

## Marlo Wanielista Berg - Re: Big Springs Reuse project - Questions please

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**From:** James Weddell  
**To:** Wanielista Berg, Marlo  
**Date:** 1/29/2009 3:34 PM  
**Subject:** Re: Big Springs Reuse project - Questions please

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James "Red" Weddell, P.E.  
 Technical Review & Oversight Team  
 Public Drinking Water Section - MC 155  
 Water Supply Division

P.O. Box 13087  
 Austin, TX 78711-3087

ph # (325) 481-8056  
 fax # (325) 658-5431  
 email: jweddell@tceq.state.tx.us

>>> Marlo Wanielista Berg 1/29/2009 2:37 PM >>>  
 David and Red,

I will need one of you to Peer review this sucker (any takers?), but first I have a few questions I would love your opinion on.

1. Does this need a new PWS ID. For City of Wichita we used the City of Wichita, this one will feed at least 3 Cities. It will use Big Spring WWTP effluent. I know Alicia wants to give it its own PWS ID, but what do we do for this letter? Tack it on Big Springs? another CRMWD source? What do you think? I think we have to give it the same ID # as the SWTPs normally, but sense it is going to go to multiple PWSs' SWTPs Alicia's method may be the best. Now the raw water source code would be different from Spence's. I think Greg R and John came up with "R" in lieu of the "G" and "S" to precede the PWS ID #.
2. Do we want daily data from the WWTP operations during that time? The flow rates, chemicals etc. I think it's a bit far reaching, but it could be considered pretreatment. It is pretreatment, and they are required to monitor and report certain parameters. You can get a copy of their permit and see what they are required to do and at what frequencies. Turbidity will not be one, but that is easy for them to run onsite.
3. Do we need the quadrangle map since there no intake really. Just a plant.... I think it can't hurt to ask for it, what do you think? Check with John M. I think we want the location of where the water discharges into the Spence pipeline.
4. I am asking for final reuse plant effluent and SWTP raw water pipeline samples for Crypto, Giardia, Viruses and HPC. Do I need reuse plant feed water samples too? I would be neat to see if they have low microbial counts in the feed water and give comfort, but aren't we really interested in the effluent of reuse plant/raw water for SWTP? Again look at a copy of the WW permit which may require monthly effluent HPC, but I don't think they have to monitor influent levels. I agree that it would be nice to see. The other problem is if we say 1/month, then they could select the day of low loading indicators to collect the sample. Now I am sending you back to look, but does their WW compliance indicate any problems? Could call Lindsey. If no violations, then lets live with the WW effluent/RO membrane feed water data.

5. The operator is still a question. We required "A TNRCC certified operator, who has been properly trained by the membrane vendor " in the Wichita Falls Report. We also say it can be WW or Water. We told them at the meeting they needed a C (SW) on site and B (SW) on call. I still like SW operators, but not sure with the older letter. What do you think? I think the SW because of the knowledge regarding drinking water. However, at Big spring this may be the same person because of the size.

6. Do we want them to run DITs daily or weekly? On RO membranes

7. BIG ONE - Do they need a challenge study.....Not as long as they go in at the head SWTP.

8. BIG ONE - we have them take measurements, but not report. Who checks these reports? Lets say a copy has to come in with each month's MOR for each SWTP that received a blend of the membrane treated WW effluent each month.

Thank you, and if you could give me some opinions by Monday afternoon, that would be very great!

Marlo Wanielista Berg, P.E.  
Texas Commission on  
Environmental Quality  
Public Drinking Water  
(512) 239-6967  
fax (512) 239-6050

**Marlo Wanielista Berg - Big Springs Reuse**

**From:** Marlo Wanielista Berg  
**To:** David Williams; James Weddell; Marlo Wanielista Berg; Reyna Holmes  
**Date:** 11/14/2008  
**Time:** 9:30 AM - 10:30 AM  
**Subject:** Big Springs Reuse  
**Place:** Reyna's office and phone

*upset + not  
work in*

*Red*

*- Detritation.  
- Chlorine? Titus - Doka  
4-log viral*

All,

Shoot Reyna will be out, but we can discuss to get our ducks in a row and give her good suggestions. I hope we can still use her office :)

I think it would be good to talk a bit more before the engineer comes in. I have reviewed the Pilot Protocol, no real big problems (some questions). But there were a few outstanding issues from last meeting of a general nature. I will list them below

Pilot questions (some maybe mute if they have finished the pilot)

- No*
1. They are using RO, do they need the same leaf length and manufacturer on the pilot as on the full scale?
  2. Do they need to figure out how to do DITs on the full scale RO (thus do them on the pilot scale RO)
  3. I want micro testing on the pilot effluent. I was thinking Crypto, Giardia, E. coli every 2 weeks or as much as we can get - do you agree?
  4. Challenge testing? do we need it? possible get infect Crypto, Giardia and E. coli
  5. they are doing on a DIT on the non-RO membranes. I am thinking it should met the Crypto pressure requirements from the guidance manual?
  6. Full Subchapter F (secondaries too) sample. Effluent vs. "stream"? Secondaries too? *How many?*

*How many plate count, Crypto, Giardia, viral,*

Full scale questions

1. Monitoring/Reporting - in the minutes Ruben said TCEQ would "get them" meaning the reports... Do they have to do SWMOR? Who will look at them? Hopefully we can coordinate with WW. For ASR they do a permit with the drinking water standards as the permit limits. That would make sense.
2. Do they have to do the DIT and other stuff on the MMOR - like the DIT after 0.150 reading? RO behind it?
3. I think we agree that only good water should go into the pipeline. Not sure how to say "no upsets/bypasses"
4. SW operator - correct?
5. UV - do we need UVMOR and verification *No.*

Thanks!

Marlo Wanielista Berg, P.E.  
 Texas Commission on  
 Environmental Quality  
 Public Drinking Water  
 (512) 239-6967  
 fax (512) 239-6050

*~ Marty - DITs, Turb, Conductivity.  
On, UV,  
Where center is significant*

*Capacity?*

## Marlo Wanielista Berg - Re: Regional Review for the Big Springs Reuse Pilot Plant Protocol

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**From:** William Edmiston  
**To:** Wanielista Berg, Marlo  
**Date:** 2/10/2009 1:12 PM  
**Subject:** Re: Regional Review for the Big Springs Reuse Pilot Plant Protocol  
**CC:** Barker, Jed; Buckner, Lindsey

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We have no objection to the pilot project. Three questions occur to us:

1. Will NELAC certified labs be used for the pilot?
2. If it is given a pws registration for full operation, there is no public hearing, correct? However, if it is given WQ permit, there is an opportunity for public hearing, correct?
3. Palatability issues aside, what do the customers for this water think?

Wm. Michael Edmiston  
Water & Waste  
Midland Regional Office

 Please consider the environment before printing this e-mail

>>> Marlo Wanielista Berg 2/10/2009 12:21 PM >>>  
Hi there,

Do you know when you think you can give me comments by? The engineer is waiting to begin his pilot and I want to give him a date that he can expect an answer from us.

Thank you,

Lindsey,

Attached is my letter reviewing the CRMWD Big Spring Reuse Pilot Plant protocol. I would appreciate your review of this document since this type of facility will be the first in the state (if it built). I tried to not only have them look for MCL contaminants, but also for microbial contaminants. Surface Water Treatment Rule assumes that the facility is receiving lake or river water, and assumes a viral and pathogen load. This raw water source has the potential of having higher viral and pathogen loads, so I am asking them to monitor it.

We are not sure how the facility will be regulated as of yet. WW and PDW will be meeting to see who will issue the permit (if any), who will check the reporting, and who will do the on-site investigations. But that is still up in the air.

If possible, can you get me comments by Friday? They are starting the pilot up on the 23rd and I want to get them the letter soon.

Thank you,

**From:** David Williams  
**To:** Marlo Wanielista Berg  
**Date:** 2/6/2009 3:50 PM  
**Subject:** Re: Peer Review of Big Springs Reuse  
**Attachments:** Protocol DAW comments.doc

Marlo

See attachment for comments and suggestions.

David

>>> Marlo Wanielista Berg 2/4/2009 9:57 AM >>>  
David,

Thank you for volunteering to Peer Review the Big Springs Reuse pilot protocol letter.

The SOS is attached and the file is located at  
J:\PDW\0 TROT\Exceptions\Membranes\Big Springs Reuse\Protocol.doc ( file:///J:0  
TROTSPRINGS Reuse.doc )

For your review.

They are beginning the Pilot on the 23rd, so I would like to get them the letter by the  
end of the week if possible. Is that possible for you?

Thanks,

Marlo Wanielista Berg, P.E.  
Texas Commission on  
Environmental Quality  
Public Drinking Water  
(512) 239-6967  
fax (512) 239-6050

February XX, 2009

Mr. Ignacio Cadena  
Freese and Nichols, Inc.  
4055 International Plaza, Suite 200  
Fort Worth, Texas 76109-4895

Subject: Membrane Filtration of Wastewater Pilot Study Protocol  
CRMWD Big Spring Reg Water Reclamation Project- PWS ID 1140038  
Howard County, Texas

Mr. Cadena:

We have reviewed your cover letter and enclosed documents received on July 14, 2008 and information received at a meeting held on November 17, 2008 at TCEQ. Your letter notified the Texas Commission on Environmental Quality (TCEQ) of the membrane filtration pilot study for advanced treatment of wastewater effluent that Colorado River Municipal Water District (CRMWD) plans to conduct. This letter included a proposed pilot study protocol for our review. The location of the pilot plant will be located at the Big Spring Wastewater Treatment Plant. For full-scale operation, it is proposed that the membrane filtered wastewater effluent will be discharged to the raw water pipeline for the City of Big Spring, City of Snyder, and City of Midland Water Treatment Plants.

Based on our review, we find the submitted 90 to 120-day HF MF/UF & RO Membrane Pilot Study Protocol generally acceptable if amended to include the following data and the amended Protocol is provided to the TCEQ with the final report.

1. Please provide a detailed description of your waste water plant treatment process and any pretreatment process for the membranes. Please submit copies of the wastewater treatment plant monitoring for permit requirements that occurs during the pilot study. During all stages of the pilot study, all pretreatment units must be monitored and results record at least one time each day or any time they are altered
  - a. Flow rate and hydraulic detention time (or surface over flow rate);
  - b. Type of chemicals being feed and their dosages; and
  - c. Chemical injection and monitoring points
2. You show a recycle return to the head of the pilot plant. In the pilot study report, please describe the flow rate, frequency and duration of the recycle stream. The pilot recycle stream must be the same (percentage of recycled water in the plant's influent stream) as the recycle stream expected at the proposed full scale plant.

3. Please include with the final report a copy of a USGS 7.5 quadrangle map, or maps, showing the pilot study's location, the proposed full-scale plant's location, and the location where the reuse facility will discharge water to the raw water pipeline.
4. All on-site analytical procedures, equipment calibrations and frequencies, and quality assurance/quality control (QA/QC) data is to be recorded and submitted with the pilot study report. Please note that all flow indicating and control devices **must have been calibrated** prior to starting the pilot study using a method specified by the manufacturer. Your submittal discusses verification of equipment, but not calibration. Data for all calibration methods and frequencies must be provided to verify the results of the pilot study report as stated in Item No. X. of our Review of Pilot Study Protocols for Membrane Filtration Guidance document. Acceptable calibration frequencies and methods can be found at this same location.
5. The submittal discussed the process for performing a turbidity spike. Please provide at least one year of historical high turbidity levels for the source water (treated waste water). The turbidity spiking event should be at the 95<sup>th</sup> percentile high turbidity level and of a duration normally seen in the source water. If an operation level will be set where turbidities above a certain level will be diverted from the reuse plant, please explain the operations and the max turbidity level can be used for the spiking event.
6. In Section 2.1, the pilot plant operator is instructed to contract the engineer when unscheduled downtime greater than 24 hours occurs. Please assure that the engineer contacts TCEQ to discuss if the pilot run can continue or if it should be restarted.
7. Please provide a description of the type and length of fibers and sheets used in pilot study membrane units. The UF or RO membrane units being tested must be of the same design and must contain fibers or sheets of the same length, type, and configuration as the proposed full-scale plant.
8. Please verify the membranes used in the pilot study must be "preconditioned" in accordance with manufacturers' recommendations. Preconditioning, if required, must be completed prior to beginning the pilot study.
9. Please assure that the items found in XIV.D of our Review of Pilot Study Protocols for Membrane Filtration guidance document are measured at least once a day during stage 1, and at least every four hours during stages 2 and 3. Many of these items are mentioned in 2.4.2, but the frequency of monitoring is unclear. The items must be measured for both the MF/UF and RO membrane systems.
  - a. Membrane rack/tank inlet pressure pounds per square inch (psi);
  - b. Membrane rack/tank outlet pressure in psi;
  - c. Filtrate/permeate pressure in psi;
  - d. Feed water flow rate in gallons per day (gpd);
  - e. Instantaneous filtrate/permeate flux rate in gallons per square-foot of feed water side of the membrane per day (gfd);
  - f. Reject/bleedby/concentrate water flow rate (if applicable) in gpd; and,

**Comment [daw1]:** The historical data in the preliminary report provided conductivity measurements with estimated TDS based on those values.

**Comment [daw2]:** This may be redundant with Item 6 at the end of your letter.

- g. Recycle water flow rate (if applicable) in gpd.
10. During the November, 2008 meeting it was discussed that a disinfectant would be applied to the feed water during the wastewater treatment process. Please assure that the items found in XIV.E and XIV.G of our Review of Pilot Study Protocols for Membrane Filtration guidance document are measured at least once a day.
- All disinfectant dosage levels at application points;
  - All disinfectant residuals at monitoring points; and
  - Feed water disinfectant residuals;
  - Filtrate/permeate water's disinfectant residual levels;
  - Clean in place (CIP), mini CIP, Chemical enhanced backwash and chemical soaking solutions' pH, disinfectant residual and temperature levels;
  - Backwash/backflush/reverse flow supply water's disinfectant residual and pH levels if adjusted;
  - Finished water Total Trihalomethanes (TTHM); and
  - Finished water Haloacetic Acids (HAA5)
11. Please amend Table 2.4 to include MF/UF Feed water sampling for hardness, iron, manganese, aluminum and TSS every 30 days.
12. Please provide a list of contaminants that may impact the performance of the piloted RO membranes (such as Silica). Assure that these contaminants are added to Table 2.4.
13. Please include a detailed description of the DIT procedure to be performed on the UF/MF membrane. Please be aware DIT calculations must conform to the formulas presented in the United States Environmental Protection Agency's (US EPA) Membrane Filtration Guidance Manual - EPA 815-R-06-009, November 2005. The DIT must be applied in a manner such that 3 um breach contributes to the response from the test.
14. Your protocol states that particle counters will be used in the pilot study. In the meeting November 2008 meeting you stated that particle counters will not be utilized. Please update the Protocol to reflect turbidity monitoring only for indirect integrity testing.
15. Please assure the use of a Turbidimeter with the ability to monitor in the range of expected feed water turbidities. The turbidity of the water produced by each membrane unit must be measured using the Hach FilterTrak Method 10133.
16. During past meetings with TCEQ it was determined that the effluent of the treatment facility must be of the same quality of or better as the water used as than the raw water for supplied to the drinking water treatment plants. To prove this as evidence, please provide the following:
- One sampling event during phase 2 of the pilot study comparing the final effluent of each of the piloted treatment trains and the raw water in the raw water pipeline. This sampling event should cover all the samples required in 30 TAC §290.41(e)(1)(F) include pH, total coliform, *Escherichia coli*, turbidity, alkalinity, hardness, bromide total organic carbon, temperature, color, taste and odor, regulated volatile organic compounds (VOC),

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regulated synthetic organic compounds (SOC), and regulated inorganic compounds (IOC). The list of VOCs, SOCs, and IOC can be found in 30 TAC 290 Subchapter F.

- b. Nitrate and Nitrate samples from the final effluent of each piloted treatment train each week during phase 2.
  - c. At least 2 *Cryptosporidium*, *Giardia*, and heterotrophic plate count samples from the final effluent of each of the piloted treatment trains and comparison samples taken at the same time from the raw water pipeline to the drinking water treatment facilities. If *Cryptosporidium* sampling has been performed on the raw water pipeline for the Long Term 2 Enhanced Surface Water Treatment Rule (LT2), no additional samples are required on the raw water pipeline. Please submit the LT2 sample results with the pilot study report.
  - d. At least 2 Viral samples from the final effluent of each of the piloted treatment trains and comparison samples taken at the same time from the raw water pipeline to the drinking water treatment facilities. The recommended virus to test for those used to complete the Information Collection Rule. Please see <http://www.epa.gov/nerlcwww/termicro.pdf> for the Viral Assay Method in Section VIII. If you have another viral test you would prefer, please contact us to discuss it. If the Viral load in the final effluent from the pilot facility is much higher than that of the raw water for the drinking water facility, then more treatment at the reuse facility or the drinking water treatment plant may be required.
17. Please include the following membrane performance data in your pilot report for both the MF/UF membranes and RO membranes.
- a. Expected time frame between chemical CIP procedures;
  - b. Frequency, duration and procedure for each CIP and chemical used during each CIP. Please note these chemicals must conform to the ASNI/NSF Standard 60.
  - c. Frequency, duration, procedure and chemicals for any other chemical cleaning procedure such as "mini CIP", "chemical enhanced backwash" and "chemical soaking"; and
  - d. Pretreatment requirements.

#### Notes for Full Scale Design and Operation

1. To assure no contamination of the final reuse plant effluent occurs, when operational there will need to be 500 feet between the reuse plant unit will need to be at least 500 feet and from any wastewater treatment units. There will also need to be backflow prevention placed on the reuse plant's reject water lines.
2. As discussed at the November, 2008 meeting, a Class B Surface Water Operator will need to be employed by the reuse facility. Class C Surface Water Operators can operate the facility if the Class B operator is on call.
  3. If a UV system will be used to ~~inactive-inactivate~~ viruses or other pathogens, then the UV system will need to have a validation study approved by TCEQ. ~~No matter~~ Regardless of the use, the UV system will need to be NSF approved.
  4. Flow measuring devices will be required on the full scale plant on the feed to UF/MF membrane treatment facility, the UF/MF membrane backwash supply, the UF/MF membrane filtrate, the RO reject line, and on the final effluents to the SWTP raw water pipeline.
  5. LT2 sampling will need to be performed on the reuse plant final effluent beginning the day water from the reuse facility enters the raw water pipeline to the surface water

treatment plants.

#### **Proposed Pilot Treatment Train**

The submitted HF MF/UF & RO Membrane Pilot Study Protocol proposes a study period of 90 to 120 days using Big Spring Wastewater Effluent. The HF MF/UF & RO membrane pilot study treatment train will include:

- HF MF/UF membrane test skids;
- Reverse Osmosis test skids;
- supernatant recycle to the head of the treatment train;

#### **The submitted HF MF/UF Membrane Pilot Study Protocol included the following:**

- A description of the proposed pilot treatment trains;
- A discussion of the Phase I, II, III, and additional conditioning phase objectives;
- A proposed raw water, MF/UF filtrate, and RO filtrate monitoring frequencies; and
- Equipment for continuous indirect integrity monitoring.

#### **Requirements for the Pilot Study Report**

Please see the attached guidance document Review of Pilot Study Reports for Membrane Filtration for a complete list of requirements, but the below are items that are frequently forgotten. Please include all the items contained in the guidance document and the following:

1. A copy of the amended pilot study protocol and this acceptance letter.
2. All flow rates and flux rates in English Units. TCEQ's design capacity and flow reporting requirement are in English Units.
3. General information about the site where the pilot study was conducted including a schematic of the pilot plant that shows chemical feed points, pretreatment facilities, pilot equipment, flow meters and monitoring points.
4. Proof of ANSI/NSF Standard 60 certification of all chemicals used in the treatment of the water and cleaning of the membranes;
5. Proof of ANSI/NSF Standard 61 certification for all water contact surfaces of equipment used;
6. The Pilot Study Report must contain information about each membrane module that is to be evaluated. Please see Section VIII(C) for a complete list.
7. CIP or any other chemical cleaning procedure must be detailed including chemicals used, flow rate, duration, quality of filtrate water used, disinfectant residual, pH and temperature of the chemical solution, the procedure, the disposal method for waste and the expected chemical cleaning frequency for the full-scale membrane facility.
8. All of the graphs detailed in Section XII displayed one graph per page on landscape paper with the 4 hour intervals clearly visible. Please also include the actual recorded data on CD
9. All of the tables listed in Section XIII & XIV
10. Detailed DIT calculations based on the formulas presented in the United States Environmental Protection Agency's (US EPA) Membrane Filtration Guidance Manual - EPA 815-R-06-009, November 2005.

Mr. Ignacio Cadena, P.E.

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11. Provide calibration procedures and frequency for all analytical equipment and flow meters.

If you have questions concerning this letter, or if we can be of further assistance, please contact me at [mberg@tceq.state.tx.us](mailto:mberg@tceq.state.tx.us) or (512)239-6967.

Sincerely,

Marlo Wanielista Berg, P.E.

Technical Review & Oversight Team

Public Drinking Water Section – MC155

Texas Commission on Environmental Quality

MEW

Enclosures: Review of Pilot Study Reports for Membrane Filtration

**From:** David Williams  
**To:** James Weddell; Marlo Wanielista Berg  
**CC:** Reyna Holmes  
**Date:** 1/29/2009 3:28 PM  
**Subject:** Re: Big Springs Reuse project - Questions please

I'd be happy to do a peer review. As far as the questions--

1. In my mind, this plant is not a PWS, but the facilities require our review as part of pretreatment for the 3 receiving PWSs. Can we use the PWS ID's for cities receiving the treated water?
2. If we have WWTP daily logs, it might be useful. Particularly, if there are turbidity spikes or fouling problems.
3. Yes, I would request a map.
4. Just to satisfy curiosity, maybe ask for one set of feed water samples.
5. I would leave as discussed in our meeting. SW operators seem the most appropriate.
6. Weekly
7. These membrane manufacturer's should be preparing to have the challenge studies. I'm not sure it's necessary in this case.
8. I'm not sure.

>>> Marlo Wanielista Berg 1/29/2009 2:37 PM >>>  
David and Red,

I will need one of you to Peer review this sucker (any takers?), but first I have a few questions I would love your opinion on.

1. Does this need a new PWS ID. For City of Wichita we used the City of Wichita, this one will feed at least 3 Cities. It will use Big Spring WWTP effluent. I know Alicia wants to give it its own PWS ID, but what do we do for this letter? Tack it on Big Springs? another CRMWD source? What do you think?
2. Do we want daily data from the WWTP operations during that time? The flow rates, chemicals etc. I think it's a bit far reaching, but it could be considered pretreatment.

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Thank you, and if you could give me some opinions by Monday afternoon, that would be very great!

Marlo Wanielista Berg, P.E.  
Texas Commission on  
Environmental Quality  
Public Drinking Water  
(512) 239-6967  
fax (512) 239-6050

Comment [MEW1]: Which to use?  
Could be several or none.

January XX, 2009

Mr. Ignacio Cadena  
Freese and Nichols, Inc.  
4055 International Plaza, Suite 200  
Fort Worth, Texas 76109-4895

Subject: Membrane Filtration of Wastewater Pilot Study Protocol  
City of Big Spring - PWS ID 1140001  
Howard County, Texas

Comment [MEW2]: Which to use?

Mr. Cadena:

We have reviewed your cover letter and enclosed documents received on July 14, 2008 and information received at a meeting held on November 17, 2008 at TCEQ. Your letter notified the Texas Commission on Environmental Quality (TCEQ) of the membrane filtration pilot study for advanced treatment of wastewater effluent that Colorado River Municipal Water District (CRMWD) plans to conduct. This letter included a proposed pilot study protocol for our review. The location of the pilot plant will be located at the Big Spring Wastewater Treatment Plant. For full-scale operation, it is proposed that the membrane filtered wastewater effluent will be discharged to the raw water pipeline for the City of Big Spring, City of Snyder, and City of Midland Water Treatment Plants.

Comment [MEW3]: They focus on Big Spring in the report, but Snyder and Midland also receive pipeline water

Based on our review, we find the submitted 90 to 120-day HF MF/UF & RO Membrane Pilot Study Protocol generally acceptable if amended to include the following data and the amended Protocol is provided to the TCEQ with the final report.

1. Please provide a detailed description of your waste water plant treatment process and any pretreatment process for the membranes. During all stages of the pilot study, all pretreatment units must be monitored and results record at least one time each day or any time they are altered

Comment [MEW4]: Do we want daily data from WWTP too?

- a. Flow rate and hydraulic detention time (or surface over flow rate);
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2. You show a recycle return to the head of the pilot plant. In the pilot study report, please describe the flow rate, frequency and duration of the recycle stream. The pilot recycle stream must be the same as the recycle stream expected at the proposed full scale plant.

3. Please include with the final report a copy of a USGS 7.5 quadrangle map, or maps, showing the pilot study's location and the proposed full-scale plant's location as required in Section VIII.B.4 of the TCEQ's Review of Pilot Study Reports for Membrane Filtration.
4. All on-site analytical procedures, equipment calibrations and frequencies, and quality assurance/quality control (QA/QC) data is to be recorded and submitted with the pilot study report. Please note that all flow indicating and control devices **must have been calibrated** prior to starting the pilot study using a method specified by the manufacturer. Your submittal discusses verification of equipment, but not calibration. Data for all calibration methods and frequencies must be provided to verify the results of the pilot study report as stated in Item No. X. of our Review of Pilot Study Protocols for Membrane Filtration Guidance document. Acceptable calibration frequencies and methods can be found at this same location.
5. The submittal discussed the process for performing a turbidity spike. Please provide at least one year of historical high turbidity levels for the source water (treated waste water). The turbidity spiking event should be at the 95<sup>th</sup> percentile high turbidity level and of a duration normally seen in the source water. If an operation level will be set where turbidities above a certain level will be diverted from the reuse plant, please explain the operations and the max turbidity level can be used for the spiking event.
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  - a. Membrane rack/tank inlet pressure pounds per square inch (psi);
  - b. Membrane rack/tank outlet pressure in psi;
  - c. Filtrate/permeate pressure in psi;
  - d. Feed water flow rate in gallons per day (gpd);
  - e. Instantaneous filtrate/permeate flux rate in gallons per square-foot of feed water side of the membrane per day (gfd);
  - f. Reject/bleedby/concentrate water flow rate (if applicable) in gpd; and,
  - g. Recycle water flow rate (if applicable) in gpd.

Comment [MEW5]: Do we need this since there is not real "intake" I think yes, but want to make sure.

10. From the November meeting it was discussed that a disinfectant would be applied to the feed water during the wastewater treatment process. Please assure that the items found in XIV.E and XIV.G of our Review of Pilot Study Protocols for Membrane Filtration guidance document are measured at least once a day.
  - a. All disinfectant dosage levels at application points;
  - b. All disinfectant residuals at monitoring points; and
  - c. Feed water disinfectant residuals;
  - d. Filtrate/permeate water's disinfectant residual levels;
  - e. Clean in place (CIP), mini CIP, Chemical enhanced backwash and chemical soaking solutions' pH, disinfectant residual and temperature levels;
  - f. Backwash/backflush/reverse flow supply water's disinfectant residual and pH levels if adjusted;
  - g. Finished water Total Trihalomethanes (TTHM); and
  - h. Finished water Haloacetic Acids (HAA5)
11. Please amend Table 2.4 to include MF/UF Feed water sampling for hardness, iron, manganese, aluminum and TSS every 30 days.
12. Please provide a list of contaminants that may impact the performance of the piloted RO membranes (such as Silica). Assure that these contaminants are added to Table 2.4.
13. Please include a detailed description of the DIT procedure to be performed on the UF/MF membrane. Please be aware DIT calculations must conform to the formulas presented in the United States Environmental Protection Agency's (US EPA) Membrane Filtration Guidance Manual – EPA 815-R-06-009, November 2005.
14. Your protocol states that particle counters will be used in the pilot study. In the meeting November 2008 meeting you stated that particle counters will not be utilized. Please update the Protocol to reflect turbidity monitoring only for indirect integrity testing.
15. Please assure the use of a Turbidimeter with the ability to monitor in the range of expected feed water turbidities.
16. During past meetings with TCEQ it was determined that the effluent of the treatment facility must be of the same quality of better as the water used as raw water for the drinking water treatment plants. To prove this please provide the following:
  - a. One sampling event during phase 2 of the pilot study comparing the final effluent of each of the piloted treatment trains and the raw water in the raw water pipeline. This sampling event should cover all the samples required in 30 TAC §290.41(e)(1)(F) include pH, total coliform, *Escherichia coli*, turbidity, alkalinity, hardness, bromide total organic carbon, temperature, color, taste and odor, regulated volatile organic compounds (VOC), regulated synthetic organic compounds (SOC), and regulated inorganic compounds (IOC). The list of VOCs, SOC, and IOC can be found in 30 TAC 290 Subchapter F.

- b. Nitrate and Nitrite samples from the final effluent of each piloted treatment train each week during phase 2.
  - c. At least 2 *Cryptosporidium*, *Giardia*, and heterotrophic plate count samples from the final effluent of each of the piloted treatment trains and comparison samples taken at the same time from the raw water pipeline to the drinking water treatment facilities. If *Cryptosporidium* sampling has been performed on the raw water pipeline for the Long Term 2 Enhanced Surface Water Treatment Rule (LT2), no additional samples are required on the raw water pipeline. Please submit the LT2 sample results with the pilot study report.
  - d. At least 2 Viral samples from the final effluent of each of the piloted treatment trains and comparison samples taken at the same time from the raw water pipeline to the drinking water treatment facilities. The recommended virus to test for those used to complete the Information Collection Rule. Please see <http://www.epa.gov/nerlcwww/icrmicro.pdf> for the Viral Assay Method in Section VIII. If you have another viral test you would prefer, please contact us to discuss it. If the Viral load in the final effluent from the pilot facility is much higher than that of the raw water for the drinking water facility, then more treatment at the reuse facility or the drinking water treatment plant may be required.
17. Please include the following membrane performance data in your pilot report for both the MF/UF membranes and RO membranes.
- a. Expected time frame between chemical CIP procedures;
  - b. Frequency, duration and procedure for each CIP and chemical used during each CIP. Please note these chemicals must conform to the ASNI/NSF Standard 60.
  - c. Frequency, duration, procedure and chemicals for any other chemical cleaning procedure such as "mini CIP", "chemical enhanced backwash" and "chemical soaking"; and
  - d. Pretreatment requirements.

Comment [MEW6]: Do we need to see Reuse plant influent samples too? - same question on (d)

#### Notes for Full Scale Design and Operation

1. To assure no contamination of the final reuse plant effluent occurs, when operational there will need to be 500 feet between the reuse plant unit and any wastewater treatment units. There will also need to be backflow prevention placed on the reuse plant's reject water lines.
2. As discussed at the November, 2008 meeting, a Class B Surface Water Operator will need to be employed by the reuse facility. Class C Surface Water Operators can operate the facility if the Class B operator is on call. A TNRCC certified operator, who has been properly trained by the membrane vendor, must be on duty at the HF UF membrane facility during any chemical cleaning/soaking or extended backpulse procedures where the chemical quality of the cleaning or backpulse solutions are significantly altered from the feed water quality. Please note that this specification is for either a certified wastewater or water operator. Currently neither training program has adequate training for membrane facilities.
3. If a UV system will be used to inactivate viruses or other pathogens, then the UV system will need to have a validation study approved by TCEQ. No matter the use, the UV system will need to be NSF approved.
4. Flow measuring devices will be required on the full scale plant on the feed to UF/MF membrane treatment facility, the UF/MF membrane backwash supply, the UF/MF

Comment [MEW7]: Make sure Reyna Agrees

Comment [MEW8]: Old lingo from Wichita falls letter. Does not say SW, Says any WW or W.

membrane filtrate, the RO reject line, and on the final effluents to the SWTP raw water pipeline.

5. The TCEQ Public Drinking Water Section shall require continuous on-line monitoring of each HF UF membrane unit and a direct integrity test once a week and after each chemical clean-in-place procedure to verify that the integrity of the membranes has not been compromised and continuous removal of *Cryptosporidium* oocysts and *Giardia lamblia* cysts is being achieved. Conductivity monitoring must be performed for integrity testing of the RO membrane. If UV is utilized for microbiologic inactivation, the dose and time out of service must be recorded. In addition, a minimum disinfection protocol with the treatment process will be required to achieve a continuous inactivation of viruses.
6. LT2 sampling will need to be performed on the reuse plant final effluent beginning the day water from the reuse facility enters the raw water pipeline to the surface water treatment plants.

Comment [MEW9]: Possibly daily

Field?

#### **Proposed Pilot Treatment Train**

The submitted HF MF/UF & RO Membrane Pilot Study Protocol proposes a study period of 90 to 120 days using Big Spring Wastewater Effluent. The HF MF/UF & RO membrane pilot study treatment train will include:

- HF MF/UF membrane test skids;
- Reverse Osmosis test skids;
- supernatant recycle to the head of the treatment train;

#### **The submitted HF MF/UF Membrane Pilot Study Protocol included the following:**

- A description of the proposed pilot treatment trains;
- A discussion of the Phase I, II, III, and additional conditioning phase objectives;
- A proposed raw water, MF/UF filtrate, and RO filtrate monitoring frequencies; and
- Equipment for continuous indirect integrity monitoring.

#### **Requirements for the Pilot Study Report**

Please see the attached guidance document Review of Pilot Study Reports for Membrane Filtration for a complete list of requirements, but the below are items that are frequently forgotten. Please include all the items contained in the guidance document and the following:

1. A copy of the amended pilot study protocol and this acceptance letter.
2. All flow rates and flux rates in English Units. TCEQ's design capacity and flow reporting requirement are in English Units.
3. General information about the site where the pilot study was conducted including a schematic of the pilot plant that shows chemical feed points, pretreatment facilities, pilot equipment, flow meters and monitoring points.
4. Proof of ANSI/NSF Standard 60 certification of all chemicals used in the treatment of the water and cleaning of the membranes;

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5. Proof of ANSI/NSF Standard 61 certification for all water contact surfaces of equipment used;
6. The Pilot Study Report must contain information about each membrane module that is to be evaluated. Please see Section VIII(C) for a complete list.
7. CIP or any other chemical cleaning procedure must be detailed including chemicals used, flow rate, duration, quality of filtrate water used, disinfectant residual, pH and temperature of the chemical solution, the procedure, the disposal method for waste and the expected chemical cleaning frequency for the full-scale membrane facility.
8. All of the graphs detailed in Section XII displayed one graph per page on landscape paper with the 4 hour intervals clearly visible. Please also include the actual recorded data on CD
9. All of the tables listed in Section XIII & XIV
10. Detailed DIT calculations based on the formulas presented in the United States Environmental Protection Agency's (US EPA) Membrane Filtration Guidance Manual – EPA 815-R-06-009, November 2005.
11. Membrane filtration systems or modules installed or replaced after April 1, 2012 and used for microbiological treatment **must be challenge tested** and the challenge test must be approved by TCEQ. You may want to consider submitting a challenge test with your Pilot Study Report.
12. Provide calibration procedures and frequency for all analytical equipment and flow meters.

*only if they test*

Comment [MEW10]: Shoot, do we need a challenge test?

If you have questions concerning this letter, or if we can be of further assistance, please contact me at mberg@tceq.state.tx.us or (512)239-6967.

Sincerely,

Marlo Wanielista Berg, P.E.  
Technical Review & Oversight Team  
Public Drinking Water Section – MC155  
Texas Commission on Environmental Quality  
MEW

Enclosures: Review of Pilot Study Reports for Membrane Filtration

Mr. Ignacio Cadena, P.E.

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bcc: TCEQ Midland Regional Office – R7

Ms. Reyna Holmes, P.E., Team Leader, Technical Review & Oversight Team – MC155

Ms. Vera Poe, P.E., Team Leader, Utilities Technical Review Team – MC153