



TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Protecting Texas by Reducing and Preventing Pollution

June 29, 2012

Ms. Susan Crawford, P.E.
CDM Smith
8140 Walnut Hill Lane, Suite 1000
Dallas, Texas 75231

Subject: City of Wichita Falls – PWS ID No. 2430001
Request for an Exception for Proposed Direct Potable Reuse
River Road Wastewater Treatment Plant Effluent – Hollow-Fiber Membrane
Pilot Study Reports
Wichita County, Texas

CN 600129316

RN 101611275

Dear Ms. Crawford:

On May 9, 2012, the Texas Commission on Environmental Commission (TCEQ) received your May 7, 2012 letter on behalf of the City of Wichita Falls (City) with exception requests for three hollow-fiber (HF) microfiltration (MF) and ultrafiltration (UF) membranes. This submittal was for the City's proposed use of the River Road Wastewater Treatment Plant's (RRWWTP) effluent as a source of raw water to be treated for human consumption use. Your May 7, 2012 letter also was a response to the April 12, 2012 meeting with TCEQ staff and TCEQ's December 1, 2009 letter requesting additional information for the previously submitted pilot study reports (Reports). The TCEQ acknowledges the City's emergency due to drought-related reduction in source water, and we are committed to working with you to expedite our review of this project.

Direct and Indirect Potable Reuse

Indirect Potable Reuse (IPR) and Direct Potable Reuse (DPR) proposals and associated treatment processes are reviewed as innovative and alternate treatment processes under Title 30 of the Texas Administrative Code (TAC) §290.42(g) and exceptions to 30 TAC Chapter 290, Subchapter D - Rules and Regulations for Public Water Systems (Rules) under 30 TAC §290.39(l). Please note that the Rules only reference groundwater and surface water as sources of water for public water systems. Therefore, the use of wastewater treatment plant (WWTP) effluent, even with additional treatment, requires an exception.

Based on the TCEQ's review, the City's previous and recent treatment scenarios are classified as DPR. Since the City began evaluating the proposed DPR project in 2000 several things have occurred that impact the TCEQ's current review and approval of IPR and DPR projects. Please see the TCEQ's DRAFT document, ENCLOSURE A: Indirect Potable Reuse and Direct Potable Reuse, regarding review considerations since rules have not been established or adopted for reviewing these types of projects.

Previously Granted Exceptions to Use Zenon ZeeWeed® Membranes

The City previously piloted the Zenon ZeeWeed® 500-B (with 650 square-feet) and ZeeWeed® 1000 CP5 (with 350 square-feet) HF UF membranes for treating the wastewater effluent from the RRWWTP in 2001. The TCEQ granted an exception in our letter dated July 31, 2002, with specified design and operating conditions for the Zenon ZeeWeed® 500-B and the ZeeWeed® 1000-CP5 version of HF UF membranes. The TCEQ understands that these Zenon products are no longer readily available. In addition, the City has requested alternate treatment scenarios different from the previously granted exceptions. Based on this information, **the exceptions previously granted to the City in our letter dated July 31, 2002 are no longer valid** for the City's proposed DPR project to use the Zenon ZeeWeed® 500-B or ZeeWeed® 1000 CP5 HF UF membranes.

Response to Questions Raised in Your May 7, 2012 Letter and April and May 2012 Meetings

In 2007 and 2008, the City piloted the Pall Microza® UNA-620 HF MF membrane, Siemens Memcor® S10V HF UF membrane, and GE Zenon ZeeWeed® 1000 CPX-0.80 UF HF membrane. We have reviewed the TCEQ's previous correspondence related to the three membrane reports received on August 20, 2009 and your May 7, 2012 letter and associated documents. We have addressed questions from your May 7, 2012 letter and questions raised during the two meetings with TCEQ staff below and in this letter's Enclosures.

1. Proposed Revision of the City's DPR Project

Previously the City proposed to discharge RRWWTP effluent treated by coagulation and HF membranes into the City's Secondary Reservoir that receives raw surface water from Lake Kickapoo and Lake Arrowhead. From the Secondary Reservoir, this blend of HF membrane treated wastewater effluent and raw surface water was to be pumped to the City's Cypress SWTP and/or gravity flow to the Jasper SWTP's Pre-Sedimentation Basin approximately six miles away. Chlorine dioxide is injected into both pipelines leaving the Secondary Reservoir.

The City's current proposal requests approval of two different treatment scenarios to address Stage IV Drought Disaster conditions. In order to approve either treatment scenario, additional data is needed as outlined below.

Treatment Scenario A proposes to discharge 5.0 million gallons per day (MGD) of RRWWTP effluent treated by coagulation and HF membranes into the Jasper SWTP's Pre-Sedimentation Basin to achieve a theoretical plug-flow blending ratio of 1:1 with 5.0-MGD of raw untreated water from Lake Kickapoo and/or Lake Arrowhead. The Jasper SWTP's operation would be reduced from 24.5 MGD to 10.0 MGD to achieve a proposed one-day theoretical detention time in the Pre-Sedimentation Basin. The Jasper SWTP would provide conventional surface water treatment with lime softening.

Additional Information Needed for the TCEQ Staff to Complete the Review of Treatment Scenario A:

- Please provide supporting documentation to show that the Pre-Sedimentation Basin will achieve plug-flow (a baffling factor of 1.0), a one-day hydraulic detention time, and 1:1 blending ratio for the two source waters.
- Please provide documentation that natural biological treatment processes occur. Demonstrate that the chlorine dioxide treated water from the Secondary Reservoir has not eliminated biological life necessary for a natural treatment process to occur.
- Please provide a list of any additional treatment processes to those currently provided at the Jasper SWTP the City will use to achieve at least the following total removal and inactivation:
 - 8.0-log removal and/or inactivation of viruses;
 - 6.0-log removal and/or inactivation of Giardia;
 - 5.5-log removal and/or inactivation of Cryptosporidium (less treatment may be required based on a review of additional source water monitoring results);
 - A reduction in detected regulated drinking water standards to levels below the maximum contaminant level for each constituent. Please include any data the City has demonstrating reduction of unregulated contaminants of emerging concern (CEC). Please see ENCLOSURE B: Chemical and Microbiological Data.
- Please see ENCLOSURE A: Indirect Potable Reuse and Direct Potable Reuse and ENCLOSURE C: Cryptosporidium Monitoring of this letter for additional information the TCEQ will be considering for the City's reuse project.
- Please include copies of other reuse studies and any other information that you and the City believe the TCEQ should take into consideration during our review of this treatment scenario, including information regarding the proposed blended source waters' quality prior to treatment at the Jasper SWTP. The water analyses should include the constituents listed in ENCLOSURE B: Chemical and Microbiological Data.

Treatment Scenario B proposes to discharge 5.0 MGD of RRWWTP effluent *without* treatment by coagulation and HF membranes into the Jasper SWTP's Pre-Sedimentation Basin to achieve a theoretical plug-flow blending ratio of 1:1 with 5.0-MGD of raw untreated water from Lake Kickapoo and/or Lake Arrowhead. It was not indicated if the Jasper SWTP's operation would be reduced from 24.5 MGD. The Jasper SWTP would provide conventional surface water treatment and lime softening. The potential need for additional treatment of the blended source waters would be based on proposed testing of the blended source waters for *Cryptosporidium*.

Additional Information Needed for the TCEQ Staff to Complete the Review of Treatment Scenario B:

- TCEQ staff understands that this scenario is proposed based on your and the City's assertion that the RRWWTP effluent is of higher quality than the raw surface water. In order for the TCEQ to complete the review of this scenario and verify that the public's health, safety and welfare will be protected in accordance with the requirements of the Texas Health and Safety Code (THSC) §341.0315, please provide:

- Chemical and microbiological data for the RRWWTP effluent (see ENCLOSURE B: Chemical and Microbiological Data):
 - Additional *Cryptosporidium* monitoring results (see ENCLOSURE C: Cryptosporidium Monitoring);
 - Please provide the RRWWTP effluent water quality data in a comparison table with the water quality from the Secondary Reservoir; and
 - Please provide supporting information for how the treatment proposed in this scenario provides adequate protection of public health. Please see ENCLOSURE A: Indirect Potable Reuse and Direct Potable Reuse and the total removal and inactivation requirements discussed under our response to Treatment Scenario A.
- Please include copies of other alternate-site reuse studies with a comparison table of the City's and alternate-site's wastewater effluent qualities and any other information that you and the City believe the TCEQ should take into consideration during our review of this treatment scenario, including information regarding the proposed blended water quality prior to treatment.

2. Nitrate Reduction

In our December 1, 2009 letter, the TCEQ requested information on how the City planned to reduce the nitrate levels in the DPR Plant's effluent. Your letter states that the City plans to install an anoxic zone at the RRWWTP for nitrate removal.

During the June 6, 2012 meeting this proposed WWTP modification was discussed with Mr. Louis Herrin, III, P.E., TCEQ Water Quality Division. Mr. Herrin indicated that notification should be sent to Mr. Firoj Vahora, TCEQ Municipal Wastewater Permits. If you or the City have additional questions regarding this WWTP modification, please contact Mr. Vahora at (512) 239-4540 or by correspondence at the following address:

Municipal Wastewater Permits – MC 148
Texas Commission on Environmental Quality
P.O. Box 13087
Austin, Texas 7811-0387

3. *Cryptosporidium* Monitoring

In our December 1, 2009 letter, the TCEQ requested *Cryptosporidium* monitoring results for the City's existing raw surface water (Lake Kickapoo and Lake Arrowhead) in a comparison table with the monitoring results for each of the three piloted HF membranes filtrate so that we might complete our review. Your letter reports that this data was not collected during the 2007-2008 pilot studies for the tested HF membranes. Your letter did include the results of eight *Cryptosporidium* samples collected from the RRWWTP's effluent between February 15 and April 23, 2012.

To support the City's proposed DPR treatment processes for Treatment Scenario A, please submit the data listed in ENCLOSURE C: Cryptosporidium Monitoring in the format requested with all laboratory analytical sheets.

ENCLOSURE C: Cryptosporidium Monitoring also contains our evaluation of the submitted *Cryptosporidium* results for the RRWWTP's effluent.

In the June 6, 2012 meeting, you asked whether the City could sample the RRWWTP effluent more frequently than twice a month. The sampling schedule and dates for raw water source monitoring and frequencies are contained in 30 TAC §290.111(b). There is not a federal or TCEQ rule that prevents the City from sampling the RRWWTP's effluent more than once a month. However, while the more frequent *Cryptosporidium* monitoring of the RRWWTP's effluent does allow for a larger sample data set to be evaluated, it does not provide information on how much variability a raw water source has over four seasons (365 continuous days). The TCEQ will consider making a Bin Classification based on twelve (12) months of data to ensure seasonal variability is considered in the classification.

4. HF Membrane Sensitivity and Resolution Calculations Used for Microbial Control

In Item No. 4 of the TCEQ's December 1, 2009 letter (see ENCLOSURE D: Requested Membrane Specific Sensitivity and Resolution Pilot Study Data), additional data was requested by the TCEQ to verify that Pall, GE-Zenon, and Siemens used TCEQ acceptable values and equations that verified the sensitivity of the direct integrity tests (DITs) conducted during the pilot studies. Our letter also requested confirmation that the DITs were conducted at a resolution to detect a 3.0-micron defect as required in federal and state rules and set forth in the US EPA's Membrane Filtration Guidance Manual – EPA 815-R-06-009, November 2005 (EPA MFGM).

In Item Nos. 4, 6, 7 and 8 of your May 7, 2012 letter, you responded that Mr. David Williams, P.E., TCEQ Technical Review & Oversight Team, is currently reviewing Challenge Test Reports for two of these membranes. You also reference Table 4-1 in both the Pall UNA-620A and Siemens Memcor S10V Reports for the requested data. Additionally you stated that a GE Zenon ZeeWeed® 1000 CPX-0.95 membrane Challenge Test Report will be submitted for approval to TCEQ on another Texas project by CDM Smith.

The data requested in Item No. 4 of the TCEQ's December 1, 2009 letter was not available in the referenced tables of the submitted pilot study reports. Both challenge test and pilot study reports require separate TCEQ reviews and approvals. The TCEQ requested data is specific to the MF and UF membrane pilot studies. Challenge tests are product-specific evaluations that are not related to the work conducted during the pilot studies. Please reference Chapter 3 of the EPA MFGM for more information on challenge testing of HF membranes. Please submit all of the information requested in ENCLOSURE D: Requested Membrane Specific Sensitivity and Resolution Pilot Study Data of this letter.

Please see our comments from the TCEQ's December 1, 2009 letter regarding TCEQ's review of the submitted Reports are contained in ENCLOSURE F: Review of 2009 Pilot Study Reports.

5. Zenon ZeeWeed® 1000 HF UF membranes with CPX-0.80 and CPX-0.95 Fibers

Your May 7, 2012 letter states that GE Zenon no longer makes the ZeeWeed® 1000 modules with CPX-0.80 fibers piloted in 2007 and 2008 and requested the TCEQ's approval to use ZeeWeed® 1000 modules with the CPX-0.95 fibers. Based on our review of the documents referenced in ENCLOSURE G: Comparison of GE Zenon 1000 CPX-0.80 and CPX-0.95 Fibers, the TCEQ will **grant** this request for substitution under the following conditions (if the GE-Zenon ZeeWeed 1000 CPX-0.95 UF HF membrane is selected for full-scale design):

- When submitting data requested under Item No. 4 above, of this letter, and in ENCLOSURE D: Requested Membrane Specific Sensitivity and Resolution Pilot Study Data, the CPX-0.80 fiber values must be used;
- The full-scale design must take into account that additional CPX-0.95 modules will be required to achieve the same flow rate because of their smaller total surface area;
- The required full-scale concentration $\times$ time (CT) study using a CPX-0.95 must include the following:
 - A volumetric concentration factor (VCF) study for the GE Zenon ZeeWeed® 1000 CPX-0.95 that supports the previously received VCF value. Since a submerged system that utilizes periodic backwash procedures can potentially re-suspend particles and increase the concentration of suspended material on the feed-side of the membranes, the study should support a VCF of 1.1.
 - A liquid-membrane contact angle (θ) value of 50.3-degrees.

In accordance with 30 TAC §290.39(l) requirements for exceptions to the TCEQ's Rules, any public water system which requests an exception must demonstrate to the executive director that the exception will not compromise public health or result in a degradation of service or water quality. Any exception granted is subject to revocation. The executive director may establish site specific design, operation, maintenance, and reporting requirements for systems that have been granted an exception.

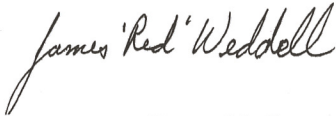
The TCEQ understands the urgency of this project and is committed to working with you to expedite our responses to your questions and submittals.

Ms. Susan Crawford, P.E.
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If you have any questions concerning this letter or if we may be of further assistance, please contact James "Red" Weddell, P.E., by email 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

Sincerely,



James "Red" Weddell, P.E.
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Plan and Technical Review Section
Water Supply Division
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Plan and Technical Review Section
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Enclosures: ENCLOSURE A: Indirect Potable Reuse and Direct Potable Reuse
ENCLOSURE B: Chemical and Microbiological Data
ENCLOSURE C: Cryptosporidium Monitoring
ENCLOSURE D: Requested Membrane Specific Sensitivity and Resolution Pilot Study Data
ENCLOSURE E: TCEQ Approved Membrane Specific Values
ENCLOSURE F: Review of 2009 Pilot Study Reports
ENCLOSURE G: Comparison of GE Zenon 1000 CPX-0.80 and CPX-0.95 Fibers
ENCLOSURE H: Separation Distances Between Reuse Piping From Wastewater Piping and From Potable Water Piping

cc w/enclosures: The Honorable Glenn Barham, Mayor, City of Wichita Falls, P.O. Box 1431,
Wichita Falls, TX 76307-1431
Mr. Daniel Nix, Public Utilities Operations Manager, City of Wichita Falls,
P.O. Box 1431, Wichita Falls, TX 76307-1431