

REVERSE OSMOSIS APPLICATION FOR MICRODYN-NADIR (ROAM)

Project Name	Projection By	Date/time	Projection Number
Test	Test	7/8/2019 12:30:13PM	32

System Design

Permeate Flow:	108,000.0	gpd	System Flux:	15.0	gfd
System Recovery:	75.0	%	Acid Dosage, H2SO4 98%:	0.0	ppm
Feedwater Temp:	25.0	C	Feed CO2:	8.1	ppm
Element Age:	0.0	years	Flux Decline Coef.:	-0.025	%
Raw Water pH:	7.0		3-yr S.P.I.F:	1.3	
Feed Pressure:	152.9	psi	Concentrate Pressure:	96.7	psi
Recirc. Flow:	0.0	gpd	Blend Flow:	0.0	gpd

Water Quality

	Raw Water		Adjusted Feed Water		Concentrate		Permeate	
Ion	mg/l	CaCO3	mg/l	CaCO3	mg/l	CaCO3	mg/l	CaCO3
Calcium (Ca)	50.00	125.00	50.00	125.00	200.09	500.22	0.11	0.27
Magnesium (Mg)	20.00	83.33	20.00	83.33	80.04	333.49	0.04	0.17
Sodium (Na)	200.00	434.78	200.00	434.78	788.94	1,715.08	4.22	9.17
Potassium (K)	10.00	12.82	10.00	12.82	39.30	50.39	0.26	0.33
Ammonium (NH4)	5.00	13.89	5.00	13.89	19.53	54.26	0.17	0.47
Barium (Ba)	1.00	0.73	1.00	0.73	4.00	2.92	0.00	0.00
Strontium (Sr)	1.00	1.14	1.00	1.14	4.00	4.55	0.00	0.00
Carbonate (C03)	0.00	0.00	0.02	0.04	0.09	0.15	0.00	0.00
Bicarbonate (HC03)	50.00	40.98	49.98	40.97	197.90	162.21	0.81	0.66
Sulfate (S04)	60.00	62.50	60.00	62.50	240.42	250.44	0.02	0.02
Chloride (Cl)	395.71	557.34	395.71	557.34	1,566.51	2,206.36	6.50	9.16
Fluoride (F)	2.00	5.26	2.00	5.26	7.61	20.02	0.14	0.36
Nitrate (N03)	5.00	4.03	5.00	4.03	19.54	15.76	0.17	0.13
Silica (Si02)	5.00	4.17	5.00	4.17	19.81	16.51	0.08	0.06
TDS	804.71	1,345.98	804.72	1,346.00	3,187.78	5,332.34	12.51	20.82
pH	7.00		7.00		7.60		5.21	

** Calculations are accurate within +/- 10%

Stage Information

Stage	Array	No of Elements	Element	Feed Flow	Conc. Flow	Pressure		Pressure		Beta	Avg. Flux
				(gpm)	(gpm)	Feed (psi)	Conc. (psi)	Boost (psi)	Permeate (psi)		(gfd)
1	2x6	12	8040-BW-400	100.0	43.8	152.9	125.3		0.00	1.17	16.9
2	1x6	6	8040-BW-400	43.8	25.0	125.3	96.7	0.00	0.00	1.09	11.3

*** This projection is not to be used for warranty purposes ***

Individual Elements

Pass	Stage	Element No.	Permeate Flow (m3/hr)	TDS	Beta	Flux (lmh)	Net Driving Pressure (bar)
1	1	1	0.55	0.08	1.09	14.75	10.2
		2	0.54	0.09	1.10	14.48	10.0
		3	0.53	0.10	1.11	14.23	9.8
		4	0.52	0.11	1.12	14.03	9.7
		5	0.51	0.13	1.13	13.85	9.5
		6	0.51	0.15	1.16	13.70	9.4
	2	1	0.49	0.18	1.08	13.19	9.1
		2	0.48	0.20	1.09	12.93	8.9
		3	0.47	0.22	1.10	12.70	8.7
		4	0.46	0.25	1.11	12.49	8.6
		5	0.46	0.28	1.12	12.31	8.5
		6	0.45	0.33	1.13	12.16	8.4

Water Saturation Indexes

	Raw Water	Feed Water	Concentrate
Langelier Saturation Index	-1.20	-1.20	0.56
S and DSI Index	-1.16	-1.16	0.45
CaSO₄/Ksp*100%	0.95	0.95	5.43
SrSO₄/Ksp*100%	1.24	1.24	6.95
BaSO₄/Ksp*100%	1,701.38	1,701.33	9,162.62
CaF₂/Ksp*100%	25.27	25.27	827.10
SiO₂ Saturation	4.17	4.17	15.42
Fe (ppm)	0.00	0.00	0.00
Al (ppm)	0.00	0.00	0.00
Osmotic Pressure, psi	8.08	8.08	32.06

Water Saturation Indexes

For optimum system performance, treatment should include TriPol™ 9500 series antiscalant at a dosage rate of 2.9 ppm. You will be required to mix a diluted solution of antiscalant. For every 10 gallons of volume in your solution tank, mix 3.6 gallons of antiscalant with 6.4 gallons of RO permeate water. Inject this solution into the RO feedstream at a rate of 3 ml/min. Antiscalant should be injected at a point where there is a turbulent flow prior to or just after the pre-RO cartridge filters. The most common injection point is just prior to or just after the pre-RO cartridge filters.

Operating 24 hours per day, the maximum daily antiscalant usage will be 0.4 gallons. Operating 24 hours per day for 30 days each month, the maximum monthly antiscalant usage will be 12.4 gallons.

Operating 24 hours per day, the maximum daily usage of H₂SO₄ 98% will be 0.0 pounds.

Operating 30 days per month the monthly usage of H₂SO₄ 98% will be 0.0 pounds.

*** WARNING *** CaCO₃ solubility exceeded, add scale inhibitor

*** WARNING *** Maximum BaSO₄ saturation exceeded, decrease recovery.

*** WARNING *** CaF₂ solubility exceeded, add scale inhibitor

Maximum saturations may sometimes be exceeded. Please contact MICRODYN-NADIR for more information.

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