from TCEQ-36J-5)				✓					
8. Water temperature at monochloramine residual monitoring tap (°C) (from TCEQ-36J-6)				✓					
9. Quantity of chlorine used (ppd)					✓				
10. Quantity of ammonia used (ppd)					✓				
TCEQ-39J: End Temporary Blended DZ 5 (at Conventional 2010 SWTP Clearwell's transfer pumps)									
1. Total chlorine residual (mg/L)		✓							
2. Monochloramine residual (mg/L)		✓							
3. Free chlorine residual (mg/L)		✓							
4. Free ammonia level (mg/L)		✓							
5. pH level at monochloramine residual monitoring tap		✓							
6. Water temperature at monochloramine residual monitoring tap (°C)		✓							
TCEQ-40J: Conventional 2010 SWTP Clearwell Effluent Water Quality (after 2010 clearwell transfer pumps and prior to GSTs)									
1. Flow rate (gpm)		✓							
2. Turbidity (NTU) (the City has selected this turbidity monitoring method at this sample site)		✓							
3. Turbidity (mNTU)		✓							
4. Nitrate (mg/L)		✓							√2
5. TDS (mg/L)		✓							√2

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6. <i>E. coli</i> enumeration					√ ¹				√ ²
7. <i>Giardia</i> (cysts/L)					√ ¹				√ ²
8. <i>Cryptosporidium</i> (oocysts/L)					√ ¹				√ ²
9. Fluoride (mg/L)					√ ¹				√ ²
10. Daily quantity of water treated (MGD)					√				
11. Chlorine dioxide (mg/L)					√				
12. Chlorite (mg/L)					√				
13. Color (color units)					√				
14. Odor (threshold odor number)					√				
15. Alkalinity (mg/L)								√	
16. Hardness as calcium carbonate (mg/L)								√	
17. Calculated Langelier saturation index (LSI)								√	
18. Chemicals listed in §290.106(b) Inorganic Chemicals ³									√
19. Chemicals listed in §290.107(b) Organic Chemicals ³									√
20. Chemicals listed in §290.108(b)(1) (radium 226, radium 228, uranium, gross alpha activity)									√
21. Chemicals listed in §290.108(b)(2) & 40 CFR §141.66(d) (gross beta particle and photon radioactivity, tritium, strontium 90)									√
22. Chemicals listed in §290.118(b) Secondary Chemicals									√
23. TTHM (ug/L)								√	
24. HAA5 (ug/L)								√	
25. Lead (mg/L)									√
26. Total culturable viruses (MPN/L)									WF
27. Enterovirus (CFU/L)									WF
28. Norovirus (CFU/L)									WF
29. N-Nitroso dimethylamine (NDMA, ng/L)									WF
30. N-Nitroso pyrrolidine (NPYR, ng/L)									WF

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31. Pharmaceuticals (µg/L)									WF
32. Hormones (ng/L)									WF
33. Personal care products (ng/L)									WF
34. Fluorinated alkyl acids (PFOS, PFOA, PFNA, PFHxS, PFHpA, & PFBS; ng/L)									WF
35. Sucralose (ug/L)									WF
36. Perchlorate (ug/L)									WF
37. Bromate (mg/L) (TCEQ added disinfection by-product)								✓	

Simulated CT for 10.0-MG GST	8-hrs.	End of three 8-hr. shifts
TCEQ-41J: Begin Temporary Blended DZ 6 (no disinfectant injection, includes Cypress 10.0-MG GST)		
1. Collect water sample at effluent of 2010 clearwell	✓	
2. 2010 clearwell transfer pumps' flow rate (gpm)	✓	
3. Calculate hydraulic detention time of 10.0 MG GST at 50-% capacity (mins.)	✓	
4. Calculate T10 using a baffling factor of 0.3 (mins.)	✓	
TCEQ-42J: End Temporary Blended DZ 6 (at Cypress high service pumps' discharge header)		
1. Water temperature of sample after holding sample for calculated T10 (°C)	✓	
2. pH level of sample after holding sample for calculated T10	✓	
3. Monochloramine residual of sample after holding sample for calculated T10 (mg/L)	✓	
4. Record 2010 clearwell transfer pumps' 8-hr. flow rate result that corresponds to the lowest virus and <i>Giardia</i> inactivation on Full-Scale Verification Test SWMOR (gpm)		✓
5. Record water sample temperature for the 8-hr. result that corresponds to the lowest virus and <i>Giardia</i> inactivation on Full-Scale Verification Test SWMOR (°C)		✓
6. Record water sample pH level for the 8-hr. result that corresponds to the lowest virus and <i>Giardia</i> inactivation on Full-Scale Verification Test SWMOR		✓
7. Record monochloramine residual for the 8-hr. result that corresponds to the lowest virus and <i>Giardia</i> inactivation on Full-Scale Verification Test SWMOR (mg/L)		✓

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Addendum K

TCEQ July 29, 2013 E-mail

Marlo Berg

From: Marlo Berg
Sent: Monday, July 29, 2013 10:58 AM
To: Russell Schreiber (russell.schreiber@wichitafallstx.gov); Daniel Nix (daniel.nix@wichitafallstx.gov); Kerry D. Maroney (kdm@bmiwf.com)
Cc: Vera Poe; Joel Klumpp; Ada Lichaa; Jack Schulze; Pritesh Tripathi; James Weddell; Linda Brookins
Subject: RE: Response to City of WF - Please review

Dear Daniel,

We had said we would get back to you on two issues from our meeting on Thursday. See our responses below.

1. Q. Does the full scale verification test need to be shut down if there are elevated levels of crypto or giardia entering the facility?
 - A. No, Item No. 8 of the TCEQ's 4th Set of Questions applies to the content of the Operations & Maintenance Manual and Monitoring Plan for a TCEQ approved Direct Potable Reuse (DPR) Water Treatment Plant (WTP) discharging water to the City's distribution system for human consumption. At that time, the Full-Scale Verification Test will need to be shut down and restarted when parameters show that the plant is not performing properly. For example, if the EP nitrates levels are over the MCL or the filters failure to meet specified turbidity. Because the facility is not going to distribute the water during the Full-Scale Verification Test, higher levels of pathogens can be used to determine the efficiency of removals the facility can provide.
2. We also said we would provide a rewrite to the 4th questions number 8kii. See below
 - ii. The *Giardia* and *Cryptosporidium* levels in water from the DPR WTP at the entry point (EP) to the distribution for human consumption must remain at zero cysts/L and oocysts/L respectively as indicated by analyses performed by either off-site or on-site methods. 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 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 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.*

Marlo Wanielista Berg, P.E. | Technical Review and Oversight Team | TCEQ

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