

Enclosure A

Full-Scale Verification Testing Protocol Minimum Monitoring and Reporting of Water Qualities and Flow Rates

Minimum required water quality monitoring for chemical and microbiological constituents and monitoring frequencies are listed and marked with a check (✓) in Table A below. These minimum required parameters and specified monitoring frequencies have been selected for the City's Full-Scale Verification Test so that the TCEQ can verify the continuous protection of public health by the removal and/or inactivation of chemical and microbiological contaminants through the different proposed treatment processes at the tested flow rates and operating parameters. Please note:

- **Yellow highlighted areas** indicate items that need to be added or revised to the City's submitted Proposed Verification Protocol received July 25, 2013.
- **Struck out sampling frequencies** (indicated with "~~WF~~") proposed by the City were changed to the TCEQ's original sampling frequency or a new sampling frequency.
- **Blue highlighted parameters with "WF" for sampling frequencies** are those parameters the City has selected for monitoring in addition to the TCEQ's minimum requirements. The TCEQ commends the City on its proposed monitoring for unregulated contaminants of concern. These include some contaminants under investigation by the EPA for possible future regulation previously recommended for monitoring by the City. Although not regulated at this time, the results of all additional monitoring conducted by the City during the Full-Scale Verification Test must be included with the City's Full-Scale Verification Test Report.
- Continuous 5-minute, 15-minute, 2-hour, 4-hour, and daily (and anytime the flow rate changes) monitoring frequencies are **to be conducted on-site using a TCEQ acceptable method.**
- **Twice per week analyses** can be either conducted on-site by City staff or analyzed off-site at a TCEQ acceptable laboratory. Twice per week sample collections are to be conducted at a consistent frequency no closer than three days apart.
- Samples collected weekly (once every 7 days) and at longer frequencies are **to be submitted to an off-site NELAP accredited laboratory for drinking water analysis.**
- Analyses marked for **both on-site and off-site monitoring** are required for quality control to verify the accuracy of the onsite monitoring equipment/method and are to be collected as split samples when the off-site samples are collected.

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Table A

	Continuous, every						Twice per week	Once every 7 days	Startup, every 30 days & end
	5-min.	15-min.	2-hrs.	4-hrs.	Once per day	Once per day & anytime the flow rate changes			
TCEQ Sample Set (TCEQ)-1A: River Road Wastewater Treatment Plant (RR WWTP) Effluent (at RR WWTP chlorine injection box after second clarification & prior to WW DZ 1 chlorine injection point before the RR WWTP Chlorine Contact Basin)									
1. DPR transmission pipeline flow rate (gpm)		✓							
2. Turbidity (NTU)		✓							
3. Temperature (°C)		✓							
4. <i>Escherichia coli</i> (<i>E. coli</i>) enumeration					✓ ¹				✓ ²
5. <i>Giardia</i> (cysts/L) enumeration					✓ ¹				✓ ²
6. <i>Cryptosporidium</i> (oocysts/L) enumeration					✓ ¹				✓ ²
7. 5-day Carbonaceous biochemical oxygen demand (CBOD ₅ , mg/L)					✓				
8. Total suspended solids (TSS, mg/L)					✓				
9. Daily flow rate (gpd)					✓				
10. Nitrate (mg/L)					✓ ²				✓ ²
11. Total dissolved solids (TDS, mg/L)								✓	
12. Alkalinity (mg/L)								✓	
13. Total organic carbon (TOC, mg/L)								✓	
14. Dissolved organic carbon (DOC, mg/L)								✓	
15. Full metal scan (mg/L, arsenic, barium, cadmium, chromium, copper, lead, manganese, mercury, nickel, selenium, silver, zinc)								✓	
16. Algae counts (CFU/L)									✓
17. Chemicals listed in §290.106(b) Inorganic Chemicals ⁴									✓
18. Chemicals listed in §290.107(b) Organic Chemicals ⁴									✓
19. Chemicals listed in §290.108(b)(1) (radium 226, radium 228, uranium, gross alpha activity)									✓
20. Chemicals listed in §290.108(b)(2) & 40 CFR §141.66(d) (gross beta particle & photon radioactivity, tritium, strontium 90)									✓
21. Chemicals listed in §290.118(b) Secondary Chemicals									✓

- 1 Samples are to be collected at each of the designated locations once per day and tested using a TCEQ accepted real-time (on-site) analytical method.
- 2 A split sample is to be collected in conjunction with the above daily samples at each location at startup, every 30 days and at the last day of the Full-Scale Verification Test and submitted to an off-site NELAP laboratory certified for conducting these drinking water quality tests.
- 3 Either a Hach Model 1720E (or TCEQ approved equivalent) or Model 660 FilterTrak turbidimeter may be used for the 15-minute filtered water turbidity level monitoring and reporting. The City's Protocol needs to specify which method will be used.
- 4 Please assure that the laboratory monitors for all of the inorganic and organic compounds. Compounds that some labs do not include, but are required are: asbestos, cyanide, endotoxin, diquat, glyphosate, asbestos, and the dioxins.

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22. Lead (ug/L)									✓
23. Total trihalomethanes (TTHM, report the species: chloroform, dichlorobromomethane, dibromochloromethane, bromoform) (ug/L)							~~WF~~	✓	
24. Haloacetic acids (group of 5) (HAA5, report the species: monochloroacetic acid, dichloroacetic acid, trichloroacetic acid, monobromoacetic acid, dibromoacetic acid) (ug/L)							~~WF~~	✓	
25. Bromate (mg/L)							~~WF~~	✓	
26. Total culturable viruses (MPN/L)									WF
27. Enterovirus (CFU/L)									WF
28. Norovirus (CFU/L)									WF
29. N-Nitroso-dimethylamine (NDMA, ng/L)									WF
30. N-Nitroso-pyrrolidine (NPYR, ng/L)									WF
31. Pharmaceuticals (ug/L)									WF
32. Hormones (ng/L)									WF
33. Personal care products (ng/L)									WF
34. Fluoridated alkyl-acids (PFOS, PFOA, PFNA, PFHxS, PFHpA, & PFBS) (ng/L)									WF
35. Sucralose (ug/L)									WF
36. Perchlorate (ug/L)									WF
TCEQ-2A: Begin Wastewater (WW) Disinfection Zone (DZ) 1 (after RR WWTP Chlorine Contact Basin)									
1. Free ammonia level before chlorine injection (mg/L)				✓					
2. Free chlorine dosage (mg/L)				✓					
3. Total chlorine residual after chlorine injection (mg/L)				✓					
4. Monochloramine residual after chlorine injection (mg/L)				✓					
5. Free chlorine residual after chlorine injection (mg/L)				✓					

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- 3 Either a Hach Model 1720E (or TCEQ approved equivalent) or Model 660 FilterTrak turbidimeter may be used for the 15-minute filtered water turbidity level monitoring and reporting. The City's Protocol needs to specify which method will be used.
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	5-min.	15-min.	2-hrs.	4-hrs.	Once per day	Once per day & anytime the flow rate changes			
6. Free ammonia level after chlorine injection (mg/L)				✓					
7. pH level at monochloramine residual monitoring tap				✓					
8. Water temperature at monochloramine residual monitoring tap (°C)				✓					
9. Quantity of chlorine used (pounds per day, ppd)					✓				
10. Bromate (mg/L)								WF	
TCEQ-3A: End WW DZ 1 (end of RR WWTP effluent transmission line at Cypress 2008 MF/RO SWTP's Flow Control Vault & prior to existing 12-inch gate valve)									
1. Total chlorine residual (mg/L)		✓							
2. Monochloramine residual (mg/L)		✓							
3. Free chlorine residual (mg/L)		✓							
4. Free ammonia level (mg/L)		✓							
5. pH level at monochloramine monitoring tap		✓							
6. Water temperature at monochloramine monitoring tap (°C)		✓							
TCEQ-4A: 2008 MF/RO SWTP's Static Mixers and Coagulant Addition (at Cypress 2008 MF/RO SWTP's Flow Control Vault)									
1. Influent alkalinity level (mg/L)				✓					
2. Influent water temperature (°C)				✓					
3. Coagulant dosage (mg/L)				✓					
4. Quantity of coagulant used (gpd)					✓				
5. <i>Escherichia coli</i> (<i>E. coli</i>) enumeration					✓ ¹				✓ ²
6. <i>Giardia</i> (cysts/L)					✓ ¹				✓ ²
7. <i>Cryptosporidium</i> (oocysts/L)					✓ ¹				✓ ²
TCEQ-5A: Begin WW DZ 2 (at 2008 MF/RO SWTP's radial flow clarifier's flocculator with chlorine and ammonia injection)									
1. Influent flow rate (gpm)		✓							
2. Free chlorine dosage (mg/L)				✓					
3. Ammonia dosage (mg/L)				✓					

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4. Total chlorine residual, after ammonia injection (mg/L)				✓					
5. Monochloramine residual, after ammonia injection (mg/L)				✓					
6. Free chlorine residual, after ammonia injection (mg/L)				✓					
7. Free ammonia level, after ammonia injection (mg/L)				✓					
8. pH level at monochloramine residual monitoring tap				✓					
9. Water temperature at monochloramine residual monitoring tap(°C)				✓					
10. Quantity of chlorine used (ppd)					✓				
11. Quantity of ammonia used (ppd)					✓				
TCEQ-6A: 2008 MF/RO SWTP Radial Flow Clarifier (flocculation & clarification)									
1. Effluent flow rate (gpm)		✓							
2. Settled water turbidity level (NTU)			✓						
3. Effluent pH level				✓					
4. Calculated flocculator hydraulic detention time (Based on influent flow rate, mins.)						✓			~~WF~~
5. Calculated clarifier surface overflow rate (gpm/sf)						✓			~~WF~~
6. Effluent TOC (mg/L)								✓	
7. Effluent DOC (mg/L)								✓	
TCEQ-7A: End WW DZ 2 (at 2008 MF/RO SWTP's radial flow clarifier's effluent pipe)									
1. Total chlorine residual (mg/L)		✓		~~WF~~					
2. Monochloramine residual (mg/L)		✓		~~WF~~					
3. Free chlorine residual (mg/L)		✓		~~WF~~					
4. Free ammonia level (mg/L)		✓		~~WF~~					
5. pH level at monochloramine monitoring tap		✓		~~WF~~					
6. Water temperature (°C) at monochloramine monitoring tap		✓		~~WF~~					

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TCEQ-8A: Begin WW DZ 3 (at MF membrane units' feed trough)									
1. Free chlorine dosage rate (mg/L)				✓					
2. Ammonia dosage rate (mg/L)				✓					
3. Total chlorine residual, after ammonia injection (mg/L)				✓					
4. Monochloramine residual, after ammonia injection (mg/L)				✓					
5. Free chlorine residual, after ammonia injection (mg/L)				✓					
6. Free ammonia level, after ammonia injection (mg/L)				✓					
7. Water temperature at monochloramine residual monitoring tap (°C)				✓					
8. pH level at monochloramine residual monitoring tap				✓					
9. Quantity of chlorine used (ppd)					✓				
10. Quantity of ammonia used (ppd)					✓				
TCEQ-9A: Selected MF Membrane Unit (at influent to selected MF units' feed trough/tank)									
1. Inlet pressure, head on bottom of membranes' feed side (psi)		✓							
2. Influent silt density index (SDI)					✓				
TCEQ-10A: Selected MF Membrane Unit Filtrate Quality (after vacuum pump & prior to blending with any other MF filtrate)									
1. Effluent turbidity (mNTU)	✓								
2. Effluent flow rate (gpm)		✓							
3. Outlet pressure, vacuum (psi)		✓							
4. Selected MF unit's effluent flow rate (gpm)		✓							
5. Temperature (°C)		✓							
6. pH level		✓							
7. Calculated average transmembrane pressure (TMP, psi)				✓					
8. Calculated average flux rate (gallons per square-foot per day, gfd)				✓					

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9. Calculated average specific flux rate (gfd/psi) at measured temperature				✓					
10. Calculated average specific flux (gfd/psi) normalized to 20° C				✓					
11. SDI					✓				
12. Alkalinity (mg/L)								✓	
13. TOC (mg/L)								✓	
14. DOC (mg/L)								✓	
15. <i>Escherichia coli</i> (<i>E. coli</i>) enumeration									WF
16. <i>Giardia</i> (cysts/L) enumeration									WF
17. <i>Cryptosporidium</i> (oocysts/L)									WF
18. Total culturable viruses (MPN/L)									WF
19. Enterovirus (CFU/L)									WF
20. Norovirus (CFU/L)									WF
TCEQ-11A: End WW DZ 3 (at selected MF membrane unit's filtrate piping & prior to combined MF filtrate pipe)									
1. Total chlorine residual (mg/L)		✓							
2. Monochloramine residual (mg/L)		✓							
3. Free chlorine residual (mg/L)		✓							
4. Free ammonia level (mg/L)		✓							
5. pH level at monochloramine residual monitoring tap		✓							
6. Water temperature at monochloramine residual monitoring tap (°C)		✓							
TCEQ-12A: Sodium Bisulfite Feed System									
1. Sodium bisulfite dosage (mg/L)				✓					
2. Quantity of sodium bisulfite used (ppd)					✓				

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TCEQ-13A: Break Tank (RO membrane feed water tank)									
1. Effluent flow rate (gpm)		√							
2. Water level (feet)				√					
3. Calculated hydraulic detention time (using effluent flow rate, mins.)						√			WF
4. Effluent free chlorine residual (mg/L)				√					
5. Effluent total chlorine residual (mg/L)				√					
6. SDI					WF				
TCEQ-14A: Sulfuric Acid Feed System									
1. Sulfuric acid dosage (mg/L)				√					
2. pH level after injection				√					
3. Quantity of sulfuric acid used (gpd)					√				
TCEQ-15A: Antiscalant Feed System									
1. Antiscalant dosage (mg/L)				√					
2. Quantity of antiscalant used (gpd)					√				
TCEQ-16A: Selected RO Membrane Unit Feed Water (after selected RO unit feed pump & prior to selected RO unit)									
1. Influent flow rate (gpm)		√							
2. Influent turbidity (mNTU)		√							
3. Inlet pressure (psi)				√					
4. Temperature (° C)				√					
5. Nitrate (mg/L)				√ ¹	WF				√ ²
6. TDS (mg/L)				√	WF				
7. TSS (mg/L)				√	WF				
8. SDI					√				

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9. pH level					✓				
10. Hardness as calcium carbonate (mg/L)					✓				
11. Alkalinity (mg/L)					✓				
12. TOC (mg/L)								✓	
13. DOC (mg/L)								✓	
14. Nitrite (mg/L)									✓
15. Silica (mg/L)									✓
TCEQ-17A: First Stage RO Membranes									
1. Temperature (°C)					✓				
2. Flow rate (gpm) at measured temperature					✓				
3. Calculated total flux rate (gfd) at measured temperature					✓				
4. Calculated maximum (or average) net driving pressure (psi)					✓				
5. Calculated specific flux rate (gfd/psi) normalized to 20° C					✓				
TCEQ-18A: Second Stage RO Membranes									
1. Temperature (°C)					✓				
2. Flow rate (gpm) at measured temperature					✓				
3. Calculated total flux rate (gfd) at measured temperature					✓				
4. Calculated maximum (or average) net driving pressure (psi)					✓				
5. Calculated specific flux rate (gfd/psi) normalized to 20° C					✓				
TCEQ-19A: Selected RO Membrane Unit Reject Water Quality (at effluent of RO unit's concentrate piping)									
1. Flow rate (gpm)		✓							
2. Pressure (psi)		✓							
3. TDS (mg/L)					✓				
4. Free ammonia (mg/L)					✓				

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5. Nitrate (mg/L)					✓				
6. pH level							✓		
7. Turbidity (NTU)							✓		
8. Temperature (°C)							✓		
9. CBOD ₅ (mg/L)							✓		
10. Full metal scan (mg/L, arsenic, barium, cadmium, chromium, copper, lead, manganese, mercury, nickel, selenium, silver, zinc)							✓		
TCEQ-20A: Selected RO Membrane Unit Permeate Quality (at selected RO unit permeate piping & prior to blending with other RO units' permeate)									
1. Flow rate per unit (gpm)		✓							
2. TDS (mg/L)		✓							
3. Effluent pressure (psi)		✓							
4. Temperature (°C)				✓					
5. pH level				✓					
6. Maximum daily TDS (mg/L)					✓				
7. Calculated average flux rate (gfd) at measured temperature					✓				
8. Calculated average net driving pressure (psi)					✓				
9. Calculated average specific flux rate (gfd/psi) normalized to 20° C					✓				
10. Nitrate (mg/L)					✓ ¹				✓ ²
11. Nitrite (mg/L) <i>if nitrite is detected in RO membrane feed water</i>					✓ ¹				✓ ²
12. <i>Escherichia coli</i> (<i>E. coli</i>) enumeration					✓ ¹				✓ ²
13. <i>Giardia</i> (cysts/L)					✓ ¹				✓ ²
14. <i>Cryptosporidium</i> (oocysts/L)					✓ ¹				✓ ²
15. Alkalinity (mg/L)								✓	
16. TOC (mg/L)								✓	

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17. DOC (mg/L)								✓	
18. TTHM (ug/L)								✓	
19. HAA5 (ug/L)								✓	
20. Bromate (mg/L)								✓	
21. Chemicals listed in §290.106(b) Inorganic Chemicals ⁴									✓
22. Chemicals listed in §290.107(b) Organic Chemicals ⁴									✓
23. Chemicals listed in §290.108(b)(1) and §290.108(b)(2) & 40 CFR §141.66(d)									✓
24. Chemicals listed in §290.118(b) Secondary Chemicals									✓
25. Total culturable viruses									WF
26. Enterovirus (CFU/L)									WF
27. Norovirus (CFU/L)									WF
28. N-Nitroso-dimethylamine (NDMA, ng/L)									WF
29. N-Nitroso-pyrrolidine (NPYR, ng/L)									WF
30. Pharmaceuticals (µg/L)									WF
31. Hormones (ng/L)									WF
32. Personal care products (ng/L)									WF
33. Fluoridated alkyl-acids (PFOS, PFOA, PFNA, PFHxS, PFHpA, & PFBS; ng/L)									WF
34. Sucralose (ug/L)									WF
35. Perchlorate (ug/L)									WF
TCEQ-21A: Calculated %-Removal (based on RR WWTP effluent quality & the RO membrane unit's permeate quality prior to discharge to waste Lagoon 3)									
1. Nitrite removal (%; if detected in RO feed water)					✓				
2. Nitrate removal (%)					✓				
3. TDS removal (%)					✓				

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4. TOC removal (%)								✓	
5. DOC removal (%)								✓	
6. Removal of inorganics (%)									✓
7. Removal of organics (%)									✓
8. Removal of all radionuclides (%)									✓
9. Removal of secondary chemicals (%)									✓
10. TTHM removal (%)								✓	
11. HAA5s removal (%)								✓	
12. Bromate removal (%)								✓	
TCEQ-22A: Temporary RO Permeate Lagoon Effluent (at waste Lagoon No. 3 recycle pump station & before blending with Secondary Reservoir source water)									
1. Flow rate (gpm)		✓							
2. Turbidity (NTU)				✓					
3. pH level				✓					
4. Temperature (oC)				✓					
5. Nitrate (mg/L)					✓ ¹				✓ ²
6. Free ammonia level (mg/L)					✓				
7. Alkalinity (mg/L)								✓	
8. TOC (mg/L)								✓	
9. DOC (mg/L)								✓	
TCEQ-23A: Raw Secondary Reservoir Source Water Quality (prior to chlorine dioxide injection)									
1. Flow rate (gpm)		✓							
2. Turbidity (NTU)		✓							
3. Temperature (°C)		✓							
4. pH				WF					

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5. TDS (mg/L)					✓				
6. TSS (mg/L)					✓				
7. Daily flow rate (gpd)					✓				
8. Nitrate (mg/L)					✓ ¹				✓ ²
9. Alkalinity (mg/L)								✓	
10. TOC (mg/L)								✓	
11. DOC (mg/L)								✓	
12. Bromate (mg/L)								✓	
13. Chemicals listed in §290.106(b) Inorganic Chemicals ⁴									✓
14. Chemicals listed in §290.107(b) Organic Chemicals ⁴									✓
15. Chemicals listed in §290.108(b)(1) and §290.108(b)(2) & 40 CFR §141.66(d)									✓
16. Chemicals listed in §290.118(b), Secondary Chemicals									✓
17. <i>Escherichia coli</i> (<i>E. coli</i>) enumeration					✓ ¹				✓ ²
18. <i>Giardia</i> (cysts/L)					✓ ¹				✓ ²
19. <i>Cryptosporidium</i> (oocysts/L)					✓ ¹				✓ ²
20. Total culturable viruses (MPN/L)									WF
21. Enterovirus (CFU/L)									WF
22. Norovirus (CFU/L)									WF
23. N-Nitroso-dimethylamine (NDMA, ng/L)									WF
24. N-Nitroso-pyrrolidine (NPYR, ng/L)									WF
25. Pharmaceuticals (µg/L)									WF
26. Hormones (ng/L)									WF
27. Personal care products (ng/L)									WF

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28. Fluoridated Alkyl-Acids (PFOS, PFOA, PFNA, PFHxS, PFHpA, & PFBS; ng/L)									WF
29. Sucralose (ug/L)									WF
30. Perchlorate (ug/L)									WF
TCEQ-24A: Begin Secondary Reservoir raw water (RW) DZ 1 (at chlorine dioxide injection point on Secondary Reservoir raw water transmission pipe)									
1. Chlorine dioxide dosage (mg/L)				✓					
2. pH level				✓					
3. Temperature (°C)				✓					
4. Quantity of chlorine dioxide used (ppd)					✓				
TCEQ-25A: End RW DZ 1 (at 1 st monitoring point on raw Secondary Reservoir transmission pipe 400 feet from chlorine dioxide injection point)									
1. Chlorine dioxide residual (mg/L)				✓	WF				
2. pH level				✓	WF				
3. Temperature (°C)				✓	WF				
TCEQ-26A: End RW DZ 2 (begins at end of RW DZ 1 and ends at 2 nd monitoring point on raw Secondary Reservoir transmission pipe 900 feet from chlorine dioxide injection point)									
1. Chlorine dioxide residual (mg/L)				✓	WF				
2. pH level				✓	WF				
3. Temperature (°C)				✓	WF				
TCEQ-27A: End RW DZ 3 (begins at end of RW DZ 2 & ends prior to tee for blending waste Lagoon No. 3 effluent at 3 rd monitoring point on raw Secondary Reservoir transmission pipe 6,500 feet from chlorine dioxide injection point)									
1. Flow rate (gpm)		WF							
2. Chlorine dioxide residual (mg/L)				✓					
3. pH level				✓					
4. Temperature (°C)				✓					
5. Turbidity (NTU)				WF					

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6. Total alkalinity (mg/L as CaCO ₃)					WF				
7. Nitrate (mg/L)					WF				
TCEQ-28A: Cypress Splitter Box Effluent (blended partially treated RR WWTP effluent from waste Lagoon No. 3 with Secondary Reservoir source water)									
1. Combined flow rate (gpm)				✓					
2. Turbidity (NTU)				✓					
3. pH				✓					
4. Temperature (°C)				WF					
5. <i>E. coli</i> enumeration					✓ ¹				✓ ²
6. <i>Giardia</i> (cysts/L)					✓ ¹				✓ ²
7. <i>Cryptosporidium</i> (oocysts/L)					✓ ¹				✓ ²
8. Nitrate (mg/L)					✓ ¹				✓ ²
9. Water color					✓				
10. Odor (threshold odor number)					✓				
11. TOC (mg/L)								✓	
12. DOC (mg/L)								✓	
13. TTHM (mg/L)								✓	WF
14. HAA5 (mg/L)								✓	WF
15. Bromate (mg/L)								✓	WF
16. Chemicals listed in §290.106(b) Inorganic Chemicals ⁴									✓
17. Chemicals listed in §290.107(b) Organic Chemicals ⁴									✓
18. Chemicals listed in §290.108(b)(1) radionuclides									✓
19. Chemicals listed in §290.108(b)(2) & 40 CFR §141.66(d) manmade radionuclides									✓
20. Chemicals listed in §290.118(b) Secondary Chemicals									✓

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	5-min.	15-min.	2-hrs.	4-hrs.	Once per day	Once per day & anytime the flow rate changes			
21. Total culturable viruses (MPN/L)									WF
22. Enterovirus (CFU/L)									WF
23. Norovirus (CFU/L)									WF
TCEQ-29A: Calculated % Change in Water Quality (between RO membrane unit permeate, prior to discharging to waste Lagoon No. 3 and the Splitter Box's effluent blended water quality)									
1. Nitrate change as % reduction (-) or % increase (+)					√ ¹				√ ²
2. Chlorite change as % reduction (-) or % increase (+)					WF				
3. TOC change as % reduction (-) or % increase (+)								√	
4. DOC change as % reduction (-) or % increase (+)								√	
5. TTHM change as % reduction (-) or % increase (+)								√	WF
6. HAA5 change as % reduction (-) or % increase (+)								√	WF
7. Bromate change as % reduction (-) or % increase (+)								√	WF
TCEQ-30A: Begin Blended partial treated RR WWTP & Secondary Reservoir waters (Blended) DZ 4 (at chlorine & ammonia injection after Cypress Splitter Box and before 2010 Rapid Mix)									
1. Free chlorine dosage (mg/L)				√					
2. Ammonia dosage (mg/L)				√					
3. Total chlorine residual, after ammonia injection (mg/L)				√					
4. Monochloramine residual, after ammonia injection (mg/L)				√					
5. Free chlorine residual, after ammonia injection (mg/L)				√					
6. Free ammonia residual, after ammonia injection (mg/L)				√					
7. pH level at monochloramine residual monitoring tap				√					
8. Water temperature at monochloramine monitoring tap (°C)				√					
9. Quantity of chlorine used (ppd)					√				
10. Quantity of ammonia used (ppd)					√				

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TCEQ-31A: Conventional 2010 SWTP Rapid Mix and Coagulant Addition									
1. Influent alkalinity level (mg/L)				√					
2. Coagulant dosage (mg/L)				√					
3. Quantity of coagulant used (gpd)					√				
TCEQ-32A: Conventional 2010 SWTP Flocculation & Clarification (Accelerator solids-contact flocculation and clarification)									
1. Effluent flow rate (gpm)		√							
2. Settled water turbidity (NTU)			√						
3. Cationic polymer dosage (mg/L)				√					
4. Lime feed rate (gpm)				√					
5. Quantity of cationic polymer used (gpd)					√				
6. Quantity of lime used (ppd)					√				
7. Calculated flocculator hydraulic detention time (mins.)						√			WF
8. Calculated clarifier surface overflow rate (gpm/sf)						√			WF
9. Effluent TOC (mg/L)								√	
10. Effluent DOC (mg/L)								√	
TCEQ-33A: Conventional 2010 SWTP Recarbonation Basin									
1. Carbon dioxide dosage (mg/L)					√				
2. Effluent pH level					√				
3. Quantity of carbon dioxide used (ppd)					√				
TCEQ-34A: Blended Phosphate Addition System (after Conventional 2010 SWTP Recarbonation Basin and prior to gravity media filters)									
1. Blended phosphate dosage (mg/L)					√				
2. Quantity of blended phosphate used (gpd)					√				

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TCEQ-35A: Selected Conventional 2010 SWTP Gravity Media Filter									
1. Selected individual filter's effluent (IFE) turbidity level (NTU)		✓							
2. Selected IFE flow rate (gpm)				✓					
3. Combined filters' effluent water flow rate (gpm)				WF					
4. Calculated selected IFE hydraulic loading rate for selected filter (gpm/sf)						✓			WF
TCEQ-36A: End Blended DZ 4 (at effluent of selected Conventional 2010 SWTP filter)									
1. Total chlorine residual (mg/L)		✓							
2. Monochloramine residual (mg/L)		✓							
3. Free chlorine residual (mg/L)		✓							
4. Free ammonia level (mg/L)		✓							
5. pH level at monochloramine residual monitoring tap		✓							
6. Water temperature (°C) at monochloramine residual monitoring tap		✓							
TCEQ-37A: Fluoride Adjustment System (after Conventional 2010 SWTP filters and prior to chlorine injection point)									
1. Fluoride level, pre-fluosilicic injection (mg/L)					✓				
2. Fluosilicic acid dosage (mg/L)					✓				
3. Quantity of fluosilicic acid used (gpd)					✓				
TCEQ-38A: Begin Blended DZ 5 (at chlorine injection prior to Conventional 2010 SWTP Clearwell)									
1. Free chlorine dosage (mg/L)				✓					
2. Ammonia dosage (mg/L)				✓					
3. Total chlorine residual, after ammonia injection (mg/L)				✓					
4. Monochloramine residual, after ammonia injection (mg/L)				✓					
5. Free chlorine residual, after ammonia injection (mg/L)				✓					
6. Free ammonia level, after ammonia injection (mg/L)				✓					

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7. pH level at monochloramine residual monitoring tap				✓					
8. Water temperature at monochloramine residual monitoring tap (°C)				✓					
9. Quantity of chlorine used (ppd)					✓				
10. Quantity of ammonia used (ppd)					✓				
TCEQ-39A: End Temporary Blended DZ 5 (at Conventional 2010 SWTP Clearwell's transfer pumps)									
1. Total chlorine residual (mg/L)		✓							
2. Monochloramine residual (mg/L)		✓							
3. Free chlorine residual (mg/L)		✓							
4. Free ammonia level (mg/L)		✓							
5. pH level at monochloramine residual monitoring tap		✓							
6. Water temperature at monochloramine residual monitoring tap (°C)		✓							
TCEQ-40A: Conventional 2010 SWTP Clearwell Effluent Water Quality (after 2010 clearwell transfer pumps and prior to GSTs)									
1. Flow rate (gpm)		✓							
2. Turbidity (NTU)		✓ ³							
3. Turbidity (mNTU)		✓ ³							
4. Nitrate (mg/L)		✓ ¹			~~WF~~				✓ ²
5. TDS (mg/L)		✓ ¹			~~WF~~				✓ ²
6. <i>E. coli</i> enumeration					✓ ¹				✓ ²
7. <i>Giardia</i> (cysts/L)					✓ ¹				✓ ²
8. <i>Cryptosporidium</i> (oocysts/L)					✓ ¹				✓ ²
9. Fluoride (mg/L)					✓ ¹				✓ ²
10. Daily quantity of water treated (MGD)					✓				
11. Chlorine dioxide (mg/L)					✓				
12. Chlorite (mg/L)					✓				

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13. Color (color units)					✓				
14. Odor (threshold odor number)					✓				
15. Alkalinity (mg/L)								✓	
16. Hardness as calcium carbonate (mg/L)								✓	
17. Calculated Langelier saturation index (LSI)								✓	
18. Chemicals listed in §290.106(b) Inorganic Chemicals ⁴									✓
19. Chemicals listed in §290.107(b) Organic Chemicals ⁴									✓
20. Chemicals listed in §290.108(b)(1) (radium 226, radium 228, uranium, gross alpha activity)									✓
21. Chemicals listed in §290.108(b)(2) & 40 CFR §141.66(d) (gross beta particle and photon radioactivity, tritium, strontium 90)									✓
22. Chemicals listed in §290.118(b) Secondary Chemicals									✓
23. TTHM (ug/L)								✓	
24. HAA5 (ug/L)								✓	
25. Lead (mg/L)									✓
26. Total culturable viruses (MPN/L)									WF
27. Enterovirus (CFU/L)									WF
28. Norovirus (CFU/L)									WF
29. N-Nitroso-dimethylamine (NDMA, ng/L)									WF
30. N-Nitroso-pyrrolidine (NPYR, ng/L)									WF
31. Pharmaceuticals (ug/L)									WF
32. Hormones (ng/L)									WF
33. Personal care products (ng/L)									WF
34. Fluoridated alkyl-acids (PFOS, PFOA, PFNA, PFHxS, PFHpA, & PFBS; ng/L)									WF

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35. Sucralose (ug/L)									WF
36. Perchlorate (ug/L)									WF
Simulated CT for 10.0-MG GST					8-hrs.	End of three 8-hr. shifts			
TCEQ-41A: Begin Temporary Blended DZ 6 (no disinfectant injection, includes Cypress 10.0-MG GST)									
1. Collect water sample at effluent of 2010 clearwell					✓				
2. 2010 clearwell transfer pumps' flow rate (gpm)					✓				
3. Calculate hydraulic detention time of 10.0 MG GST at 50-% capacity (mins.)					✓				
4. Calculate T10 using a baffling factor of 0.3 (mins.)					✓				
TCEQ-42A: End Temporary Blended DZ 6 (at Cypress high service pumps' discharge header)									
1. Water temperature of sample after holding sample for calculated T10 (°C)					✓				
2. pH level of sample after holding sample for calculated T10					✓				
3. Monochloramine residual of sample after holding sample for calculated T10 (mg/L)					✓				
4. Record 2010 clearwell transfer pumps' 8-hr. flow rate result that corresponds to the lowest virus and <i>Giardia</i> inactivation on Full-Scale Verification Test SWMOR (gpm)						✓			
5. Record water sample temperature for the 8-hr. result that corresponds to the lowest virus and <i>Giardia</i> inactivation on Full-Scale Verification Test SWMOR (°C)						✓			
6. Record water sample pH level for the 8-hr. result that corresponds to the lowest virus and <i>Giardia</i> inactivation on Full-Scale Verification Test SWMOR						✓			
7. Record monochloramine residual for the 8-hr. result that corresponds to the lowest virus and <i>Giardia</i> inactivation on Full-Scale Verification Test SWMOR (mg/L)						✓			

- 1 Samples are to be collected at each of the designated locations once per day and tested using a TCEQ accepted real-time (on-site) analytical method.
- 2 A split sample is to be collected in conjunction with the above daily samples at each location at startup, every 30 days and at the last day of the Full-Scale Verification Test and submitted to an off-site NELAP laboratory certified for conducting these drinking water quality tests.
- 3 Either a Hach Model 1720E (or TCEQ approved equivalent) or Model 660 FilterTrak turbidimeter may be used for the 15-minute filtered water turbidity level monitoring and reporting. The City's Protocol needs to specify which method will be used.
- 4 Please assure that the laboratory monitors for all of the inorganic and organic compounds. Compounds that some labs do not include, but are required are: asbestos, cyanide, endotoxin, diquat, glyphosate, asbestos, and the dioxins.