

From: David Sloan
Sent: Thu, 8 Jan 2015 18:44:06 +0000
To: Russell Schreiber (Wichita Falls)
Cc: Daniel Nix (Wichita Falls); Shawn Garcia; Mark Southard
Subject: RE: Proposed Exhibits
Attachments: WF-TCEQ Agenda 1-14-15.docx, Concept Summary.docx, Proposed Blend Ratio Accounting.docx, Proposed Modifications to DPR Conditions.docx

Russell: I am attaching the following exhibits, with others still to follow:

1. Draft Agenda for 1-14-15
2. Concept Summary
3. Proposed Blend Ratio Accounting
4. Proposed Modifications to DPR Conditions (revised to correct error in formula, last line of 4.j.)

In addition to the other exhibits I am preparing, I think it would be great to have a summary, preferably a single page, of the production, quality and consistency of operation for the DPR facility since it began operation in July, if this is something the City can prepare.

DAVID SLOAN / FREESE AND NICHOLS, INC.

From: David Sloan
Sent: Wednesday, January 07, 2015 5:00 PM
To: Russell Schreiber (Wichita Falls)
Cc: Daniel Nix (Wichita Falls); Shawn Garcia; 'Mark Southard'
Subject: Proposed Modifications to DPR Conditions

Russell:

I have prepared a list of proposed modifications to the DPR conditions contained in Enclosure A of the August 5 TCEQ approval letter for the DPR project. I will provide the other exhibits later this week, but this is a bit tedious and I wanted to give everyone extra time on it, to make sure I haven't overlooked anything. There are a couple of references in the original document to consulting with TCEQ before changes in source water, specifically mentioning the possibility of adding water from Lake Kemp. I'm not proposing to change these since they merely require what we are doing right now, but I'm open to other opinions. Please let me know if you have any questions.

Regards,

DAVID W. SLOAN, P.E., BCEE
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MEETING AGENDA



Innovative approaches
Practical results
Outstanding service

MEETING: Wichita Falls Lake Kemp/DPR Integrated Desalination
DATE OF MEETING: January 14, 2015
OFFICE/CONF ROOM: TCEQ Water Supply Division
TIME: 1:00 p.m.
MEETING ORGANIZER: Joel Klumpp

AGENDA

TOPIC	WHO	TIME
1. Introductions & Review of DPR Status	Russell Schreiber/ Daniel Nix	1:00
2. Water Supply Status & Drought Projections	Russell Schreiber/ David Sloan	1:05
3. Proposed Modifications to Cypress WTP/DPR Projected Water Quality Disinfection Strategy Physical Modifications	David Sloan	1:10
4. Proposed Blend Ratio Accounting Basis	David Sloan	1:25
5. Proposed Step-wise Implementation	David Sloan	1:35
6. Requested Changes to DPR Authorization	David Sloan	1:45
7. Action Items	All	1:55
8. Adjourn		2:00

Wichita Falls Lake Kemp/DPR Integrated Desalination Concept Summary

The City of Wichita Falls continues to face a historic, catastrophic drought which has diminished available municipal water supplies and challenged the City to maintain essential water service through this period. Although the intensity of heat and evaporation have abated, rainfall has continued below normal for the region, and lake levels continue to decline. The City has responded with a series of measures, most notably extreme conservation measures which have reduced water consumption, and implementation of an emergency program to blend purified effluent from the River Road Water Resource Recovery Facility (WRRF) with water from Lake Arrowhead and Lake Kickapoo prior to final treatment at the Cypress Water Treatment Plant. This program is generally referenced as the Emergency Direct Potable Reuse (DPR) program.

By letter dated June 27, 2014, The Texas Commission on Environmental Quality provided conditional authorization for the City to blend effluent from the River Road WRRF, following treatment through the City's 2008 microfiltration/reverse osmosis (MF/RO) treatment facility, with other supplies prior to final treatment. The City proceeded with blending in accordance with these provisions on July 6, 2014. The authorization was limited to an initial period of six months, but the City is proceeding with installation of UV disinfection equipment to comply with the TCEQ's principal condition for extended operation, and the authorization has been extended through February 28, 2015 to allow completion and startup of the UV system. However, concerns regarding continued loss of water supply remain, threatening even the DPR program, which is dependent on blending with equal parts of fresh water from Lakes Arrowhead and/or Kickapoo.

The City's third reservoir, Lake Kemp is a brackish source which requires desalination prior to use for drinking water. The facilities constructed for this purpose are the same facilities currently used for the DPR program, which was presumed to be of limited duration and therefore not in long-term conflict with the use of the Kemp supply. The City now proposes to blend and concurrently treat reclaimed water and Kemp water through the City's existing desalination facility, and credit the Kemp blending as a substitute for all or a portion of the current Arrowhead/ Kickapoo blending. Total finished water from the Cypress WTP derived from reclaimed water would remain at or below 50%. The City proposes to implement this source as soon as possible to conserve the Arrowhead and Kickapoo supplies for continued, but reduced, use to delay or prevent their exhaustion.

Wichita Falls Lake Kemp/DPR Integrated Desalination

Proposed Blend Ratio Accounting

The original DPR concept assumed blending raw surface water at least equal to the amount of permeate derived from the DPR source water. If Lake Kemp is used as the sole source of blend water, an equivalent blend would result from blending raw Kemp supply at least equal to the amount of DPR source water prior to membrane treatment. However, it is also appropriate to consider a combination of raw water supplies to meet the overall blending requirement. This will allow the City maximum flexibility to utilize sources in response to their current and projected availability while maintaining compliance with TCEQ authorization.

The proposed combination blend calculation considers the share of RO permeate originating from the DPR source as a percentage of the total water produced. This approach considers the blending from brackish surface water prior to desalination, and blending from fresh surface water prior to conventional treatment.

DPR % of permeate = DPR source flow (MGD) / (DPR source flow + Kemp raw flow) x 100%

DPR share of permeate (MGD) = DPR % x Total permeate flow

DPR % of total = DPR share of permeate / (permeate flow + Arrowhead/Kickapoo raw flow) x 100%

The following example illustrates this approach:

7.2 MGD of DPR source water is mixed with 5 MGD of raw water from Lake Kemp. At an overall MF/RO recovery of 67%, 8.17 MGD of permeate is produced. An additional 1.8 MGD of raw water from Lake Arrowhead is blended with the permeate before treatment through the 2010 conventional plant. The resulting DPR source percentage is calculated as follows:

DPR % of permeate = $7.2 / (7.2 + 5) \times 100\% = 59.0\%$

DPR share of permeate = $59\% \times 8.17 \text{ MGD} = 4.82 \text{ MGD}$

DPR % of total = $4.82 / (8.17 + 1.8) \times 100\% = 48.4 \%$

The revised calculation will require measurement of the following streams:

1. DPR water delivered from River Road WRRF (WWTP) to Cypress WTP
2. Kemp water delivered from Headquarters Road Pump Station to Cypress WTP
3. RO permeate delivered from 2008 membrane plant to Waste Lagoon No. 3
4. RO permeate pumped from Waste Lagoon No. 3 to Splitter Box
5. Arrowhead/Kickapoo water delivered from Secondary Reservoir to Cypress WTP

Wichita Falls Emergency DPR Facilities

Proposed Modifications to Conditions for the Temporary DPR WTP

Reference Enclosure A of TCEQ Conditional Approval Letter dated August 5, 2014

- 4.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 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 instantaneous 15-minute readings must be below 50.00%. The 2-hour averages begin at midnight and continue every 8 readings. 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%. Continuous flow metering of the following streams will be used to determine the percentage originating as RRWWTP effluent:

- (1) RRWWTP effluent delivered to the Cypress WTP
- (2) Lake Kemp raw water delivered to the Cypress WTP
- (3) RO permeate produced from DPR treatment train
- (4) Permeate pumped from Waste Lagoon No. 3
- (5) Secondary Reservoir raw water delivered to the Cypress WTP

DPR % of permeate = DPR source flow (1) / [DPR source flow + Kemp raw flow (2)] x 100%

DPR share of permeate = DPR % x Total permeate flow (3) OR (4)

DPR % of total = DPR share of permeate / [permeate flow + Secondary Reservoir RW (5)] x 100%

16. Because of concerns regarding the potential introduction of contamination into the Lake Kemp/Headquarters Road Reservoir raw water line, the 1961 SWTP and 1987 SWTP treatment equipment and associated clearwells and piping, the following conditions must be met:
- a. The 2008 SWTP flow control vault's valve located on the Lake Kemp/Headquarters Road Reservoir pipeline must continue to remain closed unless the Headquarters Road Pump Station is delivering water to the Cypress WTP. The City must take the following actions:
 - i. The valve must be closed within 30 minutes after flow from the Headquarters Road Pump Station is interrupted.
 - ii. When the valve is opened, flow from the Headquarters Road Pump Station must be initiated within 30 minutes after valve opening.
 - iii. Valve position shall be visually inspected daily.
 - iv. [language from existing item a.ii.]
 - v. The results of the daily visual inspections and any corrective actions must be recorded, kept onsite, and made available to the TCEQ upon request.
 - vi. At the end of DPR operations, the Headquarters Road Pump Station must be operated for at least one week without flow from the River Road WWTP before reverting to normal operations. During this transitional operation, permeate will continue to be treated through the 2010 conventional WTP.
 - b. The weir gates in the Cypress Splitter Box to the 1961 and 1987 SWTPs must be maintained closed and:
 - i. Visually inspected weekly 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. [language from existing item]

- iv. [language from existing item]
- v. The results of the weekly visual inspections and any follow-up inspections must be recorded, kept onsite, and made available to the TCEQ upon request.

24.l. The DPR% of 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%.

33.d. action to reduce the output of the permeate transfer pumps at Waste Lagoon No. 3 when the DPR % of total finished water exceeds 50.00%; and