

From: Linda Brookins
Sent: Tue, 5 May 2015 22:57:32 +0000
To: David Slone (dws@freese.com)
Cc: Marlo Berg; Jennelle Crane; Karen Smith; Joel Klumpp; Cari-Michel Lacaille; Eria Harvey; Russell Schreiber (russell.schreiber@wichitafallstx.gov); Daniel Nix (daniel.nix@wichitafallstx.gov); Mark Southard (mark.southard@wichitafallstx.gov); Shawn Garcia; Vera Poe
Subject: RE: Wichita Falls Request to Blend Lake Kemp water with DPR
Attachments: Wichita Falls_Exception Letter.pdf, Enclosure A _ List of Conditions_Wichita Falls.pdf, Exception Enclosure B.pdf, Wichita Falls CT Study Letter.pdf

David,

In response to the requests in your emails dated March 10 and April 30, 2015, please see the attached draft TCEQ conditional approval letter and enclosures. Our letter and enclosures address changes to the City of Wichita Falls Direct Potable Reuse (DPR) project, including:

- Final conditional approval of the ultraviolet light (UV) disinfection system;
- Conditional approval of the use of Kemp water as a source for the DPR project;
- Revised contact time (CT) study approval letter for the Cypress Temporary DPR Water Treatment Plant; and
- Necessary amendments to our August 5, 2014 conditions of approval for the DPR project to reflect the UV disinfection system and new source. [The highlights within the letter represent the changes made to the August 5, 2014 conditions based upon the city's latest request.](#)

In response to comments from the City during our April 30, 2015 teleconference, we have amended our conditional approval of the phased approach to incorporate water from Lake Kemp by shortening the minimum required duration of your originally proposed Phase 2 from two months to 30 days. We understand the City's concern that the faster they can utilize water from Lake Kemp, the faster they can transition away from their current level of reliance on Lakes Arrowhead and Kickapoo.

Please review the draft letter and enclosures. Per the City's request, our review of your submittals was expedited and we are committed to getting the final version of this letter and enclosures to the City as soon as possible.

Please let me know if you have any questions.

Sincerely,

Linda Brookins, Director
Water Supply Division
Texas Commission on Environmental Quality
P.O. Box 13087
Austin, Texas 78711-3087
(512) 239-4625

From: David Sloan [<mailto:DWS@freese.com>]

Sent: Thursday, April 30, 2015 5:59 PM

To: Joel Klumpp; Linda Brookins

Cc: Russell Schreiber (Wichita Falls); Daniel Nix (Wichita Falls); Mark Southard (mark.southard@wichitafallstx.gov); Shawn Garcia

Subject: FW: Wichita Falls Request Amendment

Importance: High

Joel & Linda: On behalf of the City of Wichita Falls, we appreciate your team's priority review of the City's request to incorporate blending of Lake Kemp water into the City's current DPR operation. It was very helpful to have the discussion this afternoon regarding the planned contents of TCEQ's modified approval. As we considered the impact of the increased time frames for Phase 1 and 2, it became apparent that the relief to the City's reliance on Lakes Arrowhead and Kickapoo would be later than hoped, even with the timely approval which now appears imminent.

We therefore respectfully request that the City be allowed to resume operation of the DPR facility at its current flow of 7.5 MGD following the first month of Phase 2. This will allow up to 7.5 MGD of effluent from River Road WWTP to be transferred and treated through the 2008 membrane facility along with up to 3.75 MGD of raw water from Lake Kemp, producing up to 7.5 MGD of RO permeate with UV disinfection. This would be blended with at least 2.5 MGD of water from the Secondary Reservoir (Arrowhead/Kickapoo) to comply with the maximum contribution from River Road effluent. We note the following in support of this approach:

1. This approach will allow testing the most challenging blend (50% reclaim/50% Lake Kemp) in the membrane facility for the first 2 months.
2. As effluent contribution returns to the current amount, the salinity of the raw water blend will decrease.
3. This will allow the City to resume maximized use of their available effluent, as they have successfully for the past 10 months.
4. TCEQ will retain its oversight of the facility performance before approving the final, more flexible operation proposed as Phase 3.

Please contact me if you have any questions regarding this request.

Best regards,

DAVID W. SLOAN, P.E., BCEE
SENIOR PROCESS ENGINEER
BOARD CERTIFIED ENVIRONMENTAL ENGINEER

From: David Sloan [<mailto:DWS@freese.com>]

Sent: Tuesday, March 10, 2015 11:50 AM

To: Joel Klumpp; Vera Poe

Cc: Russell Schreiber (Wichita Falls); Brad B. Castleberry (Lloyd, Gosselink); Daniel Nix (Wichita Falls)

Subject: Wichita Falls Request to Blend Lake Kemp water with DPR

Joel & Vera:

Attached is the submittal package for the Wichita Falls Lake Kemp supply integration, as we discussed at our meeting in your offices in January. We are also providing 3 hard copies by mail. Included are the following:

1. Transmittal letter.
2. Sealed Engineering Report.
3. Updated CT studies (for River Road WWTP source and Headquarters Road PS source [Lake Kemp])
4. Proposed Modifications to DPR Conditions (with explanatory comments)
5. Plans & specs submittal review form
6. Supplemental pump station drawings
7. Pump specification

As noted in the transmittal letter, the City is eager to incorporate this source and would welcome a meeting with your staff to discuss this and work out any details. Please contact me if there are questions regarding the attached documents or the overall plan.

Best regards,

DAVID W. SLOAN, P.E., BCEE
SENIOR PROCESS ENGINEER
BOARD CERTIFIED ENVIRONMENTAL ENGINEER



WATER / WASTEWATER TREATMENT & REUSE
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EMAIL: dws@freese.com

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May <>, 2015

Mr. David W. Sloan, P.E.
Freese & Nichols, Inc.
4055 International Plaza, Suite 200
Fort Worth, TX 76109-4895

Re: City of Wichita Falls - Public Water System ID No. 2430001
Conditional Approval of the Temporary Cypress Direct Potable Reuse Project with
Modifications Using Lake Kemp Water as an Additional Source
Plan Review Log No P-04232015-159
Wichita County, Texas

CN600129316; RN105598739

Dear Mr. Sloan:

On March 13, 2015, the Texas Commission on Environmental Quality (TCEQ) received planning materials with your letter dated March 10, 2015 for the proposed Cypress Temporary direct potable reuse (DPR) water treatment plant (WTP) operational modifications. The City of Wichita Falls (City) proposes to blend and concurrently treat the wastewater effluent from the City's River Road Wastewater Treatment Plant (RRWWTP) and Lake Kemp water through the City's Cypress Temporary DPR WTP before the microfiltration/reverse osmosis (MF/RO) membrane units, and credit the Lake Kemp blending as a substitute for all or a portion of the current Secondary Reservoir (Lake Arrowhead and Lake Kickapoo) blending. Total finished water from the DPR WTP derived from wastewater effluent will remain at or below 50.00%.

On April 1, 2015, TCEQ received ultraviolet light (UV) disinfection system Standard Operating Procedures (SOPs) followed by an additional SOP and alarm & shutdowns conditions for Full Scale Operations Version 5.4 on April 23, 2015. This material was submitted to satisfy requirements 5 and 6 of the TCEQ letter dated March 10, 2015 concerning final approval of the UV system. The material submitted is satisfactory and all conditions of the TCEQ letter dated March 10, 2015 have been met. The UV system is **approved for use**.

The conditional approval package for Full-Scale Operation of the Temporary Direct Potable Reuse Project dated August 5, 2014 is replaced with this letter and enclosures except that the following enclosures from the August 5, 2014 letter remain unchanged and remain in effect:

Enclosure C: CT Study Letter for the Cypress 2010 Water Treatment Plant
Enclosure E: Revised Direct Integrity Test Letter

- Enclosure F: Updated Use of Chloramines Exception Letter
- Enclosure G: Unregulated Contaminants of Concern
- Enclosure H: Industrial Contributions to the RRWWTP
- Enclosure I: Full Scale Verification Test (FSVT) 2 Discussion
- Enclosure J: Cypress 2010 WTP 10 Million Gallon Ground Storage Tank Sample Analysis

Project Description

Because of the ongoing drought, the City has been supplementing its water supply with the temporary reuse of wastewater effluent from the City's RRWWTP as source water for the Cypress Temporary DPR WTP. The project uses the existing Cypress 2008 WTP and Cypress 2010 WTP in series to create the Cypress Temporary DPR WTP.

The treated wastewater from the RRWWTP is delivered to the Cypress Temporary DPR WTP via a temporary pump skid located at the RRWWTP. From the temporary pump station, the treated wastewater is delivered through approximately 12 miles of high-density polyethylene above-ground temporary transmission line. The effluent enters the Cypress Temporary DPR WTP through an existing flow control valve vault located prior to the 2008 WTP clarifier. The proposed modifications include introducing Lake Kemp water to be blended and mixed with the RRWWTP effluent in the existing flow control valve vault.

The Cypress Temporary DPR WTP will treat the blended RRWWTP effluent and Lake Kemp water using MF/RO. The treated water from the MF and RO membrane units will pass through the recently installed UV disinfection system before it is further blended with untreated surface water from the Secondary Reservoir at a location upstream of the existing Cypress 2010 WTP splitter box. The blended water will then be treated through the existing conventional Cypress 2010 WTP prior to entering the distribution system. The finished blend of water distributed from the Cypress Temporary DPR WTP will include less than 50.00% treated wastewater effluent from the City's RRWWTP, with the remaining source water from Lake Kemp and the Secondary Reservoir sources.

Current DPR WTP Regulatory Monitoring Locations, Frequency, and Action Levels

Enclosure A lists the City's temporary exceptions granted for the Cypress Temporary DPR WTP with the approval conditions. Changes to the enclosure are highlighted in grey. Enclosure B of this letter is the updated figure depicting the TCEQ-required regulatory monitoring locations, frequency, and action levels for the modified Temporary DPR Project. Please submit a copy of the City's revised Monitoring Plan for the Temporary DPR WTP for our records.

Revised CT Study

The City submitted a proposed disinfection protocol for the modified Cypress Temporary DPR WTP. Enclosure D of this letter is the revised contact time (CT) study approval letter for the Cypress Temporary DPR WTP. The City must follow all requirements included in both CT study approval letters.

Phased Approach and Blending Plan

The approved blending plan consists of multiple phases:

Phase 1

Phase 1 must be conducted for a period of **30 days**. This phase will verify continued consistent operation of membrane and conventional treatment processes and involves blending 3 million gallons per day (MGD) of wastewater effluent from the City's RRWWTP and 3 MGD of Lake Kemp raw water. This blend is expected to yield 4 MGD of permeate to the backwash lagoon. The permeate will be combined with an equal or greater amount (4 MGD) of raw water from the Secondary Reservoir. This 8 MGD blend will be treated using the existing conventional 2010 SWTP prior to entering the distribution system. **If any shutdown conditions are encountered, TCEQ must be immediately notified to discuss whether the phase can be continued.**

After two weeks of Phase 1, *Crypto*, *Giardia*, and viruses must be sampled at both the RRWWTP and the Entry Point. The results should be provided to TCEQ after the City has received, reviewed, and compiled the results into a submittal. The TCEQ acknowledges that the virus results will be provided at a later date than the other results due to longer laboratory analytical requirements. The system **must notify** TCEQ, but **may continue to Phase 2A after 30 days of run time.**

Phase 2A

Phase 2A must be conducted for a minimum of **30 days**. **If any shutdown conditions are encountered, TCEQ must be immediately notified to discuss whether the phase can be continued.** In Phase 2A, the flows from Lake Kemp and the RRWWTP can increase to 3.75 MGD each, which is approximately the current flow of the MF and RO membrane units and UV reactors. Permeate from the MF and RO membrane units and UV reactors is expected to stabilize at approximately 5 MGD, which will be blended with an equal amount of water from the Secondary Reservoir. **After two weeks of Phase 2A, *Crypto*, *Giardia*, and viruses must be sampled at both the RRWWTP and the Entry Point.** The results should be provided to TCEQ after the City has received, reviewed, and compiled the results into a submittal. The TCEQ acknowledges that the virus results will be provided at a later date than the other results due to longer laboratory analytical requirements. At the end of the 30-day duration of Phase 2A, all available sampling data required in the Enclosure A Reporting section must be submitted for TCEQ's review including the items detailed in the bullet list on the next page (under 'Reporting Requirements'). The system **cannot start Phase 2B** until all data generated during Phases 1 and 2A are submitted by the City and reviewed and approved by the TCEQ. **The TCEQ has not approved the continuation to Phase 2B at this time.**

Phase 2B

Per discussion with you and the City on April 30, 2015 and as documented in your email of the same date, you requested to modify your original submittal by adding an additional phase. You requested that the City be allowed to maintain flow from Lake Kemp at 3.75 MGD but increase flow from the RRWWTP to 7.5 MGD, producing up to 7.5 MGD of RO permeate with UV disinfection. This would be blended with at least 2.5 MGD of water from the Secondary Reservoir. The finished blend of water to distribution from the Cypress Temporary DPR WTP would include less than 50.00% treated wastewater effluent from the City's RRWWTP and 50.00% or more treated water from Lake Kemp and the Secondary Reservoir sources.

Phase 3

Phase 3 will gradually substitute contribution from the Secondary Reservoir with additional intake from Lake Kemp to be treated at the Cypress Temporary DPR WTP. The finished blend of water to distribution from the Cypress Facility will include less than 50.00% treated wastewater effluent from the City's RRWWTP and 50.00% or more treated water from Lake Kemp and the Secondary Reservoir sources. **The TCEQ has not approved the continuation to Phase 3 at this time.**

Phase 1 and 2A Reporting Requirements

Weekly Reporting Requirements:

During Phase 1 and 2A, the City must submit by email the following data weekly on Mondays by noon:

- Calculated log removal credits for both the Cypress Temporary DPR WTP and the Cypress 2010 WTP once every 8 hours;
- Microfilters - Daily DIT results, 5-minute turbidity readings with max turbidity noted for all microfilters;
- Conventional Filters – IFE: 15-minute readings with max turbidity noted for each filter, CFE: 15-minute readings with max turbidity reading noted, IFE and CFE credit awarded;
- UV – UVT, flow, lamp status, and validated UV dose – 15-minute readings with Max and Min reading for each day;
- The surface water monthly operating reports (SWMORs) for the week; and
- All required reporting in Enclosure A, No. 57 – Addendum to the SWMOR.

Please send the emails to:

- Jennelle Crane at Jennelle.Crane@tceq.texas.gov and
- Joel Klumpp at Joel.Klumpp@tceq.texas.gov.

Monthly Reporting Requirements – based on start date:

At the end of the 30-day duration of Phases 1 and 2A (at days 30 and 60), please submit to TCEQ:

- All sampling results indicated in Enclosure A - Reporting Section;
- A graph of each MF unit's performance showing temperature adjusted flux, transmembrane pressure, filtrate turbidity, and indicating any clean-in-places performed;
- Graphs of each RO unit's performance showing flux, temperature, net driving pressure, filtrate total dissolved solids, filtrate nitrate levels, and an indication of any clean-in-places performed; and
- A list of any pinning activity for the MF units.

Please submit this information to:

Plan and Technical Review Section MC-159
Attn: Wichita Falls Project Team

Mr. David W. Sloan, P.E.
Page 5 of 7
May <>, 2015

Texas Commission on Environmental Quality
P.O. Box 13087
Austin, Texas 78711-3087

Monthly Reporting Requirements – SWMOR and Addendum:

By the tenth day of the month following the end of the normal reporting period submit to TCEQ:

- The SWMORs; and
- The required supplemental DPR monthly information.

Please submit the SWMORs and supplemental information to the usual address for SWMOR submittals.

Phase 2B and 3 Reporting Requirements

Reporting requirements for Phases 2B and 3 will be determined after complete review of Phase 1 and 2A information.

If you have any questions regarding this letter or need further assistance, please contact Mr. Joel Klumpp at (512) 239-4453 or by e-mail at joel.klumpp@tceq.texas.gov or Vera Poe at (512) 239-6988 or by e-mail at vera.poe@tceq.texas.gov.

Sincerely,

Joel Klumpp, Manager
Plan & Technical Review Section
Water Supply Division
Texas Commission on Environmental Quality

Vera Poe, P.E., Team Leader
Utilities Technical Review Team
Plan & Technical Review Section
Water Supply Division
Texas Commission on Environmental Quality

Linda Brookins, Director
Water Supply Division
Office of Water
Texas Commission on Environmental Quality

LB/JPK/VP/cas/

Enclosures:

Mr. David W. Sloan, P.E.

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May <>, 2015

Enclosure A: Revised List of Conditions for the Temporary DPR WTP

Enclosure B: Revised Current DPR WTP Regulatory Monitoring Locations, Frequency,
and Action Levels

Enclosure D: Revised CT Study Letter for the Cypress Temporary DPR Water
Treatment Plant

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

City of Wichita Falls, Attn: Mr. Darron Leiker, City Manager, 1300 7th Street, Wichita
Falls, TX 76301

City of Wichita Falls, Attn: Daniel K. Nix, Utilities Operations Manager, P.O. Box 1431,
Wichita Falls, Texas 76307-1431

DRAFT

Enclosure A
List of Conditions, May <>, 2015
City of Wichita Falls - PWS 2430001
Cypress Temporary Direct Potable Reuse WTP - 410791

Due to the ongoing drought, the City of Wichita Falls (City) will augment its water supply with the temporary reuse of wastewater effluent from the City of Wichita Falls River Road Wastewater Treatment Plant (RRWWTP) as source water for the Cypress Temporary Direct Potable Reuse (DPR) Water Treatment Plant (WTP). The project utilizes the existing Cypress 2008 and 2010 Water Treatment Plants (WTPs) located at the Cypress Water Treatment Plant (WTP) facility to create the Cypress Temporary DPR WTP.

EXCEPTIONS

1. The use of RRWWTP effluent as a raw water source and the associated treatment processes for a DPR WTP require exceptions to Title 30 of the Texas Administrative Code (30 TAC) Chapter 290, Subchapter D regulations. The TCEQ staff review requests for exceptions to ensure that a public water system will provide safe quality and adequate quantity of drinking water to their customers as required by the Texas Health and Safety Code (THSC) §341.0315(a).

The conditional granting of these temporary exceptions ~~is valid for the duration listed in the associated cover letter.~~ Listed below are the City's temporary exceptions granted for the Cypress Temporary DPR WTP used to produce potable drinking water for distribution:

- a. The use of RRWWTP effluent in lieu of groundwater or surface water as a source of water for a public water system [30 TAC §290.41];
 - b. The use of the Cypress Temporary DPR WTP equipment and piping in the proposed configuration which includes common walls between areas carrying water in prior stages of treatment [30 TAC §290.42(d)(2)];
 - c. The use of pre-formed chloramines as a pre-disinfectant [30 TAC §290.42(e)(3)(G)];
 - d. The use of chloramines for inactivation credit [30 TAC §290.42(e)(3)(G)];
 - e. Micro-filtration (MF) membranes for removal of pathogens [30 TAC §290.42(g)(3)];
 - f. Reverse osmosis (RO) membranes for the removal of primary and secondary drinking water chemical contaminants [30 TAC §290.42(g)];
 - g. Post-RO membrane pH adjustment [30 TAC §290.42(g)]; and
 - ~~h. The use of ultraviolet light (UV) for pathogen removal [30 TAC §290.42(g)(5)];~~
2. Please be aware that these conditionally granted temporary exceptions, and any exceptions granted in the future, **are subject to TCEQ revision or revocation if:**
 - a. Monitoring results, on-site alarms, or other data indicate that the Cypress Temporary DPR WTP is producing a finished water quality—after all removal, chemical treatment, and blending—that is a potential risk to public health;

- b. The U.S. Environmental Protection Agency (EPA) revises the allowable maximum contaminant levels (MCLs) for existing regulated contaminants or establishes MCLs or treatment technique requirements for chemical or microbiological contaminants that are currently unregulated;
 - c. Substantiated data becomes available establishing a public health risk for one or more unregulated contaminants at a specified concentration level in drinking water; or
 - d. The City fails to comply with one or more of the conditions of the temporarily granted exceptions.
3. All of the TCEQ's and EPA's regulations that apply to surface water treatment plants also apply to the City's Temporary DPR WTP. In addition to the TCEQ and EPA drinking water regulations, **this enclosure includes the minimum site-specific requirements for the granted exceptions for the Cypress Temporary DPR WTP to use RRWWTP effluent as source water** meant for human consumption. The following conditions are TCEQ site-specific minimum operation, design, reporting, calibration, and record keeping requirements for the Cypress Temporary DPR WTP facility which will produce drinking water and are based on the full-scale verification study data supplied by the City.

OPERATIONAL REQUIREMENTS WITH SHUTDOWN CONDITIONS

4. The City's Cypress Temporary DPR WTP may only discharge water into the City's distribution system when all of the following conditions have been met. These conditions are in addition to the EPA and TCEQ public drinking water or other rules and are **the minimum site-specific requirements for the granted exceptions for the proposed temporary DPR WTP to use RRWWTP effluent as source for water**. If any of the conditions are not met, the plant or unit must be shut down until all the conditions are met.

The conditions are:

- a. The City's Cypress Temporary DPR WTP must provide at least a total 9.0-log removal and/or inactivation of viruses; a total 8.0-log removal and/or inactivation (including at least 2.0-log of inactivation) of *Giardia*; and a total 5.5-log removal and/or inactivation of *Cryptosporidium*. If the disinfection or removal barriers do not meet the required parameter(s), resulting in the plant providing less treatment than required, the plant must be taken off line, corrective actions taken, and the Cypress Temporary DPR WTP must not be returned to service until the failed parameter(s) is within the appropriate range.
- b. All of the RRWWTP influent must pass through each of the treatment units, including the entire RRWWTP process, sedimentation, MF, RO, **DV** blending with raw surface water, secondary sedimentation, conventional filtration, and disinfection. If water bypasses a unit process, the entire Cypress Temporary DPR WTP must be shut down until the bypass is corrected, and TCEQ has approved the corrective action.

- c. The RRWWTP effluent turbidity must remain below 24 Nephelometric Turbidity Units (NTU) at all times. If the RRWWTP effluent turbidity level is at or above 24 NTU, the water from the RRWWTP must not enter the pipeline leading to the Cypress Temporary DPR WTP until corrective action is taken, and the turbidity is below 24 NTU.
- d. The RRWWTP effluent monochloramine residual must be 1.0 milligrams per liter (mg/L) or greater when temperatures are above 16°C and 1.5 mg/L or greater when the temperature is at or below 16°C. If the RRWWTP effluent monochloramine residual is below 1.0 mg/L when temperatures are above 16°C and below 1.5 mg/L when the temperature is at or below 16°C, the water from the RRWWTP must not enter the pipeline leading to the Cypress Temporary DPR WTP until corrective action is taken, and the residual is above the action level.
- e. The *Giardia*, *Cryptosporidium* and virus concentrations in the RRWWTP effluent must not exceed 700 cysts/L, 9.5 oocysts/L, and 22.2 viruses/L, respectively. If the RRWWTP effluent exceeds the concentrations above (when the results are received), the RRWWTP effluent must stop entering the pipeline leading to the Cypress Temporary DPR WTP, and the entire Cypress Temporary DPR WTP must be shut down until TCEQ provides approval to continue.
- f. The *Escherichia coli* (*E. coli*) concentrations in the RRWWTP effluent (after the chlorine contact basin) must be no greater than 75 colony forming units (CFU)/100 mL. If the RRWWTP *E. coli* effluent concentration is above 75 CFU/100 mL (when the results are received), the RRWWTP effluent must stop entering the pipeline leading to the Cypress Temporary DPR WTP and the entire Cypress Temporary DPR WTP must be shut down until corrective action is taken and the *E. coli* levels return to below 75 CFU/100 mL.
- g. A direct integrity test (DIT) must be performed on **each membrane unit** at a frequency of **no less than once each day** that the unit is in operation. All DITs must be conducted using a sensitivity of 2.8-log and a resolution capable of detecting a 3.0 micron breach using the parameters approved by TCEQ in Enclosure E. If a MF membrane unit fails a DIT, it must be taken off-line immediately, inspected and, if necessary, repaired. The MF membrane unit cannot be returned to service until the inspection and any needed maintenance have been performed and the unit passes a subsequent DIT.
- h. If salt rejection $[(\text{total dissolved solids (TDS)}_{\text{-Feed}} - \text{TDS}_{\text{-Product}}) / (\text{TDS}_{\text{-Feed}}) \times 100]$ for a single RO unit decreases by more than 10% over the unit's acceptable daily salt rejection average from the previous day, then the RO unit must be removed from service. The unit must have any problems repaired and retested until the salt rejection returns to within 10% of the unit's acceptable daily salt rejection total from the previous day before the RO unit can resume discharging to the next stage of treatment. The monthly average of the unit's salt rejection must not decrease 5% or more from the previous month's average of acceptable daily salt rejection levels.

- i. The nitrate levels of each RO unit's permeate must be below 10 mg/L. If any of the 8-hour sample results show the nitrate level to be at or above 10 mg/L then the unit must be taken off line, inspected, and, if necessary, repaired. The unit cannot be returned to service until the level of nitrate is below 10 mg/L.
- j. The percentage of finished water from the Cypress WTP originating as RRWWTP effluent must be no greater than 50.00%. This calculation shall consider the impact of surface water, Lake Kemp, blending occurring prior to the MF/RO treatment process as well as the blending of surface water from the secondary reservoir with RO permeate. No single instantaneous 15-minute reading may be above 55.00% and the 2-hour averages of 15-minute readings must be below 50.00%. The 2-hour averages begin at midnight and continue every 8 readings (i.e. 12 am to 1:45 am, 2:00 am to 3:45 am, etc.). If the instantaneous or averaged ratios are above the threshold, then the water from the lagoon to the splitter box or the water from the secondary reservoir must be adjusted to establish a ratio below 50.00%.
- k. The weekly nitrate and nitrite levels at the entry point to the distribution system from the City's Cypress Temporary DPR WTP must be below 10.0 mg/L and 1.0 mg/L, respectively. If the sample results show the nitrate level to be above 10.0 mg/L or the nitrite level to be more than 1.0 mg/L then the facility must be taken off line, inspected, and, if necessary, repaired. The City can only return the plant to service when the nitrate or nitrite levels are below the MCLs.
- l. The weekly *E. coli* concentration levels at the entry point to the distribution system from the Cypress Temporary DPR WTP must be zero (0) most probable number/Liter (MPN/L). If *E. coli* is present at the entry point, the facility must be shut down, inspected and, if necessary, repaired. The City must resample *E. coli* and receive a zero MPN/L concentration before the City's Cypress Temporary DPR WTP can be returned to service.
- m. The twice monthly *Cryptosporidium*, *Giardia* and virus concentration levels at the entry point to the distribution system from the Cypress Temporary DPR WTP must be non-detectable based on a sample volume of at least 15 L and a "fast response" requested for the laboratory. If upon verbal notification from the laboratory, *Cryptosporidium*, *Giardia* or viruses are present at the entry point to distribution, the facility must be shut down, inspected and, if necessary, repaired. The City must resample *Cryptosporidium*, *Giardia* or virus and receive a non-detectable concentration in 15 L of water and the Water Quality Task Force shall be convened to discuss the implications regarding community impacts. The Water Quality Task Force must recommend to TCEQ a return to service and TCEQ must also approve the recommendation before the Cypress Temporary DPR WTP may be returned to service.
- n. The City must provide at least a 3.0-log inactivation of *Cryptosporidium* through the use of UV. If the City produces off-spec water for more than four (4) consecutive hours during a day or for more than 5% of the water produced during a month, the reactor must be taken off-line and the reactors must be inspected and, if necessary, repaired. The UV unit is considered to be operating off-spec when:

- (1) The validated dose falls below the dose needed to achieve 3.0-log inactivation of *Cryptosporidium*;
- (2) the reactor operates at a flow rate that exceeds 25.6 MGD;
- (3) the UV transmittance of the water falls below 70%; or
- (4) one or more of the lamps is inoperable.

NOTIFICATIONS

5. The City must have notified the Technical Review and Oversight Team (MC-159) in writing when the City's Cypress Temporary DPR WTP began distributing treated water.
6. Item No. 4, above, contains the conditions under which the City's Cypress Temporary DPR WTP, or a particular treatment process, must be shut down. Table 1, below, shows the conditions under which the City must notify their retail customers, their wholesale water customers, and the TCEQ of a plant or process shut down, or lack of shut down, due to noncompliance with an item in No. 4. When the City notifies the TCEQ, the TCEQ may determine that the retail and/or wholesale customers need notification, even if that notification is not shown on Table 1.

TABLE 1: CITY CYPRESS TEMPORARY DPR WTP NOTIFICATION REQUIREMENT

Condition	Shutdown Requirement	Notify		
		Retail Customers	Wholesale Customers (PWSs)	TCEQ
4a. Treatment total below <i>Crypto</i> 5.5-log, <i>Giardia</i> 8-log, and virus 9-log	Entire Plant			✓ *
4b. Water bypasses a treatment unit	Entire Plant	✓	✓	✓
4c. Turbidity higher than 24 NTU at RRWWTP and no diversion of WW effluent	Water from RRWWTP	✓	✓	✓
4d. Monochloramine too low at RRWWTP and no diversion of WW effluent	Water from RRWWTP	✓	✓	✓
4e. <i>Crypto</i> , <i>Giardia</i> , virus above limits at RRWWTP	Entire Plant			✓ *
4f. <i>E. coli</i> at RRWWTP above 75 MFN/100 mL	Entire Plant			✓ *
4g. Failing a DIT and continuing to produce water	MF Unit	✓	✓	✓
4h. Having too little salt rejection on a RO unit and	RO Unit	✓	✓	✓

Condition	Shutdown Requirement	Notify		
		Retail Customers	Wholesale Customers (PWSs)	TCEQ
continuing to produce water				
4i. Nitrate above 10 mg/L at a RO unit effluent and continuing to produce water	RO Unit	✓	✓	✓
4j. Ratio above 55% for one reading or with a 2-hour average greater than 50.00%	Adjust pumps			✓ *
4k. Nitrate and nitrite above MCLs at entry point.	Entire Plant	✓	✓	✓
4l. <i>E. coli</i> above zero MPN/L at entry point	Entire Plant			✓ *
4m. <i>Crypto</i> , <i>Giardia</i> , virus above zero or non-detect at entry point	Entire Plant	✓	✓	✓
4n. WTP produces off-spec water for over 4 hours or more than 5% of water in a month				✓ *

* When the City notifies the TCEQ, the TCEQ may determine that the retail and/or wholesale customers need notification, even if that notification is not shown above.

7. Public notice is required for specific situations as described in 30 TAC §290.122
8. If notification is required by Table 1, the TCEQ and the City's retail and wholesale customers must be contacted within 24 hours. The TCEQ shall be contacted by telephone at 1-888-777-3186 or by e-mail at PDWS@tceq.state.tx.us. Within five working days, the City must submit written notification to:

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

The written notification to TCEQ must include:

- a. A detailed description of the problem that required:
 - i. The RRWWTP effluent to be diverted from the Cypress Temporary DPR WTP; or
 - ii. The City's Cypress Temporary DPR WTP, or a particular treatment process, to be taken out of service;
- b. The corrective actions taken; and
- c. The quantity and duration of any unacceptable water discharged to the retail and wholesale customers.

OPERATIONAL REQUIREMENTS WITHOUT SHUTDOWN CONDITIONS

9. The City has chosen to achieve removal credits for *Cryptosporidium* and *Giardia* through the optimization of the granular media filters. To achieve the 1.0-log removal credit the facility must maintain the turbidity under the conditions set in 30 TAC §290.111(g)(1) (for Individual Filter Effluent (IFE)) and §290.111(g)(2) (for Combined Filter Effluent (CFE)). If the conditions of §290.111(g)(1) are not met then the facility cannot receive the additional 1.0-log removal credit for enhanced individual filter performance for the month. If the conditions of §290.111(g)(1) are not met, but those in §290.111(g)(2) are met, then the facility can receive 0.5-log of additional removal credit for enhanced combined filter effluent credit.
10. The City must provide an additional 1.0-log viral inactivation when using pre-formed chloramines (ammonia before chlorine) as a pre-disinfectant. Based on consultation with EPA Region 6 staff, the TCEQ has concluded that 1.0-log of additional viral inactivation will provide an equivalent safety factor to that provided when chlorination precedes ammonia addition. Therefore, using pre-formed chloramines will require at least 9.0-log of total viral removal and inactivation through the Cypress Temporary DPR WTP.
11. The City must conduct conductivity measurements on individual RO pressure vessels to identify pressure vessels which should be investigated on an 8-hour basis. If necessary, based upon the conductivity readings being 20% over the daily average of the entire unit, the individual vessels must be repaired or replaced. No shutdown of units is necessary for this process control parameter.
12. The City has elected to use a Water Quality Task Force to communicate with health officials during the operation of the Cypress Temporary DPR WTP. The Water Quality Task Force must be convened when the triggers for convening the Water Quality Task Force are reached. These triggers are described in section 11 of the City's final engineering report submitted to TCEQ on December 11, 2013 and the Alarm and Shut Down Triggers document submitted as part of the full-scale verification test-2 (FSVT2) report.
13. If the *E. coli* levels at the RRWWTP before the chlorine contact basin are above 15,000 CFU/100 mL, the historical sample that was collected at the same time as the *E. coli* sample yielding the high *E. coli* results will be sent for analysis of *Cryptosporidium* and *Giardia* within 24 hours of the high *E. coli* sample.
14. If the *E. coli* levels at the RRWWTP before the chlorine contact basin are above 30,000 CFU/100 mL the Water Quality Task Force shall convene to discuss the situation.
15. To assure the pipeline from the RRWWTP to the Cypress Temporary DPR WTP is intact, the City shall inspect the pipeline for leaks or illegal taps at least once a day. If a leak or illegal tap is found, the leak or tap must be investigated and repaired/removed as necessary.
16. Because of concerns regarding the potential introduction of contamination into the Lake Kemp/Headquarters Road Reservoir raw water line, the Cypress 1961 WTP and

1987 WTP treatment equipment and associated clearwells and piping, the following conditions must be met:

- a. The Cypress 2008 WTP flow-control vault's valve located on the Lake Kemp/Headquarters Road Reservoir pipeline must continue to remain closed at all times during Cypress Temporary DPR project.
- b. The weir gates in the Cypress Splitter Box to the Cypress 1961 and 1987 WTPs must be maintained closed and:
 - i. Be visually inspected daily for leakage;
 - ii. If leaking from either of these two weir gates is noted, the extent of leakage must be noted for disinfection activities prior to resuming normal operation;
 - iii. As proposed by the City in your July 29, 2013 email, the drain valve in the Cypress 1961 WTP settling basin must be maintained open during the proposed temporary project;
 - iv. The drain valve in the 1987 WTP Parshall flume must be maintained open during the proposed temporary project; and
 - v. The results of the daily inspections and any follow-up inspections must be recorded, kept onsite, and made available to the TCEQ upon request.
17. Operators having both a water and wastewater license may work in the Cypress Temporary DPR WTP and the RRWWTP, but not during the same shift, to prevent the introduction of contaminants.
18. The Cypress Temporary DPR WTP must have a Class B or higher Surface Water (SW) operator onsite when CIP procedures are being conducted on the MF and RO membrane units. A Class B SW operator must be available to respond to alarms and shut-downs caused by the automated control system.
19. A plant operations manual that meets the requirements of 30 TAC §290.42(l) must be kept on site and must be made available to TCEQ staff upon request. The manual shall include the procedures and contact information for the TCEQ and the receiving PWSs.
20. The City must maintain up-to-date standard operating procedures that include actions to be taken when any of the triggers in this enclosure are reached.
21. The operators must have a method to verify that the proper control algorithms and coefficients are being used for each UV unit in operation. The operators must be able to demonstrate the method upon request by TCEQ.
22. The Texas Pollutant Discharge Elimination System (TPDES) permit and 30 TAC Chapter 210 authorization of the City's RRWWTP must be current. For assistance, please contact TCEQ's Wastewater Permitting Section (MC 148) for information at (512) 239-2369.
23. The City must completely isolate the 10-million gallon (MG), 5-MG, and 3-MG ground storage tanks (GSTs) at the Cypress WTP site by closing all of the 28 butterfly valves located that:

- a. connect the 3-MG and - MG GSTs to the suction line for the Cypress 2010 WTP high service pump station;
- b. would allow water to flow back and forth between the three GSTs; and
- c. connect the 2010 WTP clearwell to the Cypress 1961 or 1987 plants.

The 3- and 5-MG GSTs will be isolated during full-scale operations and the disinfectant residual of the water in the tanks will be monitored periodically.

MONITORING

24. The City must monitor and record the following for the Cypress Temporary DPR WTP:

- a. All of the data and other information needed to complete the monthly reports for the Cypress Temporary DPR WTP (Surface Water Monthly Operating Report for Alternative Treatment (SWMOR-Alt)) and the Cypress 2010 WTP (SWMOR).
- b. The *E. coli* concentration must be monitored immediately before the chlorine contact basin at the RRWWTP daily.
- c. Continuous turbidity monitoring of the RRWWTP effluent turbidity must be recorded every 15 minutes. The turbidity will be monitored before the chlorine contact basin.
- d. Continuous monochloramine residual monitoring of the RRWWTP effluent must be recorded at least every 15 minutes. The residual will be monitored before the chlorine contact basin.
- e. *E. coli* must be sampled each day in the RRWWTP effluent at the end of the chlorine contact basin, but before the transmission pipeline from the RRWWTP to the temporary DPR WTP.
- f. The City must conduct a DIT on each MF membrane unit to verify that the integrity of the MF membranes has not been compromised and the approved 2.8-log removal credit for *Cryptosporidium* oocysts and *Giardia* cysts is being continuously achieved. A DIT must be conducted on a MF membrane unit:
 - i. Once each calendar day for each unit in operation for any period of time during that day;
 - ii. If any MF membrane unit produces filtered water with a turbidity level above 0.100 NTU in two consecutive 5-minute readings;
 - iii. Before returning a MF membrane unit to service after failing an initial DIT and being repaired; and
 - iv. After each clean-in-place (CIP) procedure.
- g. Each DIT must meet the TCEQ requirements contained in its Cypress Temporary DPR WTP DIT approval letter shown in Enclosure E.

- h. Continuous indirect integrity monitoring of each MF membrane unit's filtrate turbidity levels must be conducted using the Hach Model FilterTrak method 10133, or an approved alternative acceptable to the TCEQ. The results must be recorded every five minutes.
- i. The nitrate levels must be measured and recorded every eight hours at the effluent of each active RO unit.
- j. The performance of the on-line RO units shall be monitored three times a day by a conductivity or TDS meter. The feed and permeate conductivity or TDS shall be monitored three times a day. The average of the three salt rejections found for each RO unit shall be calculated each day that the RO unit is used.
- k. The performance of the individual pressure vessels in the RO units shall be monitored for conductivity once per eight-hour shift.

l. The percentage of DPR water in the total finished water must be determined and recorded every 15 minutes. The highest instantaneous 15 minute ratio for the day must be reported each month. The two-hour averages must also be reported if the maximum daily 15-minute instantaneous ratio is above 50.00%. Flow metering of the following streams will be used to determine the percentage of finished water originating as RRWWTP effluent:

- 1. RRWWTP effluent (MGD)
- 2. Lake Kemp raw water (MGD)
- 3. Water pumped from Waste Lagoon No. 3 (MGD)
- 4. Secondary Reservoir raw water (MGD)

The calculation used to determine the percent of flow that originated as RRWWTP effluent is as follows:

$$\text{DPR \% of permeate} = \frac{\text{DPR source flow (1)}}{[\text{RRWWTP effluent (1)} + \text{Kemp raw flow (2)}]} * 100\%$$

$$\text{DPR share of permeate (MGD)} = \text{DPR \% of permeate} * [\text{Lagoon (3)}]$$

$$\text{DPR \% of total} = \frac{\text{DPR share of permeate}}{[\text{Lagoon (3)} + \text{Secondary Reservoir (4)}]} * 100\%$$

- m. The percent of the total capacity of the Cypress 10-MG storage tank must be recorded every two hours. Any percentage less than 50% full, and the duration, must be reported monthly.
- n. The nitrate and nitrite levels must be measured and recorded weekly at the entry point to the distribution system from the City's Cypress Temporary DPR WTP.
- o. The *E. coli* concentration must be monitored weekly at the entry point to the distribution system from the Cypress Temporary DPR WTP.

- p. *Cryptosporidium* and *Giardia* sampling must be performed once a month (normal turn-around) at the RRWWTP effluent and two times per month (Fast Response) at the entry point to the distribution system from the Cypress Temporary DPR WTP using EPA method 1623. *Cryptosporidium* analysis must be performed by a laboratory approved by EPA for *Cryptosporidium* analysis. One entry point sample per month must be collected and must be delayed by the approximate detention time that it takes the water to travel to the entry point sampling location from the RRWWTP effluent sampling plant. This delay will help to be able to establish the removal efficiency provided by the Cypress Temporary DPR WTP.
 - q. Total Culturable Virus sampling must be performed once a month at the RRWWTP effluent and two times per month at the entry point to the distribution system from the Cypress Temporary DPR WTP using EPA method 1615. One entry point sample per month must be collected and must be delayed by the approximate detention time that it takes the water to travel to the entry point sampling location from the RRWWTP effluent sampling plant. This delay will help to be able to establish the removal efficiency provided by the Cypress Temporary DPR WTP. Please note that during the verification testing process a subset of the EPA 1615 method was required, specifically total culturable viruses. During full-scale operation, all of the results generated through EPA 1615 must be determined and submitted.
 - r. The UV intensities as measured by the UV sensors, lamp status, flow rate through the unit, UV transmittance (UVT), and lamp power must be monitored continuously and the results recorded every 15 minutes in accordance with 30 TAC §290.111(d)(2)(A).
 - 1. If the reactor is operated at flow rates below 1.0 MGD, the calculated validated dose (D_{va}) value must be based on 1.0 MGD or higher.
 - 2. If the UVT of the water being treated by the UV reactor exceeds 98%, the D_{va} value must be based on 98% or lower.
 - s. The D_{va} for the UV system calculated must be recorded at least every 15 minutes.
 - t. The total amount of water treated by each UV unit each month must be recorded.
 - u. The total amount of water produced each month when the UV unit is not operating within validated conditions (off-spec) in accordance with 30 TAC §290.111(d)(3)(B) must be recorded.
 - v. The continuous time each day that the UV unit is not operating with validated conditions (off-spec) must be recorded.
25. All monitoring required as a condition of this exception must be conducted using methods that conform to the requirements of 30 TAC §290.119. If alternative methods are preferred, reasonable field methods can be approved by the TCEQ.
26. The City must continue using the approved amperometric method to measure the chlorine dioxide residuals at the disinfection zone D1A, D1B, and D1C sampling points of the Cypress 2010 WTP and at the entry point to the distribution system. However, chlorine dioxide samples collected in the distribution system, if necessary, may be analyzed using the colorimetric method and a colorimeter in the field

27. To obtain inactivation credit for the disinfection in the Cypress Temporary DPR WTP, the operators must monitor specific disinfectants.
 - a. The operators must continue to measure and use monochloramine, instead of total chlorine, residuals at the end of disinfection zones D1, D2, and D3 at the Cypress Temporary DPR WTP; and
 - b. The operators must also continue to measure total chlorine residuals in disinfection zones D4 and D5 of the Cypress Temporary DPR WTP using an approved total chlorine method.
28. The free ammonia, total chlorine, and monochloramine levels must be monitored at each chloramine injection point, the end of each disinfection zone, and the entry point to the distribution system from the Cypress Temporary DPR WTP one time per week. See Enclosure F: Updated Use of Chloramines Exception Letter for more details.
29. The TCEQ has received chemical analytical results from the Cypress Temporary DPR WTP's verification testing. Based on these results, the TCEQ will require quarterly sampling for all regulated compounds in 30 TAC 290 Subchapter F for the life of the Cypress Temporary DPR WTP.
30. The City must monitor for cyanide quarterly at the entry point to the distribution system.

Please note for items No. 29 and No. 30, if the sampling contractor notifies the City of the date that samples will be collected and the City's Cypress Temporary DPR WTP is not producing water on that date, the City is responsible for contacting the sampling contractor and scheduling the sampling for another date, which is within sampling period. For example, if the samplers call and schedule a visit for February 28th, and the plant is not operating that day, then it is the City's responsibility to work with the sampling contractor to choose another date before the end of the calendar quarter, March 31st.
31. The TCEQ recommends that the City monitor the RRWWTP's effluent and the entry point to the distribution system from the City's Cypress Temporary DPR WTP for the potential chemical and microbiological contaminants of concern contained in Enclosure G: Unregulated Contaminants of Concern on a quarterly basis.
32. The City must provide the results of any sampling performed under the EPA's Unregulated Contaminant Monitoring Rule -3 (UCMR3) to the TCEQ within two weeks of receiving those results.
33. Before water from the Cypress Temporary DPR WTP enters the distribution system, all shut-down controls and alarms for summoning the operators must be tested. The testing must be repeated every three months. Documentation of the testing procedure and results shall be kept on site to be reviewed by TCEQ staff during site visits. The alarms and shut down controls are for taking:
 - a. the RRWWTP effluent transfer pumps (to the Cypress WTP facility) out of service when the effluent exceeds 24 NTU;

- b. the RRWWTP effluent transfer pumps (to the Cypress WTP facility) out of service when the effluent has inadequate monochloramine residual(below 1.0 mg/L when temperatures are above 16°C and below 1.5 mg/L when the temperature is at or below 16°C);
- c. a MF membrane unit out of service when its filtrate turbidity level is greater than 0.100 NTU for two consecutive five-minute readings;
- d. ~~action to reduce the output of the permeate transfer pumps at Waste Lagoon No. 3 when the percent of DPR water in the total finished water exceeds 50.00%;~~
- e. ~~action to correct the UV unit(s) if off-spec water is produced; and~~
- f. a gravity media filter out of service when the individual filter effluent turbidity level exceeds 0.3 NTU for two consecutive 15-minute readings.

DESIGN REQUIREMENTS

- 34. The following temporary piping modifications at the Cypress WTP that were approved for construction in TCEQ's letter dated January 22, 2014 and as-built modifications approved by TCEQ's letter dated May 12, 2014 to eliminate common walls and cross connections as indicated below must remain as part of the City's Cypress Temporary DPR WTP:
 - a. Connection No. 1- modifications included cutting and removing a portion of pipe to provide an air gap on the connection from Lagoon No. 2 to the reuse Pump Station and include modifications at the Filter-to-Waste Pump Station with the removal of the Flange Coupling Adaptor and modifications at the Reuse Pump Station with the removal of a portion of pipe to provide an air gap at the 12-inch filter-to-waste waterline connection;
 - b. Connections No. 2 and No. 3- approximately 3,800 linear feet (l.f) of proposed temporary 36-inch above-ground high density polyethylene (HDPE) waterline to divert the Cypress 2008 WTP RO permeate to existing storage Lagoon No. 3 with a nine-inch vertical separation between the bottom of the pipe and the top of the lagoon's berm; this includes the blind flange of the existing 36" line;
 - c. Connections No. 8 and No. 9- approximately 2,100 linear feet of a temporary 18-inch HDPE above-ground waterline from the Lagoon Valve Vault, located north of Lagoon No. 2 to an existing 20-inch brine line that ultimately discharges to the Wichita River; and
 - d. Connection No. 6- modifications at the Backwash Valve Vault with the removal of the Flange Coupling Adaptor and closing of the 24-inch valve to isolate the 1961/1987 backwash lines.
- 35. The following temporary piping modifications are approved for construction for the City's Cypress Temporary DPR WTP:
 - a. Connections No. 4 and No. 5-reconnection of the Cypress 2010 WTP transfer pumps to the 10-MG GST and backwash supply to the high service pumps; and

- b. To close the valves as indicated on the map supplied by the City to TCEQ on June 26, 2014 to isolate the 3.0-MG, 5.0-MG GSTs from the 10-MG GST and the high service pumps.
36. The City must notify TCEQ prior to making any significant change in water source, (increase or decrease) in production, treatment, and storage facilities, disinfection (disinfectant method/type used, application points, or monitoring points), replacement of membranes (MF or RO), blending ratio, or any additional treatment processes as described in 30 TAC §290.39(j).

For further clarification, some examples of changes which would require notification include any proposed change to the raw water sources, proposed treatment design modifications at the RRWWTP or the Cypress WTP, or any proposed changes to the waste stream management practices. Some examples of changes which are considered non-significant and which would not require notification include operational practices at the RRWWTP and the Cypress WTP, such as aeration rates or chemical dose adjustments
37. All waste discharge must be in accordance with federal and state requirements as described in 30 TAC §290.42(i). You may contact TCEQ's Wastewater Permitting Section (MC 148) regarding information required for the proper disposal of generated waste (such as RO membrane reject, CIP cleaning solutions, etc.) and any required discharge permit at (512) 239-2360.
38. The City must continue to use the MF membrane system with Evoqua (formerly Siemens Memcor distributed by USFilter) S10V MF membrane modules for which an exception was previously granted and for which the City received TCEQ approval to construct on August 19, 2004. This system has the following design and operating requirements:
 - a. A feed-side surface area of 300 square-feet (sf);
 - b. A nominal pore size of 0.2-micron;
 - c. Maximum transmembrane pressure (TMP) of -12 pounds per square-inch (psi);
 - d. Water temperature range of 10 to 40°C;
 - e. pH tolerance range of 2 to 12;
 - f. Five tanks containing 504 submerged MF membrane elements;
 - g. A maximum instantaneous flux rate of 19.6 gallons per square-foot per day (gfd) at 20 °C;
 - h. A three-minute backwash duration (nine minutes out of service) once every 30 minutes of run-time;
 - i. A 32-minute maintenance clean (45 minutes out of service) once per 24 hours of run-time; and
 - j. A CIP procedure once every 720 hours of run-time.
39. The 2.8-log removal credits for the MF membrane units that were approved in the TCEQ letter dated November 6, 2013 are approved for the duration of the Cypress

Temporary DPR project.

47. The MF and RO membrane systems must be designed so that the membrane units' feed water, filtrate, backwash supply, waste, and chemical cleaning piping shall have cross-connection protection to prevent chemicals from all chemical cleaning processes from contaminating other membrane units' filtrate and permeate in other modes of operation. This may be accomplished by the installation of a double block-and-bleed

valve arrangement, a removable spool system, or other alternative method approved by the TCEQ.

48. The City's Cypress Temporary DPR WTP source water must receive the same pretreatment, at a minimum, under full-scale operation as received during the full-scale verification study. The treatment is provided at the RRWWTP and is as follows: Raw wastewater is first screened and de-gritted, then flows to a primary clarification. Primary effluent then proceeds to aeration basins for biological treatment. The contents of the aeration basins flow to the final clarifiers, where the active biomass settled from the treated effluent is returned to the aeration basin. The effluent is then chlorinated and after sufficient detention time, the effluent containing a monochloramine residual is the source water for the Cypress Temporary DPR WTP.
49. An adequately equipped laboratory must be available so that daily tests and all other tests required by the conditions of this letter may be performed.

CALIBRATION

50. Conductivity meters used to monitor the RO membrane units' permeate shall be calibrated with solutions of known concentrations at least once every 90 days.
51. Flow measuring devices and rate-of-flow controllers shall be calibrated at least once every 12 months. The accuracy of magnetic flow meters shall be verified at least once every 12 months and calibrated if needed.
52. Pressure monitors used for DIT measurements shall be calibrated or verified at least once every 12 months.
53. Instruments used to monitor nitrate and nitrite shall be calibrated or verified at least once every 12 months.

~~54. UV light sensors and UVT analyzers must be properly calibrated as required by 30 TAC §290.46(c)(2)(D).~~

REPORTING

55. The City's Cypress Temporary DPR WTP must submit the completed SWMOR and SWMOR-Alt, report ~~(including UV pages)~~ and other reports listed in the reporting section of this enclosure to the TCEQ by the tenth day of the month following the end of the reporting period. Send the reports to:

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

56. To accurately describe the treatment processes at the Cypress Temporary DPR WTP, please use the Demonstration of Performance fields on the "LT2-Summary" page of the

SWMOR-Alt to allow the plant to gain a 0.5 log removal credit for the second flocculation and clarification unit process.

57. An addendum to the SWMORs containing the following information must be submitted at the same time.
- a. The highest daily turbidity level in the RRWWTP effluent;
 - b. If water is diverted from the Cypress Temporary DPR WTP pipeline due to high turbidity, the amount (in gallons) and duration (in minutes) of the diversion;
 - c. The lowest daily monochloramine level in the RRWWTP effluent (before the chlorine contact basin);
 - d. If water is diverted from the Cypress Temporary DPR WTP pipeline due to low monochloramine levels, the amount (in gallons) and duration (in minutes) of the diversion;
 - e. The *Giardia*, *Cryptosporidium* and virus results from the monthly sampling at the RRWWTP effluent;
 - f. The daily *E. coli* results from the RRWWTP effluent;
 - g. If any of the pathogen concentrations in items No. 57e and No. 57f are over the action limits, then also provide a report indicating the time the plant was shut down, the corrective action taken, and the subsequent samples that showed the plant could produce safe water again;
 - h. The date that any CIP that had been performed on a RO membrane unit;
 - i. The total daily flow to each of the RO membrane units;
 - j. Both the average daily and monthly average salt rejection for each active RO membrane unit;
 - k. If any RO unit does not meet the salt rejection action levels, then also report the duration of time the RO unit was out of service, the corrective actions taken and the results of the lab tests that show the unit can be returned to service;
 - l. The highest nitrate results found in each of the active RO units' effluent each day;
 - m. The action taken if the nitrate results were higher than the action level;
 - n. The highest daily 15-minute instantaneous maximum ratio of partially treated RRWWTP effluent to lake water;
 - o. If the highest daily 15-minute instantaneous maximum ratio is greater than 50.00% also include the 2-hour averages of the ratio (for example, the averages from 12:01 am to 2:00 am; 2:01 am to 4:00 am, etc.);
 - p. If the average ratios were over 50.00%, or the instantaneous ratio was over 55.00% then the duration the membrane and RO plant were off-line, the corrective actions taken and the ratio that was achieved when the plant was put back on line;
 - q. The minimum operational level each day of the Cypress 10-MG GST expressed as percentage full;
 - r. The nitrate and nitrite results found at the entry point to the distribution system from the Cypress Temporary DPR WTP effluent each week;

- s. If the nitrate or nitrite concentrations at the entry point to the distribution system from the Cypress Temporary DPR WTP are above the MCLs, then report the duration the temporary DPR WTP was off-line, the corrective actions taken and the nitrate and/or nitrite results found before the plant was put back on line;
 - t. The weekly *E. coli* concentration at the entry point to the distribution system from the Cypress Temporary DPR WTP;
 - u. The twice monthly *Cryptosporidium*, *Giardia*, and virus sample results at the entry point to the distribution system from the Cypress Temporary DPR WTP; and
 - v. If any of the pathogens in items No. 57t and No. 57u are detected, then also report the time the plant was shut down, the corrective action taken, and the samples that showed the facility could produce safe water again.
58. The City shall record the daily and monthly data required in the reporting section of this Enclosure using the customized, site-specific version of the SWMOR-Alt (form number 00102D) that the TCEQ created for the Cypress Temporary DPR WTP.
59. The TCEQ will require the reclaimed wastewater to be identified as a raw water source on the Consumer Confidence Report (CCR) for this and any wholesale customer using water from the Cypress Temporary DPR WTP.
60. The City must report to TCEQ as described in Table 1. If required, the City must contact the TCEQ within 24 hours by telephone at 1-888-777-3186 or by e-mail at PDWS@tceq.state.tx.us, and immediately notify all retail customers and wholesale customers. Within five working days, submit written notification to the address below regarding the problem that required the City's Cypress Temporary DPR WTP, or part of it, to be taken out of service, the corrective actions taken, and the quantity of any unacceptable water discharged:

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

RECORD RETENTION

61. The City must retain this letter while the exception is valid and subsequently for at least five years after the exception is no longer valid.
62. The Trojan UV Swift 8L24-2L validation report must be kept on-site for the Cypress Temporary DPR WTP operators and TCEQ staff to verify the proper control algorithms and coefficients are being used for each UV unit for as long as the reactors are included as a treatment unit at the Cypress Temporary DPR WTP.
63. The following records must be retained for at least ten years:
- a. A copy of the submitted SWMORs for the Cypress Temporary DPR WTP, including the UV pages, and the Cypress 2010 plant;
 - b. The highest daily confirmed turbidity level in the wastewater effluent;

- c. The lowest daily monochloramine level in the RRWWTP effluent (before the chlorine contact basin);
- d. The *Giardia*, *Cryptosporidium* and virus results from the monthly sampling at the RRWWTP effluent;
- e. The daily *E. coli* results from the RRWWTP effluent;
- f. Any CIP that has been performed on a RO membrane unit;
- g. The total daily flow to each of the RO membrane units;
- h. The average daily and monthly average salt rejection for each RO membrane unit;
- i. The nitrate results found in each of the active RO unit effluent each day;
- j. The highest daily 15-minute instantaneous maximum ratio of partially treated RRWWTP effluent to lake water;
- k. If the daily 15-minute instantaneous maximum ratio is greater than 50.00% also include the 2-hour averages of the ratio (for example 12:01 am to 2:00 am; 2:01 am to 4:00 am, etc.);
- l. The daily minimum operation level in the Cypress 10-MG GST expressed as percentage;
- m. The nitrate and nitrite results found at the entry point to the distribution system from the Cypress Temporary DPR WTP each week;
- n. The weekly *E. coli* concentration at the entry point to the distribution system from the City's Cypress Temporary DPR WTP;
- o. The twice monthly *Cryptosporidium* or *Giardia* sample results at the entry point to the distribution system from the City's Cypress Temporary DPR WTP;
- p. The highest daily confirmed conductivity or total dissolved solids for each RO membrane unit; and
- q. The results of all chemical analyses.

MF MEMBRANE FORMULA

64. The following formula shall be used to determine filtrate flux:

$$\text{filtrate flux}_{\text{at feed water temperature}} = \frac{(\text{filtrate flux}_{\text{at } 20^{\circ}\text{C}})}{[1.784 - (0.0757 * T) + (0.0011 * T^2) - (10^{-5} * T^3)]}$$

Where T is the MF membranes' feed water temperature in degrees centigrade (°C), and filtrate flux at 20°C is 19.6 gfd.

DECOMMISSIONING OR MODIFYING THE CYPRESS TEMPORARY DPR WTP

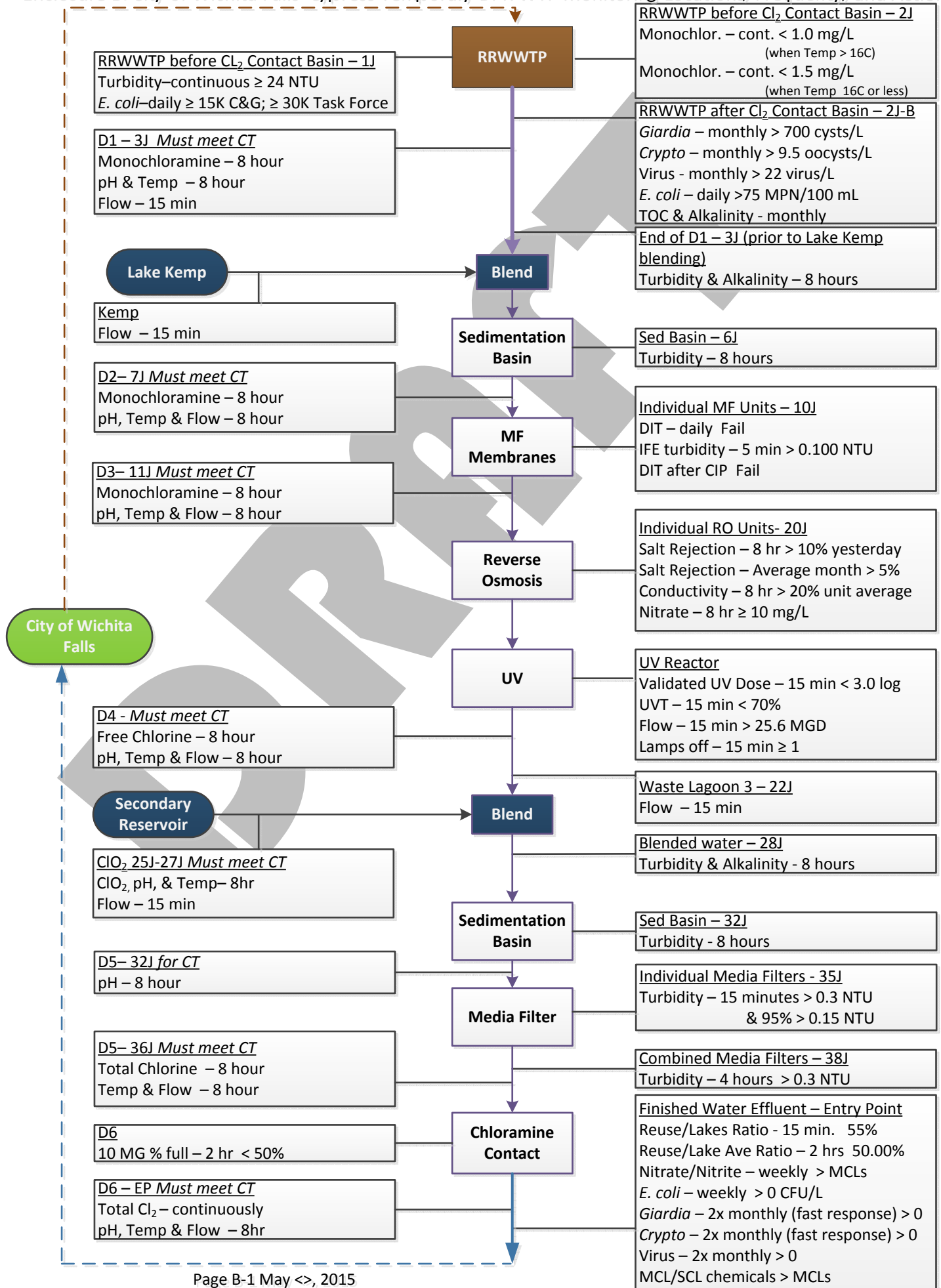
65. After the Cypress Temporary DPR WTP is no longer treating RRWWTP effluent, the City may not return the Cypress 2008 WTP and the Cypress 2010 WTP to their traditional source waters and operational practices without the prior written approval of the TCEQ.

66. The City must receive prior written approval from TCEQ before adding any other source water to the Cypress Temporary DPR WTP beyond Lake Kickapoo, Lake Kemp, Lake Arrowhead, and RRWWTP effluent.

67. At least 30 days before the conclusion of the Cypress Temporary DPR project, the City must prepare and submit a sealed engineering report describing the plan for converting the plants back to untreated surface water. The proposal must describe in detail how the City will:

- a. decommission the temporary wastewater effluent line from the RRWWTP;
- b. ensure that all of the treatment units and equipment at the two plants have been cleaned, disinfected, and show no evidence of contamination by RRWWTP effluent;
- c. transition back to the original piping configurations at the Cypress 2010 WTP; and
- d. prepare to reactivate the facilities at the Cypress 1961 and 1987 WTPs.

Enclosure B: City of Wichita Falls Cypress Temporary DPR WTP Monitoring Locations, Frequency, and Action Levels





Texas Commission on Environmental Quality

Protecting Texas by Reducing and Preventing Pollution

May <>, 2015

Mr. Mark Southard
Water Source/Purification Superintendent
City of Wichita Falls
4801 Big Ed Neal Drive
Wichita Falls, Texas 76310

Subject: Public Drinking Water System Contact Time Study
City of Wichita Falls - PWS ID No. 2430001
Cypress Temporary Direct Potable Reuse Water Treatment Plant,
TCEQ Plant ID No. TP410791
Wichita County, Texas
CN600129316 RN105598759

Dear Mr. Southard:

The Texas Commission on Environmental Quality (TCEQ) Technical Review and Oversight Team (TROT) has reviewed the Engineering Report dated March 3, 2015 submitted by Mr. David W. Sloan, P.E., Freese and Nichols for the City of Wichita Falls (City). The report included a revised Contact Time (CT) Study for the Cypress Temporary Direct Potable Reuse Water Treatment Plant (DPR WTP). A revised CT Study is necessary to include installation of two (2) Trojan Swift™ 8L24-SL Ultraviolet Light (UV) reactors and piping after the Microfiltration (MF) and Reverse Osmosis (RO) at the Cypress Temporary DPR WTP. Based on the information provided, we are approving the proposed disinfection protocol.

Please note this letter does not waive any of the conditions required in the TCEQ's current exception letter and enclosures and applies when the Cypress Temporary DPR Project is in operation. **The information in this letter supersedes and does not supplement any previous CT study correspondence for the Direct Potable Reuse Project. As you are aware, the City will need to submit another CT Study update at the conclusion of the Cypress Temporary DPR Project.**

The Cypress Temporary DPR WTP may use a blend of raw water from several sources:

- treated effluent supplied through a transmission line from the River Road Waste Water Treatment Plant (RRWWTP) pretreated with chlorine (Cl_2) and ammonia (NH_3);
- raw water from Lake Kemp through a transmission line from the Headquarters Road Pump Station (HQrdPS) pretreated with chlorine dioxide (ClO_2); and/or
- raw water from Lake Kickapoo and/or Lake Arrowhead through a transmission line from the Secondary Reservoir pretreated with ClO_2 .

For the duration of the Project, the Cypress Temporary DPR WTP will include:

- approximately twelve (12) miles of 27-inch raw water line from the RR WWTP to the Cypress Temporary DPR WTP;
- All the treatment units at the Cypress 2008 WTP during normal (non-DPR) operating conditions, which includes a static mixer, a Floc-Clarifier; five (5) Memcor® S10V hollow fiber (HF) MF filters; a break tank and six (6) two-stage RO units and RO permeate tanks;
- all of the treatment units at the UV disinfection unit and the RO Permeate lagoon;
- all of the treatment units at the Cypress 2010 WTP during normal (non-DPR) operating conditions, which includes a splitter box that, under normal (non-DPR) operating conditions, distributes water between the Cypress 1961, 1987, and 2010 plants; a mechanical rapid mix; a Parshall Flume meter; a solids contact, slurry recirculation clarifier; a re-carbonation basin; and five (5) dual-media gravity filters;
- a small Cypress 2010 Clearwell and filtered water transfer pump station; a 10 million gallon (MG) Cypress 2010 Ground Storage Tank (GST) that has been isolated from the rest of the GSTs at the Cypress site; and
- the Cypress 2010 High Service Pump Station (HSPS) that discharges to the distribution system.

During the Cypress Temporary DPR Project, when Lake Kemp is used as a source water it will be blended with the RRWWTP effluent and treated through the MF and RO membranes, and UV units prior to being pumped to the Cypress 2010 WTP for further treatment. Raw water for the Cypress 2010 WTP will be RO permeate (with UV treatment) with a possible blend of surface water pumped from the Secondary Reservoir (Lake Kickapoo and Lake Arrowhead). The MF and RO units have a maximum treatment capacity of 15 million gallons per day (MGD) with the maximum treatment capacity for the UV unit and the Cypress 2010 WTP being 10 MGD.

The proposed disinfection protocol during the Cypress Temporary DPR Project includes injection of chlorine (Cl_2) and ammonia (NH_3) in the piping from the RRWWTP. Once at the Cypress Temporary DPR WTP, Cl_2 and liquid ammonium sulfate (LAS) are injected in the mix zone of the MF clarifier. Cl_2 and LAS are again added at the clarifier effluent to form chloramines through the MF trough and cells. Sodium hypochlorite is added to the downstream side of the RO permeate tanks, prior to the UV reactor to form free chlorine residual through the RO permeate piping to the lagoon. The disinfection protocol continues with the injection of Cl_2 and LAS at the outlet of the splitter box. There are also standby/secondary Cl_2 and LAS injection points at the Cypress 2010 Clearwell and the HSPS.

A disinfection zone is a segment of the treatment process which begins at a disinfectant application point and ends at a subsequent disinfectant application or residual sampling point. Hence, each disinfectant application point regardless of the frequency of use represents the beginning of a separate disinfection zone. Similarly, a plant may have only one disinfectant point, but may also choose to monitor disinfection residuals at more than one point, thus creating multiple disinfection zones.

During the Cypress Temporary DPR Project, there are six (6) disinfection zones at the Cypress Temporary DPR WTP. The first disinfection zone, D1, consists of the 12 miles of treated effluent water line from the RRWWTP. The second disinfection zone, D2, consists

of the Clari-flocculator before the MF units and the third disinfection zone, D3, includes the MF cells and their inlet channel and associated piping. The fourth zone, D4, contains the piping through the UV reactor disinfection unit to the upstream side of the RO permeate lagoon. The fifth zone, D5, contains the rapid mix, clarifier, re-carbonation basin, granular media filters, and associated piping at the Cypress 2010 WTP. The last disinfection zone, D6, incorporates the Cypress 2010 Clearwell, Cypress 2010 GST and the associated piping.

Contact Time (CT) calculations are used to evaluate the disinfection process. The time that the disinfectant is in contact with water in the disinfection segment must be determined on a daily basis to complete the CT calculations. This contact time, measured as T_{10} , is determined based on the peak hourly flow rate occurring during the 24-hour period and the detention time that is equaled or exceeded by 90 percent of the water passing through the basin. Since T_{10} values are required to calculate the CT for the treatment process, Table 1 was developed for the Cypress Temporary DPR WTP. The T_{10} values are based on the information provided in the CT Study template you submitted on March 3, 2015 and the most recent TCEQ approved CT Study dated August 5, 2014.

TABLE 1: T_{10} Table for the Cypress Temporary Direct Potable Reuse Water Treatment Plant, TCEQ Plant ID No. TP410791

DISINFECTION ZONE	TREATMENT UNIT	VOLUME (GAL)	FLOW RATE (MGD)	BAFFLING FACTOR	T_{10} (MIN)	
					Unit	Sum
D1	Treated Effluent Transmission Line	1,860,000 ⁽¹⁾	7.5 ⁽¹⁴⁾	1.0 ⁽¹⁸⁾	357.0	357.0
D2	2008 MF/RO Floc-Clarifier	3,476,000 ⁽²⁾	15.0 ⁽¹⁵⁾	0.3 ⁽¹⁹⁾	111.6	111.6
D3	Piping	13,200 ⁽³⁾	15.0 ⁽¹⁵⁾	1.0 ⁽¹⁸⁾	1.3	4.6
	Microfiltration Inlet Trough	5,510 ⁽⁴⁾		0.1 ⁽²⁰⁾	0.1	
	Microfiltration Cells (5)	9,560 ⁽⁵⁾	3.0 ⁽¹⁶⁾	0.7 ⁽²¹⁾	3.2	
D4	Permeate Piping through UV Disinfection Area	7,500 ⁽⁶⁾	10.0 ⁽¹⁷⁾	1.0 ⁽¹⁸⁾	0.42	2.4
	HPDE Diversion Piping	13,500 ⁽⁷⁾			2.0	
D5	Piping	14,600 ⁽⁸⁾	10.0 ⁽¹⁷⁾	1.0 ⁽¹⁸⁾	2.2	67.1
	2010 Clarifier	926,500 ⁽⁹⁾		0.3 ⁽²²⁾	40.0	
	Re-carbonation Basin	183,000 ⁽¹⁰⁾		0.5 ⁽²³⁾	13.2	
	Granular Media Filters (4)	29,100 ⁽¹¹⁾	2.5 ⁽¹⁸⁾	0.7 ⁽²⁴⁾	11.7	
D6	2010 Clearwell	109,100 ⁽¹²⁾	10.0 ⁽¹⁷⁾	0.5 ⁽²⁵⁾	7.9	223.3
	2010 Ground Storage Tank	4,987,000 ⁽¹³⁾		0.3 ⁽²⁶⁾	215.4	

Notes:

1. Based on a 27-inch diameter pipe that is 62,500 feet long River Road WWTP.
2. Based on a flocculation clarification unit that has a 155-foot diameter, a 25.3-foot side water depth, and a 31.76-foot center water depth.
3. Based on a 36-inch diameter pipe that is 250 feet long.
4. Based on the section of the influent trough from the trough inlet to the closest of the microfiltration cells. This section of the trough is 25.16 feet long and 11 feet wide and has a 2.66-foot side water depth.
5. Based on the volume of water contained in a single filter cell containing 504 submerged Siemens Memcor® S10V microfiltration membrane modules.
6. Based on cumulative volume of 104 LF of 24-inch and 32 LF of 20-inch diameter pipe.
7. Based on cumulative volume of 114 LF of 36-inch and 320 LF of 24-inch diameter pipe.
8. Based on cumulative volume in 220 LF of 36-inch piping between the splitter box to the rapid mix and

85 LF of 30-inch piping from the rapid mix to the 2010 clarifier.

9. Based on a 90-foot diameter clarifier with a side water depth of 18.9 feet and a center water depth of 20.6 feet.
10. Based on a basin that is 45.5 feet long and 32 feet wide and has a 16.8-foot side water depth.
11. Based on one dual-media gravity filter that is 24 feet long and 15 feet wide, contains 6 feet of gravel and media, and a 1-foot underdrain system. The minimum water depth over the media was reported to be 6.8 feet and a 50% porosity of the filter media is assumed.
12. Based on a clearwell that is 98.4 feet long and 26 feet wide. The maximum water depth and minimum operating levels in the clearwell are 11.3 feet and 5.7 feet, respectively.
13. Based on a tank that has a 206-foot diameter, a 40-foot maximum water depth, and a 20-foot minimum operating level.
14. Based on the pump capacity of DPR water from RRWWTP.
15. Based on the design capacity of the 2008 CWTP.
16. Based on the design capacity of the 2008 CWTP. Assumes equal flow divided between five racks of Siemens Memcor® S10V.
17. Based on the design capacity of the 2010 CWTP.
18. Assumes equal flow split between like filters.
19. Assumes that the flow conditions that exist in long pipeline segments will virtually eliminate the possibility of short-circuiting and create "perfect" baffling characteristics.
20. Assumes that the mixing zone within the solids contact clarifier results in sufficient short-circuiting that the overall baffling characteristic of the clarifier will be "poor".
21. Assumes "unbaffled" for basin with no baffle walls.
22. Assumes "superior" baffling condition based on the configuration of the filter cell and the submerged membrane units.
23. Assumes that "average" baffling conditions will occur in a tank that contains multiple baffle walls that create a contactor with an effective length:width ratio greater than 20:1 but less than 50:1.
24. Assumes that the hydraulic conditions that exist in a gravity filter will create "superior" baffling characteristics.
25. Assumes that a tank with two internal baffles and a length to width ratio of 30:1 will create "average" baffling characteristics.
26. Assumes that a tank with two inlets, three internal baffle walls, and a single outlet will exhibit some short-circuiting and demonstrate "poor" baffling characteristics.

The treatment of water from the RRWWTP must achieve a 5.5-log removal or inactivation of *Cryptosporidium*, a 8.0-log removal or inactivation of *Giardia* and a 9.0-log removal or inactivation of viruses before the treated water can be distributed to the customers. The proposed UV system has been sized to provide a 3.0-log inactivation of both *Cryptosporidium* and *Giardia*. The Cypress WTP installation will consist of a 24-inch Trojan UVSwift™ 8L24-2L reactor with 2 lamps. The 8L24-2L reactor will operate at flow rates of up to 10.0 MGD, with a second 8L24-2L reactor serving as the stand-by reactor. The maximum approved disinfection credits for the reactor and operating condition are described in the table below.

Trojan UVSwift™ 8L24-2L UV Disinfection Design Criteria

Design Criteria	Type of Unit	Design Value
Flow Rate	MGD	1.0 - 10.0
<i>Cryptosporidium</i> disinfection	Log inactivation	3.0
<i>Giardia</i> disinfection	Log inactivation	3.0

Based on the combination of treatment processes that will be used at the Cypress Temporary DPR WTP, the **City of Wichita Falls Cypress Temporary DPR WTP must**, for compliance with minimum treatment technique requirements, **provide at least a 2.0-log inactivation of *Giardia* and 5.0-log inactivation of viruses through the disinfection**

process. We have prepared a Disinfection Process Parameters table to help the operators complete their Surface Water Monthly Operating Report-for Alternative Technologies (SWMOR-Alt). In Table 2, we have characterized the T₁₀ available in each of the disinfection zones based on the flow rate through the unit(s) that contributes most to the disinfection process within that zone. We have also provided the operators with the disinfection requirements that the Cypress Temporary DPR WTP must meet on a continuous basis.

TABLE 2: Disinfection Process Parameters Table for the Cypress Temporary Direct Potable Reuse Water Treatment Plant, TCEQ Plant ID No. TP410791

APPROVED CT STUDY PARAMETERS						PERFORMANCE STANDARDS	
Parameters	Disinfection Zones					Log Inactivation	
	D1	D2	D3	D4	D5	Giardia	Viruses
Flow Rate (MGD)	7.50	15.00	3.00	10.00	10.00	2.0	5.0
T ₁₀ (minutes)	357.0	111.6	4.6	2.4	67.1		

APPROVED CT STUDY PARAMETERS						PERFORMANCE STANDARDS	
Parameters	Disinfection Zones					Log Inactivation	
	D6	D7	D8	D9	D10	Giardia	Viruses
Flow Rate (MGD)	10.00	na	na	na	na	2.0	5.0
T ₁₀ (minutes)	223.3	na	na	na	na		

As you are aware, zone D5 includes the Cypress 2010 clarifier, re-carbonation basin, and filters. As we have discussed, this grouping of treatment processes results in some constraints on the manner in which the plant can be operated and monitored **when using Lake Kickapoo and Lake Arrowhead raw water**. Specifically:

- **The operators must monitor the pH in disinfection zone D5 at the outlet of the Cypress 2010 clarifier.** Historically, the plant has practiced full lime softening and, therefore, the clarifier has operated at a higher pH range in order to achieve greater hardness reductions and improved total organic carbon removal. During the Cypress Temporary DPR project, the Cypress Temporary DPR WTP expects to meet these two treatment objectives when blending the surface water (from Lake Kickapoo and Lake Arrowhead) with RO permeate. However, the City would like to retain the flexibility to practice partial lime softening when conditions warrant.

This desired level of flexibility is understandable. However, the US Environmental Protection Agency's CT Tables for chloramines only apply at pH levels between 6 and 9, i.e., from 5.5 through 9.49. Because zone D5 includes both the clarification and re-carbonation processes and re-carbonation lowers pH, the pH in zone D5 must be measured before re-carbonation. Consequently, the operators must monitor the pH for disinfection zone D5 at the outlet of the clarifiers rather than at the typical site located at the end of the disinfection zone. The alternate location will ensure that the Cypress 2010 WTP plant does not overestimate disinfection levels when the clarifier pH reaches 9.5.

- **The operators must have at least four filters in operations whenever the plant is treating water.** This operational constraint is needed because zone D5 contains

Mr. Mark Southard
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both the plant's gravity filters and the disinfection contact time within the zone depends on the flow rate of the water and the total volume of water contained in the treatment units. Consequently, the CT calculations will overestimate the level of viral inactivation achieved if fewer than four filters are on line whenever the plant is treating water.

As mentioned above, when the raw water for the Cypress Temporary DPR WTP can be a blend of surface water pumped from the Headquarters Road Pump Station (HQrdPS) (Lake Kemp) and the River Road WWTP (RRWWTP) effluent, the combined raw waters are treated through the sedimentation basin, MF and RO membranes units, and UV disinfection units before being pumped to the Cypress 2010 WTP for further treatment. Approximately 12,000 linear feet of raw water transmission line from Lake Kemp is pretreated with chlorine dioxide prior to blending with the RRWWTP water. Because the Lake Kemp water, after blending with RRWWTP effluent, then receives adequate treatment for surface water through the Cypress Temporary DPR WTP, the City and TCEQ have agreed that no separate disinfection zone is necessary for the chlorine dioxide applied to the Lake Kemp water.

It is also important to note that this approved CT study is only applicable for the duration of the Cypress Temporary DPR Project and only if the plant adheres to the operational constraints identified above. **Therefore, you must submit another revised CT study when the plant returns to its traditional source water and operational practices.**

If you have any questions concerning our evaluation or if we may be of other assistance, please contact Ms. Sylvana (Sam) Turner at (903) 535-6132, by e-mail at sylvana.turner@tceq.texas.gov, or by correspondence at:

Technical Review and Oversight Team (MC-159)
Texas Commission on Environmental Quality
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Sincerely,

Joel Klumpp, Manager
Plan & Technical Review Section
Water Supply Division
Texas Commission on Environmental Quality

JPK/JCS/SAT

Enclosure: CT Study Template

cc w/ enclosure: Mr. Daniel K. Nix,
Operations Manager, Public Utilities
City of Wichita Falls

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