

Case Study

LANDFILL LEACHATE

Trip Report

Landfill Site-Houston, Texas

9/16/2013

CARDEN Water Systems, LLC demo unit arrived at Landfill site in Houston, Texas.

09/17/2013

Set up and testing operations began at 10:30 AM. CARDEN was provided 6 complete sets of sample coolers from Test America. Samples taken. Feed water from the leachate equalization tank was very dark in color with a viscosity equivalent to antifreeze. Leachate feed water pressure for the Nano/Ultra Membrane assembly was 120 PSI. Reject water was flowing at the rate of 2 GPM. Combined permeate flow was unmetered but estimated at 30 gallons per minute.

First run was a combined permeate from the Nano and the Ultra Filters into one 275 gallon tote. Tote filled, the permeate and the reject water recycled back into the leachate feed water tank. That tote of ultra/nano permeate used as feedwater for the RO System. Process pressure and pumping was provided on the skid by 3-2 hp motors @460 volts, 3.7amps, plus a re-circulating 1hp pump @ 460 volts, 1.6 amps.

After about a half an hour of operations and continuous running the WM 6,500 gal feed water leachate tank level was not able to provide enough water to continue the testing. CARDEN operators reconfigured the feed water arrangement and resumed operations and testing.

About 2 pm, the unit was switched over to the RO section and began running the RO test and sampling procedures. Process pressure of 170 psi and pumping for the RO section was provided on the skid by 2-3 hp motors @460 volts, 4.75 amps, plus a re-circulating 1hp pump @ 460 volts, 1.6 amps. Flow rate of the reject water was metered at 2 gallons per minute. RO permeate was unmetered but estimated at 35 gallons per minute

After all the samples were collected, the CARDEN demo unit was cleaned and all components placed back in the trailer for pick up in the morning to go to site in San Antonio, Texas.

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Raw Leachate ready for testing

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Analytical Testing Results of Untreated Leachate

17-Sep-13

CARDEN Water Unit Field-Scale Test - Atascocita LF Leachate

M. Caldwell

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Analyte	Feed Water	Ultra Perm	Nano Perm	RO Perm	Reject (1)	Standards (mg/L)	
						Bealine WWTP	30 TAC 210
	(concentration mg/L)					(standards mg/L)	
HEM (Oil and Grease)	8.9	12	<3	<3	6.9		10
TDS	8,400	7,800	700	290	12,000		2,000
Cyanide, available	0.078	0.017	0.039	<0.002	0.019	<1*	0.200
Phenols, total	16	12	1.3	0.17	30	<1	
COD	6,300	4,800	160	<20	13,000	<30,000	
Sulfide	8.7	4.2	21	<0.05	3.6	<10	
TOC	2,800	1,600	27	4.7	4,100		55
BOD	1,700		170	28	2,700		
Chloride	2,300	2,200	190	100	2,100		
Ammonia	990	920	96	27	1,200		
Nitrate	<1	<1	0.24	0.26	2		10
pH	7.48	7.56	7.29	7.28	7.48	6 to 12	
UV transmittance (%)	0	6.3	50.1	90.4	0		

(1) - Measured op efficiency - ~90%

* - Total

Nano permeate Nano filtration permeate achieves all performance standards for 30 TAC 210 land application rules and Bealine PT limits (except for total phenols and sulfides (possible lab error))

Process Flow - Leachate tank => centrifugal clarifier => 10 µ filter => 5 µ filter => ultra membrane/nano membranes in parallel (separated permeate) => RO membrane => reject

Operating Pressure at each stage - ultra & nano - 120 psi; RO - between 170-200 psi (predominant pressure 170)

Flow - Field test run at ~20-30 gpm; measured ~ 2 gpm reject; closed loop system does not require depressurization between stages; reverse flow across the membranes every 10 mins.

Process Pressure - 3, 2-HP motors at 460 volts, 3.7 amps, plus a recirculation pump 1-HP motor @ 460 volts, 1.6 amps;

