From: Crawford, Susan
Sent: Mon, 9 Feb 2015 16:29:33 +0000
To: Daniel Nix
Cc: Russell Schreiber; Vandegrift, Jillian C.; da Silva, Allegra K.
Subject: FW: Wichita Falls IPR and DPR Case Study
Attachments: WichitaFallsCaseStudyFINAL.docx

Daniel,

Here's the draft write-up for the Wichita Falls case study that will go in the EPA DPR document we are preparing as part of our contract with them. You will note that there is no discussion currently about the UV system. We left that out so that you add this as you see fit. This document is really your story to tell others, so you can edit it to add more information if you like and as you see fit to be accurate.

Most of the information provided here is from public documents and your previous presentations. If you want to use track changes to edit, that would be great!

Let me know how I can help or answer any questions you may have. We'd like to get this back from you next week if possible.

Regards,
Susan L. Crawford, PE, BCEE | Senior Vice President
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From: Vandegrift, Jillian C.
Sent: Friday, February 06, 2015 3:47 PM
To: Crawford, Susan
Cc: da Silva, Allegra K.; Bell, Kati
Subject: RE: Wichita Falls IPR and DPR Case Study

Hi Susan,
Here is the final version of the write up with your edits incorporated. Thanks!

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13.6 River Road WWTP and Cypress WTP Permanent IPR and Emergency DPR Project

Figure 13-X: Left: Temporary DPR Pipeline Installation (Source: Nix, 2013) Right: Lake Arrowhead Levels in 2013 (Source: Nix, 2013)

Location: Wichita Falls, Texas

Size: **DPR:** 5 MGD **IPR:** 16 MGD

Year of Installation: **DPR:** 2014 **IPR**: TBD

Status: **DPR:** Operational **IPR**: Planning Stages

Cost: **DPR:** $13 Million **IPR:** Projected $33.5 Million

Background: Lake Arrowhead and Lake Kickapoo are the main surface water supplies for the City of Wichita Falls, Texas. During 2013, both lakes were less than 35% full sending Wichita Falls into extreme drought conditions with no readily available water supply solution (Khan, 2013). By May 2014, Wichita Falls declared a Stage 5 drought catastrophe with a total combined reservoir capacity in the region of 20% (TRNS, 2015). Wichita Falls, however, proactively began investigating wastewater reuse following the drought of 1995-2000 during which they supplemented their drinking water supply with highly saline water from Lake Kemp and Lake Diversion (Dahl, 2014). By using microfiltration and reverse osmosis, they were able to integrate the treated saline lake water with the existing potable water supply. Wichita Falls Public Works Department was confident they could do the same with municipal wastewater when faced with the most recent drought conditions. The City drafted a two-phase project plan involving both a permanent indirect potable reuse scheme and an emergency temporary direct potable reuse scheme. Public outreach techniques regarding potable reuse were used to educate doctors and professors of environmental science and chemistry and the general public (Dahl, 2014). Ensuring the community was comfortable with the potable reuse concept immensely helped the projects evolution. The DPR scheme was implemented because drought conditions led to severe and abrupt drinking water needs for the City of Wichita Falls. Water conservation methods were practiced in a staged format and saved up to 2 BG of water, however were not significant enough to sustain a reliable drinking water supply (Nix, 2013). TCEQ

approved the DPR scheme after reviewing the project proposal and accounting for the proposed long-term IPR system solution. Since there are no regulatory guidelines for DPR in Texas (or in any other state), TCEQ and the City of Wichita Falls Public Works Department collaboratively discussed the necessary treatment requirements and effluent limitations. The emergency DPR project began operating online on July 9, 2014. The system transfers treated effluent from River Road WWTP to Cypress WTP where MF and RO processes occur, followed by holding in an engineered storage buffer for 24 hours and subsequent blending with Lake Arrowhead surface water, constituting 50% of the total blended water volume. This process creates an additional 5 MGD (33% of daily demand) of municipal drinking water. (Khan, 2013). 2.5 MGD of reject from the MF and RO processes is discharged to the Big Wichita River (Nix, 2013).

The DPR system will operate until a $33.5 million loan from the Clean Water State Revolving Fund is approved, and design and construction of the IPR pipeline and River Road WWTP improvements is complete (Ingle, 2014). The loan process is expected to be finalized in early 2015. The IPR project will utilize the existing 12-mile pipeline constructed for the DPR project to complete the 15-mile pipeline from River Road WWTP to Lake Arrowhead. The City has received a new discharge permit from TCEQ for the permanent IPR installation. The IPR project will ultimately pipe up to 16 MGD of highly purified effluent from River Road WWTP back to Lake Arrowhead, which will serve as an environmental buffer, before the water is treated at the city's conventional water treatment plants and distributed to customers. River Road WWTP will be retrofitted with a new phosphorous reduction process, tertiary filtration processes and a new pump station using loan money to fund the upgrades (Ingle, 2014).

Treatment Process:

DPR: WWTP→WTP (MF→RO)→Holding Lagoon (Engineered Storage Buffer)→Blending 50-50→Conventional Water Treatment Plant (Chlorine dioxide pre-disinfection, coagulation, lime softening, sedimentation, re-stabilization, gravity media filtration, fluoridation).

IPR: River Road WWTP → Lake Arrowhead → Conventional Water Treatment Plant (Chlorine dioxide pre-disinfection, coagulation, lime softening, sedimentation, re-stabilization, gravity media filtration, fluoridation).

DPR Permitting and Monitoring:

Although there are no indirect or direct potable reuse regulations currently implemented in Texas, TCEQ reviews submitted project proposals individually and grants approval and discharge permits on a case-by-case basis (CDM Smith, 2014). For the DPR project, TCEQ required an intense 45-day testing period following installation which was complete in December, 2013. TCEQ subsequently asked that an additional 30-day testing period occur, and approved a permit on June 28, 2014 based on successful analysis of a 6,000 page compilation of the testing results.

For the temporary direct potable reuse scheme as of 2013, the range of chemical and microbial constituents required for monitoring are similar to the current Safe Drinking Water Act (SDWA) requirements (CDM Smith, 2014). The DPR process is required to achieve 9-log virus removal, 7-log Giardia removal, and 5.5-log Cryptosporidium removal as specified by TCEQ. TCEQ does not give log-

removal credits for the reverse osmosis process during DPR treatment with respect to the microbial log-removal requirements. As a result, other employed treatment methods must successfully inactivate these microbial agents. TCEQ requires both bi-weekly and daily monitoring of *Cryptosporidium* utilizing two different methods (EPA method 1623 and polymerase chain reaction (PCR)) (CDM Smith, 2014). Other monitoring parameters include *Giardia*, *E. coli*, full metal scans, algae counts, inorganic, organic, radioactive, and secondary chemicals specified under Texas drinking water codes, and disinfection byproducts (CDM Smith, 2014). There are 40 sampling and monitoring locations within the DPR System to ensure public health is protected and off-speculation drinking water is prohibited from entering the distribution system (**Figure 13-X**).The City of Wichita Falls has historically produced high-quality drinking water, and pride themselves on the certification system with respect to plant operators. Wichita Falls plant operators must be certified by the State of Texas and continue training throughout their career lifetime. They can achieve certification levels A through D, A being the highest achievable level. Operators must be recertified every three years (City of Wichita Falls, 2014). In total, the City of Wichita Falls has five class A operators, 19 class B operators, and 11 class C operators (City of Wichita Falls, 2014).

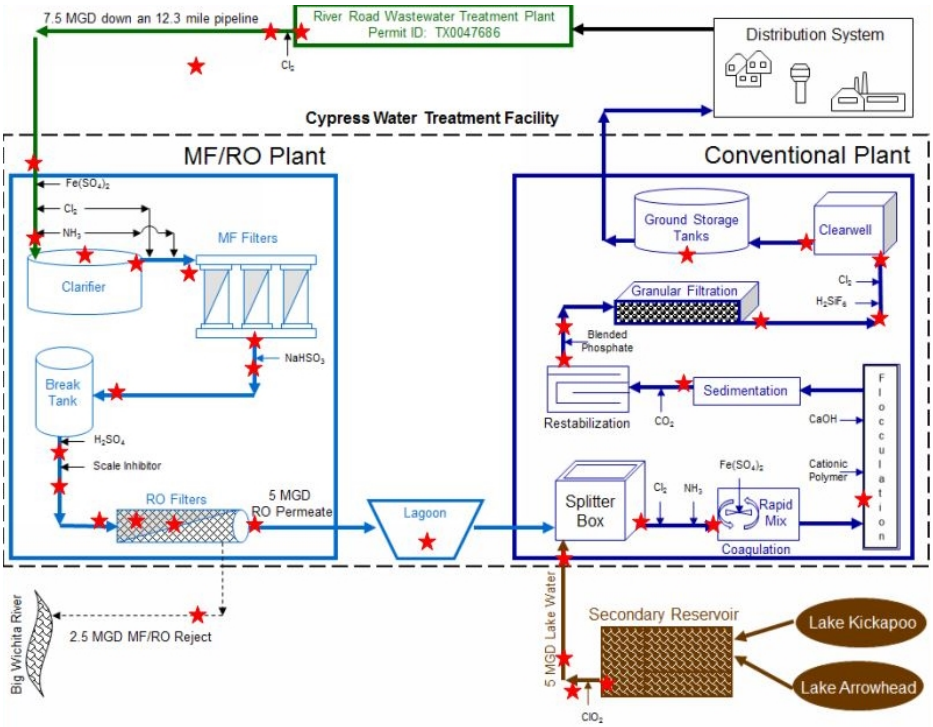

Figure 13-X: Sampling Locations within Emergency DPR Project (Source: Nix, 2013)

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