Desalination Stakeholder Meeting Minutes – May 18, 2012

Welcome – Linda Brookins, TCEQ

Purpose of Meeting – Marlo Wanielista Berg, TCEQ

- Find ways to streamline TCEQ processes involving approval of brackish groundwater desalinization
- Work with a balanced group of stakeholders to identify potential alternatives to pilot studies for membrane filtration

Current Rules

- Design requirements in rule
- Exception process needed for anything not in rule
- Desalination and membrane processes not in the rule, so they require exceptions

Stakeholder Process Goals

- A new staff guidance document for a streamlined approval process
- New process to begin testing in fall 2012
- New process finalized by January 1, 2013

Goals for today's meeting

- Find 1 or 2 alternatives to pilot studies
- Lists of pros and cons for alternatives
- List of action items or information needed to minimize cons

Scope – find out what helps the most PWSs

- Streamline process to help with drought
    - Find solutions that will help most of the systems
    - Use industry accepted and scientifically sound alternatives
    - Protect public health

Presentation of history of existing pilot studies and policies – David Williams

Presentation on the Texas Water Development Board funder project: Alternatives to Pilot Studies– Shane Walker, University of Texas at El Paso and Justin Sutherland, Carollo Engineers

Presentation on TCEQ rules – David Williams, TCEQ

Stakeholder Input

Alternatives

Marlo Wanielista Berg, TCEQ - Did the presentation give all of the alternatives? What other alternatives do you know about?

Stakeholder - What about comparing with other systems already in use?

Marlo Wanielista Berg, TCEQ - This is already allowed per the rule.

Tina Hanson, Hazen & Sawyer - What about allowing systems to upgrade their membranes without piloting?

Tony Bennett, ABC Consulting - You could use source water and what contaminant that is being treated to determine whether a pilot study is needed. Base the need for a pilot study on health effects. For example short term health effects need more piloting.

Tina Hanson, Hazen & Sawyer – If an approved membrane system is in place, adding pretreatments should not need a new pilot study.

Steve Walden, SWC - Have TCEQ not sign off until testing is done on the water produced at the plant. Then base the sign off on the water quality produced. If the design produces the water quality you say it will; it is approved. Use bonds and guarantees or take or pay contracts. Just be concerned with quality of water produced. The designer would take all the risk.

James Kuhr, Cintra - The developer can ensure key performance indicators are met

Scott Hekman, Feese and Nichols - Have specific constituents to indentify key indicators and use TCEQ approved model.

Tina Hanson, Hazen & Sawyer - Could TCEQ approve membrane use based on past performance demonstrated by manufactures?

What should we be looking at? – Marlo Wanielista Berg, TCEQ

Rex Hunt, APA - Break it down by size of project. Smaller project equals a smaller risk to the public and developer.

Steve Walden, SWC - Have the engineering submittal include experience and list of successful projects.

Tom Seacord, Carollo - Have financial incentives to encourage adequate supply. Start with qualifications based vs. cost based. This method allows developer to determine design.

Caroline Russell, ARCADIS - Start with TCEQ minimum design requirements and depending on parameters needed, require addition information.

Lou Portillo, SAIC - Engineers have design guidelines. Silt density index < 2 that had brackish water specific parameters designed with computer model and additional information. Base on water quality and size of system what kind of testing required.

Marlo Wanielista Berg, TCEQ - Are you using computer model.

Several stakeholders say yes

Marlo Wanielista Berg, TCEQ - What about flat sheet testing?

Some stakeholders say yes

Marlo Wanielista Berg, TCEQ - What about single element testing?

Some stakeholders say yes

Marlo Wanielista Berg, TCEQ - What about if you have a groundwater system with no primary contaminants but only secondary contaminants

Several stakeholders say yes to the use of computer models

Some stakeholders say yes to the use of flat sheet testing

No stakeholders say yes to the use of single element testing

Most stakeholders would use computer models in most cases and will work with manufactures to have a basis for pilot study.

Marlo Wanielista Berg, TCEQ - Pilots can be time intensive, what alternatives are people using?

Tom Seacord, Carollo – He has designed several systems. If nothing in water quality data is of concern, then he designs off computer model if the hydro-geologist says water won't change. Or the hydro-geologist tells when it will and the engineer can design around it.

Lou Portillo, SAIC – Uses the computer model based on water quality.

Tony Bennett, ABC Consulting - What is the concern with water systems when there are no primary contaminants in the source water? Is TCEQ concerned with removal of salts?

Marlo Wanielista Berg, TCEQ - TCEQ is concerned with capacity, water quality and funding. What happens if the system doesn't work after it has been paid for?

David Williams, TCEQ - TCEQ wants a better idea of how the system works. Demonstration of effectiveness and reliability give TCEQ confidence in the project.

Tony Bennett, ABC Consulting - Unless they structurally fail, membranes are going to produce good quality water. The only issues would be fouling and capacity. TCEQ needs to be able to assure the utility that the system will work.

Mark Graves, HDR – It's common to use computer models. It can be expensive to do pilot studies.

Tina Hanson, Hazen & Sawyer –You get a capacity from the pilot study, but you are assuming the operators are thoroughly trained and that maintenance is performed to maintain the capacity.

Carol Batterton, WEAT - The goal of these meetings is to streamline the process and have a shorter time frame and reduce costs correct?

Marlo Wanielista Berg, TCEQ – We are focusing on the timeframe, but reducing costs would also be positive.

Saqib Shirazi, TWDB – What about existing plants? Does a PWS upgrading the membranes need a pilot study?

Lou Portillo, SAIC – When the plant is operating successfully using the same aquifer, would they have to run another pilot study?

Marlo Wanielista Berg, TCEQ – for new plants in the same aquifer TCEQ has allowed the use of an alternative site, but the facility must demonstrate that the water is from the same source and the current treatment at the alternative site works.

David Williams, TCEQ - With real performance data, a model of existing elements and a model of new elements, we have approved new elements to be used.

Scott Hekman, Feese and Nichols - What about RO testing vs. low pressure membrane pilot testing? If you hit water quality targets with low pressure why require RO pilots if the RO is after the low pressure membranes? RO typically is used to remove secondary not primary contaminants.

MORNING BREAK

Computer Modeling

Marlo Wanielista Berg, TCEQ – TCEQ can't change the design criteria now because it is in rule. It would take over 2 years to complete the process. Maybe this group would be interested in working on that project in the future.

What are the alternatives to pilot studies? What I have heard this morning is that you are using computer modeling now to do your designs, what if TCEQ could approve the project based on computer modeling, could you move forward with your projects faster?

Tina Hanson, Hazen & Sawyer – Would an experience statement from an engineer be sufficient?

Marlo Wanielista Berg, TCEQ - Not with the current rules. TCEQ doesn't endorse particular engineers.

Marlo Wanielista Berg, TCEQ – For people using groundwater and removing secondary contaminants, what is needed to be able to model?

Caroline Russell, ARCADIS - What is TCEQ looking for as far as brine disposal and management?

David Williams, TCEQ - Not sure how we would incorporate this topic into today's discussion. Disposal method is not approved by the Water Supply Division. This is not part of this meeting today, but a good point.

Fouling and Clean in Place

David Williams, TCEQ - In addition to modeling, how do you evaluate fouling and cleaning? How can this be demonstrated without piloting.

Lou Portillo, SAIC - Silt Density Index should be less than 3 or pretreatment is required. If greater than 3 there must be pretreatment. The design should have approved by TCEQ to reach less than 3.

Alan Murphy, Bob Johnson and Associates -Different manufactures don't have arsenic or radionuclides in their software.

But what do we need to run a model? You mentioned water quality analysis before, what water quality parameters are needed? How does the engineer know what to plug into the model? – Marlo Wanielista Berg, TCEQ

Tom Seacord, Carollo - The model has inputs for constituents that contribute to scale, as long as you are operating properly. There are no inputs for organics/TOC, but most groundwater has very low TOC. Models work with proper inputs. The outputs show that the water will be within minimum standards.

Lou Portillo, SAIC - If the facility is not designed correctly it can sometimes invalidate the warranty. The model has guidelines. If we agree on a range for GFD (flux), TCEQ could give authorization for the next step.

Mark Graves, HDR – I know we are looking at alternative to piloting, but the existing guidance document from TCEQ looks at low pressure, not high pressure.

David Williams, TCEQ – In a pilot study, a Clean in Place (CIP) is required after 30 days, but RO can go much longer. If TCEQ accepts a model, how is the CIP demonstrated? For RO, if the performance characteristics are good, but the CIP doesn't work, then fouling can occur and recovery can go down. Utility has then spent a lot of money for a system that doesn't work.

Lou Portillo, SAIC – Fouling and CIP can only be demonstrated in pilot, but that pilot doesn't have to be full scale. You can do it with a single element.

David Williams, TCEQ – How do you demonstrate fouling in different parts of the membrane with a single element or single sheet?

Shane Walker, UTEP – For some source waters, the plant can operate without fouling for 1-2 years. A 90 day pilot may not show your fouling.

David Williams, TCEQ – The fouling should be addressed.

Scott Hekman, Feese and Nichols – Developing the rating of the plant based on pilot data may not be that accurate. Maybe we should wait until full scale to verify flux rating

David Williams, TCEQ – The client is buying capacity. Engineer needs to know production after fouling. How much water will be produced in 5 years?

Tom Seacord, Carollo – Cleaning is part of operator training. All the engineer can do is give them tools, guidelines, and size the CIP system properly.

David Williams, TCEQ – TCEQ would like to know how some CIP systems are designed.

David Parkhill, AECOM – Accelerated life cycles can be run in a batch mode. Let it foul, run CIP, compare performance with the baseline, and then define how effective the CIP was.

Tony Bennett, ABC Consulting – There should be some limit to the up-front approval process.

Marlo Wanielista Berg, TCEQ –How do engineers design the CIP system?

Stakeholder – The membrane manufacturer sets limits. The differential pressure would have a limit. Then the engineer would program the SCADA system with alarms, warnings and shutdowns. The engineer makes sure the CIP system is there and that the indicators are set. The operators would need to be trained to respond to the alarms.

David Williams, TCEQ – What about different water quality contaminants needing more than one type of CIP?

Mark Graves, HDR – The CIP process can be different for different constituents. It would be case specific. The engineer would know the computer model, and have performance history of the CIP chemicals.

Justin Sutherland, Carollo – Models will give solubility standards.

Tina Hanson, Hazen & Sawyer – There should be adequate water quality data to identify constituents of what would foul. It would be specific, groundwater not surface water.

Steve Walden, SWC – The band of constituents broadens and can change over time. The operator should adjust. It would be false hope that a pilot would give all the answers.

Alan Murphy, Bob Johnson and Associates – The engineer is asked to adjust CIP overtime. Scaling tendencies are based on water quality concerns. CIPs based on start up data and operator. CIP should be done at least 6 months after start up to get baseline and get analysis before the CIP.

David Williams, TCEQ – The pilot study requirements include using worse case water quality in the study.

Alan Murphy, Bob Johnson and Associates – Yes, but the timing on the pilot study is based on equipment availability and when the project is needed. You can't always get

the worst case water and even if you think you have, it could rain and could cause the water quality to change.

Saqib Shirazi, TWDB – Sometimes there is irreversible fouling. It may take 6 months one time and then 3 months another time. The time between cleaning may get shorter and shorter. Maybe the final product should be considered if you can compensate for increased CIP frequency and fouling.

David Williams, TCEQ – Does the warranty on an RO include the CIP process?

Roy Daly, CSM– No, this is usually the engineer's responsibility. No guarantee from the manufacturer.

Tom Seacord, Carollo – The manufacturer will give guidelines on chemicals, pH, etc. The warranty is more for workmanship and materials. The burden of proof is on the owner that operating procedure was followed. Most owners don't have a record keeping process to demonstrate that. Usually operator error causes failures.

Mark Graves, HDR – RO doesn't have the kind of warranty that low pressure systems receive.

David Williams, TCEQ – CIP needs can change and the operator must be able to figure it out.

Other issues with computer models

Marlo Wanielista Berg, TCEQ - What are the other issues with computer models?

Deborah Helstrom, TCEQ – Getting the initial water quality data to submit. Some engineers only use one set of data. That one set may not be representative of the water quality.

Marlo Wanielista Berg, TCEQ – Should TCEQ be concerned about the quantity of data? What kinds of best practices do you use?

Tom Seacord, Carollo – I would have hydro-geologist tell me if water quality would change. Look at TDS and fluoride over 1 year to 20 year. Make projections over time and look if there is a history of change in the aquifer.

Marlo Wanielista Berg, TCEQ – What about if you were designing for a 75 person public water system

Tom Seacord, Carollo – I would have a 10 minute conversation with the hdyro-geologist and move on.

Marlo Wanielista Berg, TCEQ – Is that similar to what everyone does?

Tina Hanson, Hazen & Sawyer – With less data you would be more conservative. You would need to look at cost/benefit considerations

Linda Brookins, TCEQ – When you talk to your clients, do you talk to them about compliance and consequences? They need to understand that planning and engineering up front saves later. TCEQ and public water systems are graded by performance of the water systems meeting state/federal Safe Drinking Water

Standards. It's TCEQ goal that public water systems develop long-term performance solutions so enforcement can be avoided. Do you talk about potential of going the cheap route and discuss the consequences? There could be a bad outcome if it's not done right and could cost more money in the long run.

Mark Graves, HDR – Yes, conversations absolutely happen. What is designed depends on the factors: source, case specific, size matters, level of scale/risk – level of care is widely variable.

Tony Bennett, ABC Consulting – All membranes are going to foul, it just depends on how much and how fast, not determined by design but you can design conservatively without piloting. You can't design failure to do cleaning. Where do you break off concerns about design and concerns about operation? Be conservative on design and you may overbuild. You can't design around operator induced malfunction.

David Williams, TCEQ – What else would you do (besides modeling)? What are other tools you can use to have confidence there will be a good design.

Tony Bennett, ABC Consulting – Models updated based on data from membranes being used, some level of full scale demonstration is fed back into the models. The models are improved as data is added from the real world.

Shane Walker, UTEP – The second phase of the TWDB project is to look at the models precision, etc. How they compare to each other? How well do they predict? How well do models compare to actual plants in terms of accuracy? UTEP is going to study several plants; however, water quality does change. Systems change source quality to save on operating costs. Statistics will be more representative with more comparison data.

Justin Sutherland, Carollo – Models are tweaked based on feedback

Tony Bennett, ABC Consulting - Would third party verification ease the need to look at full scale data?

Marlo Wanielista Berg, TCEQ –Is there any one model that you don't trust? Are models created equally?

Stakeholders – Some are more accurate than others. Some are right on the mark.

Marlo Wanielista Berg, TCEQ – What kind of accuracy are you talking about?

Stakeholders – Salt passage more of +/- 10%, permeability of +/- 5%. Look at the quality of data of permeate. Sometimes 10 mg/L difference isn't that big a deal if the levels are already very low. Some manufactures have better models. Engineering report should justify why each model was chosen.

LUNCH

Studies to support models

Marlo Wanielista Berg, TCEQ – Based on the feedback we have gotten so far, I believe we will need to have the next stakeholder meeting farther in the future than we had originally planned.

So far we have discussed the use of models instead of pilot studies, specifically about facilities used for treating secondary contaminants from groundwater. Is the model enough? What about demonstration studies? What studies are typically done after a facility is built.

Tom Seacord, Carollo - If you give the model all the information it needs, a model is enough. With good water quality and built-in safety factors, a model is enough.

Marlo Wanielista Berg, TCEQ - What things do you do at start up?

Tom Seacord, Carollo – Well field is hooked up with just orifice plates and we use the raw water to test the programming. Water runs for a couple of weeks and you can test water quality. Then you load the membranes, run, take the bacteriological samples and then you are done.

Marlo Wanielista Berg, TCEQ - Are you testing TDS?

Tom Seacord, Carollo – Nothing outside the requirements of the Health Department

Marlo Wanielista Berg, TCEQ - What about water quality? Would you test blending? Are you checking TDS, nitrates, etc?

Tom Seacord, Carollo - Engineers ask for validation. They look at TDS, pH, chloride, and iron. Then they set up blending to the engineering specifications and report to engineer, system, and manufacturer, saying the system meets the engineer's specifications.

Marlo Wanielista Berg, TCEQ – What about primary contaminants, such as Arsenic, radionuclide, that the models do not include? How do you design an RO system for them?

Tom Seacord, Carollo – You can build a model based on experience and data you have. Also you can include further testing before putting it into use or full scale testing after construction.

Justin Sutherland, Carollo - You can use water quality data. You can do a screening study with nano-filtration and RO and correlated radium and conductivity.

Shane Walker, UTEP– Chronic health effects don't have to be tested in start-up as much as acute health effect constituents. Some constituents are not in the model, but you can estimate their removal based on constituents in the model.

Integrity testing

David Williams, TCEQ - What about process control once the plant is in operation. Indirect pressure monitoring is used in low pressure. What works for RO? Direct vs. indirect integrity monitoring for RO? What are the best management practices for Radium?

Justin Sutherland, Carollo – Conductivity is a direct measure in RO for radium.

Steve Walden, SWC – Different forms. Conductivity as a surrogate for some constituents.

David Williams, TCEQ – What if you use conductivity for process control and removal is based on the charge of the ion?

Tom Seacord, Carollo – Direct integrity test is surface water treatment language. There is no DIT requirement for groundwater.

Tony Bennett, ABC Consulting – Safety factor because of the magnitude of health effects between groundwater and surface water are different. There are so many ways to meet a maximum contaminant level (MCL). DIT is out of proportion to health effects and would equal over monitoring.

Justin Sutherland, Carollo – For RO, indirect conductivity monitoring is better than DIT.

Marlo Wanielista Berg, TCEQ – How do you measure if a membrane is still intact and producing quality water?

Justin Sutherland, Carollo – Conductivity. It is cheap, easy, and produces data real time. Also pressure, this gives a measurement of fouling.

Primary contaminants

Marlo Wanielista Berg, TCEQ – Are there any primary contaminants that we should not use models to approve?

Justin Sutherland, Carollo? - Boron, but it is not regulated. It is not accurate in the models. Arsenite is also not accurate.

Tony Bennett, ABC Consulting – There is marker based testing. Fluoride would be in lowest valence state. If it's passing fluoride, it is passing TDS. Fluoride can be used as an indicator.

Deborah Helstrom, TCEQ – If TOC is present, it can be used as a surrogate. It has real time testing.

Steve Walden, SWC – Particles are large and it would be hard to measure removal of smaller particles based on TOC.

Deborah Helstrom, TCEQ – There are problems with radionucludes and lag-time and blending.

Engineering report / exception request content

Tom Seacord, Carollo – We are not hoping to expedite the process for surface water desalination. Radon goes through RO, but it's unregulated. Could we use an engineering report to guide this process? Other states have either adopted 10 state standards or use 10 state standards plus additions. If there is a guidance or standard format it would stream-line the process.

Marlo Wanielista Berg, TCEQ – RO is still going to need an exception to fit into our current rules. But the exception request could follow an engineering report format. What would be in an engineering report?

Tom Seacord, Carollo – Basis of Design.

Raw Water Quality – Basis for your determination? Safety factors used? Do you foresee a change in the water quality?

Flows – How big is the system? What are the demands?

Finished water quality goals? Constituents? Treatment goals?

Design criteria – Each unit process; flow, pressure drops, pieces of equipment, flood plain etc. Backflow prevention, hydraulic profit to size pumps.

David Williams, TCEQ - How is the engineering report different than pilot report. Should we start with RO pilot report guidance and modify it?

Marlo Wanielista Berg, TCEQ – We still have to ask the question – how did you come up with this design.

Tom Seacord, Carollo – With this engineering report, the engineer gives blending, etc and provides calculation in the appendix.

Marlo Wanielista Berg, TCEQ – We would want something to show that the model is adequate?

Tom Seacord, Carollo - If requirement is to ensure production capacity, there must be a hydraulic profile.

David Williams, TCEQ – But you don't need a hydraulic profile to approve an RO unit

Steve Walden, SWC – Affirmation from engineer that waste stream is going to be handled properly.

Tom Seacord, Carollo – Add a section on permits.

Caroline Russell, ARCADIS – Add a section on monitoring plan for how the engineer is going to verify performance.

Mark Graves, HDR – For an exception request for fast paced project, you may need more information. What about a "virtual" report that comes in at the same time as the plans?

Tony Bennett, ABC Consulting – Need 2 boxes, one for pilot reports and another plans and specifications.

Steve Walden, SWC – But what about the timeframe for development?

Future topics

Caroline Russell, ARCADIS – Have we talked about future discussions on low pressure?

Marlo Wanielista Berg, TCEQ – No, today has focused on high pressure.

Steve Walden, SWC – What about other exceptions for alternative or innovative treatments?

Marlo Wanielista Berg, TCEQ - Those would need to be talked about in future meetings.

Next meeting

Marlo Wanielista Berg, TCEQ - We will take your idea and put them into some kind of document that will fit into our current rules. We will make a straw man for the stakeholder to comment on and will send it out before the next stakeholder meeting.