

PROGRESS REPORT

Task 1.

An initial review of desalination facilities in the State of Texas was conducted. During this review, 34 desalination facilities utilizing either reverse osmosis or EDR were identified. This list of facilities was cross-referenced against wastewater treatment plants in close proximity to the seawater desalination facilities. Letters were sent to 20 facilities requesting that they provide water quality data for the concentrate streams, and wastewater streams at the facility. Follow-up via email and telephone was made to each facility. Early commitments to provide data were provided by 7 of the 20 facilities, including EPWU, Laredo, City of Seadrift and Brownsville PUB, with additional data promised by several other smaller facilities. We are attempting to pull in the last data available.

Additional information was extracted from the following documents to characterize the desalination concentrate expected from Texas based seawater desalination facilities:

NRS (2008). "FINAL Pilot Study Report Texas Seawater Desalination Demonstration Project", Brownsville, Texas

Henthorne, L. (2007). "Evaluation of Membrane Pretreatment for Seawater Reverse Osmosis Desalination", United States Bureau of Reclamation, Desalination and Water Purification Research and Development Program Report No. 106, USBR Agreement No. 01-FC-81-0735

Based upon the Brownsville raw water quality, modeling was conducted to examine the expected concentrate for the Brownsville location. The following concentrate concentrations are expected (Table 1).

Given recent literature on required draw solutions osmotic pressures required to provide adequate flux, it has become evident that seawater desalination concentrate provides the largest gradient, and therefore provides the greatest likelihood

In general, receiving wastewater water quality data with full ionic screens has been much more challenging, as few facilities track data not required in their discharge permits. To fill this data gap, we have good data from Brownsville and El Paso. CH2M HILL has approached TCEQ to discuss getting compliance data for concentrate discharge and wastewater discharge facilities identified – which generally will include TDS.

CH2M HILL will finalize this task prior to the end of April. The draft deliverable will include:

Map of Texas identifying desalination facilities and wastewater treatment facilities

- different symbols of each
- differentiating symbol for facilities selected for water quality data
- graphical and tabular water quality information for the selected facilities

TABLE 1.
Brownsville Concentrate Data

Name	Pass Streams (mg/l as Ion)				
	Feed	Adjusted Feed	Concentrate	Permeate	
			Stage 1	Stage 1	Total
NH4	0.00	0.00	0.00	0.00	0.00
K	684.00	684.00	1317.92	6.16	6.16
Na	10175.00	10354.17	19961.43	81.26	81.26
Mg	1330.00	1330.00	2571.55	2.43	2.43
Ca	434.00	434.00	839.15	0.78	0.78
Sr	7.73	7.73	14.95	0.01	0.01
Ba	0.24	0.24	0.47	0.00	0.00
CO3	79.73	4.68	16.82	0.00	0.00
HCO3	313.00	364.93	683.63	3.74	3.74
NO3	1.05	1.05	1.98	0.06	0.06
Cl	19000.00	19012.34	36665.69	135.87	135.87
F	0.00	0.00	0.00	0.00	0.00
SO4	2642.00	2721.29	5264.42	1.95	1.95
SiO2	29.50	29.50	56.74	0.37	0.37
Boron	17.86	17.80	30.34	4.39	4.39
CO2	0.79	18.35	24.55	20.35	20.35
TDS	34798.10	35045.74	67568.23	257.75	257.75
pH	8.30	7.00	7.20	5.41	5.41

Task 2. Not yet started.

Task 3.

Spiral Wound membranes have been obtained from HTI and are currently at the Colorado School of Mines (CSM). We are working to get the CSM contract in place to conduct their portion of the work.

Task 4. Not yet started.

Task 5. Not yet started.

ATTACHMENT 1.
Desalination Facilities in Texas

Facility	County	Capacity (mgd)	Built	Process	Pre-treatment	Post-Treatment	Concentrate Disposal
Haciendas del Norte WID	El Paso	0.05	1981	RO	Cartridge filter; media filter; coagulation; scaling control	Disinfection	Land Application; Evaporation Pond
Horizon Regional MU	El Paso	2.2	2001	RO	Cartridge Filter; centrifugal sand separator; scaling control	Blending; Disinfection	Land Application; Evaporation Pond
Kate Bailey Hutchison Desalination Plant	El Paso	15.5	2005	RO	Cartridge filter, scaling control	Blending, pH adjustment, disinfection, corrosion protection	Deep Well Injection
Esperanza Fresh Water Supply	Hudspeth	0.03	1990	RO			
Dell City	Hudspeth	0.1	1996	EDR		Disinfection	Land Application
Big Bend Motor Inn	Brewster	0.072	1992	RO	Cartridge filter; media filter; scaling control	Adjustment of pH; Disinfection	Evaporation Pond
Study Butte Terlingua Water System	Brewster	0.144	2000	RO	Cartridge filter; media filter; oxidation; scaling control	Disinfection	Surface water body
Longhorn Ranch Motel	Brewster	0.023	1990	RO	Cartridge filter	Disinfection	Land application
City of Fort Stockton Osmosis/Desalination Facility	Pecos	6	1996	RO	Cartridge filter; disinfection; disinfection-UV; oxidation; scaling control	Blending; Disinfection; Aeration	WWTP
City of Laredo Santa Isabel RO	Webb	0.1008	1998	RO	Cartridge filter; Disinfection-chlorination / chloramination; pH adjustment; scaling control	pH adjustment; Disinfection	WWTP
Water Runner Inc	Midland	2.16	2001	RO			Land application
City of Raymondville	Hidalgo	1	2004	RO		Disinfection	Surface water body
North Cameron / Hidalgo WA	Hidalgo	2	2005	RO	Cartridge filter	Disinfection	Surface water body
City of Primera	Cameron	2	2005	RO	Cartridge filter; media filter	Blending; Disinfection; CaCl and caustic soda	Surface water body
Southmost Regional Water Authority	Cameron	6.75	2004	RO	Oxidation, coagulant, MF membranes, Cartridge filter, scaling control	Blending; pH Adjustment; Disinfection; CaCl added	Surface water body
City of Abilene	Taylor	8	2004	RO	Membrane filter, coagulation	Disinfection	Evaporation pond
City of Brady	McCulloch	1.5	2005	RO	Cartridge filter	Disinfection	Evaporation pond
City of Seymour	Baylor	0.5	2000	RO	Cartridge filter; disinfection-chlorination / chloramination; pH adjustment; dechlorination; activated carbon; scaling control	Blending; Gas Removal; pH Adjustment; Disinfection	Surface water body
City of Electra	Wichita	0.5	1999	RO	Gravity filter; membrane filter; media filter; pH		Land application

					adjustment; scaling control		
Sportsmans World MUD	Palo Pinto	0.083	1984	RO	Cartridge filter; media filter; pH adjustment; clarification	pH Adjustment; Disinfection	Surface water body
The Cliffs	Palo Pinto	0.2		RO	Cartridge filter, media filter	Disinfection	Surface water body
City of Granbury	Hood	0.11	1985	EDR	Gravity filter; disinfection-chlorination / chloramination	Disinfection	WWTP
Lake Granbury Surface Water Advanced Treatment System	Hood	6	2003	RO	Membrane filter; cartridge filter; disinfection-chlorination / chloramination; pH adjustment; coagulation; clarification; scaling control	Blending; pH Adjustment; Disinfection	Surface water body
Oak Trail Shores	Hood	0.792	1990	RO	Media filter, clarification		Surface water body
City of Sherman	Grayson	7.5	1993	EDR	Cartridge filter; media filter; oxidation; pH adjustment; coagulation; activated carbon; scaling control	Disinfection; Sodium hexametaphosphate	WWTP
City of Bardwell	Ellis	0.036	1990	RO	Membrane filter; cartridge filter; disinfection-chlorination / chloramination; activated carbon	Blending; Disinfection	WWTP
City of Robinson	McLennan	1.8	1994	RO	Gravity filter; cartridge filter; media filter; disinfection-chlorination / chloramination; pH adjustment; coagulation; clarification; dechlorination; scaling control	Blending, gas removal; pH adjustment, corrosion control, disinfection and aeration	Surface water body
Windermere Water System	Travis	1	2003	RO	Cartridge filter; media filter		WWTP
River Oaks Ranch	Hays	0.144	1987	RO	Media filter	Disinfection	Evaporation pond
City of Kenedy	Karnes	0.72	1995	RO		pH Adjustment, Disinfection	Surface water body
City of Tatum	Rusk	0.288	1999	RO	Cartridge filter; disinfection-chlorination / chloramination	Blending; Disinfection	WWTP
City of Beckville	Panola	0.144	2004	RO	Oxidation; scaling control	Disinfection	WWTP
Holiday Beach WSC	Aransas	0.15	1998	RO	Cartridge filter, pH adjustment	Disinfection	Surface water body
City of Seadrift	Calhoun	0.524	1998	RO	Media filter	Gas removal, Disinfection	Surface water body