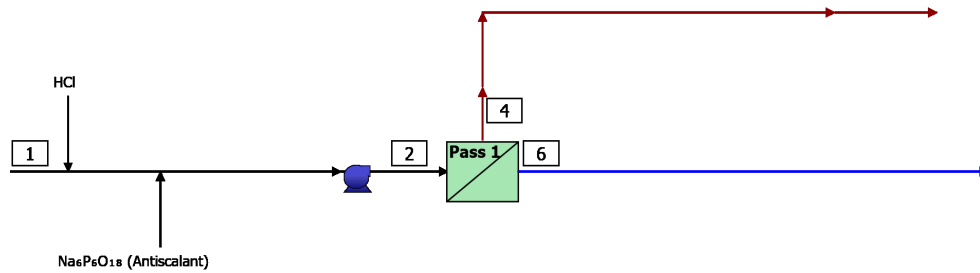


RO Summary Report

RO System Flow Diagram



#	Description	Flow (m ³ /h)	TDS (mg/L)	Pressure (psi)
1	Raw Feed to RO System	13.4	11,162	0.0
2	Net Feed to Pass 1	13.3	9,632	410.3
4	Total Concentrate from Pass 1	5.33	24,021	361.2
6	Net Product from RO System	8.00	34.41	0.0

RO System Overview

Total # of Trains	1	Online =	1	Standby =	0	RO Recovery	59.7 %
System Flow Rate	(m ³ /h)	Net Feed =	13.4	Net Product =	8.00		

Pass	Pass 1
Stream Name	Stream 1
Water Type	Well Water (SDI < 3)
Number of Elements	9
Total Active Area (m ²)	334
Feed Flow per Pass (m ³ /h)	13.3
Feed TDS ^a (mg/L)	9,632
Feed Pressure (psi)	410.3
Flow Factor Per Stage	0.85, 0.85, 0.85
Permeate Flow per Pass (m ³ /h)	8.00
Pass Average flux (LMH)	23.9
Permeate TDS ^a (mg/L)	34.41
Pass Recovery	60.2 %
Average NDP (psi)	258.4
Specific Energy (kWh/m ³)	1.64
Temperature (°C)	27.3
pH	6.0 (After Adjustment)
Chemical Dose	3.0 mg/L Na ₆ P ₆ O ₁₈ 2,237 mg/L HCl
RO System Recovery	60.0 %
Net RO System Recovery	60.0%

Footnotes:

^aTotal Dissolved Solids includes ions, SiO₂ and B(OH)₃. It does not include NH₃ and CO₂

RO Flow Table (Stage Level) - Pass 1

Stage	Elements	#PV	#Els per PV	Feed				Concentrate			Permeate			
				Feed Flow	Recirc Flow	Feed Press	Boost Press	Conc Flow	Conc Press	Press Drop	Perm Flow	Avg Flux	Perm Press	Perm TDS
				(m ³ /h)	(m ³ /h)	(psi)	(psi)	(m ³ /h)	(psi)	(psi)	(m ³ /h)	(LMH)	(psi)	(mg/L)
1	SW30HRLE-400	1	3	13.3	0.00	405.8	0.0	10.2	387.2	18.6	3.15	28.2	14.5	24.96
2	SW30HRLE-400	1	3	10.2	0.0	384.3	0.0	7.43	371.9	12.4	2.75	24.7	0.0	32.85
3	SW30HRLE-400	1	3	7.43	0.0	369.0	0.0	5.33	361.2	7.8	2.10	18.9	0.0	51.53

RO Solute Concentrations - Pass 1

Concentrations (mg/L as ion)									
	Raw Feed	pH Adjusted Feed	Concentrate			Permeate			
			Stage1	Stage2	Stage3	Stage1	Stage2	Stage3	Total
NH ₄ ⁺	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
K ⁺	42.69	42.69	55.90	76.49	106.5	0.14	0.21	0.37	0.22
Na ⁺	1,117	1,117	1,463	2,002	2,788	3.10	4.76	8.47	5.08
Mg ⁺²	513.3	513.3	672.5	920.8	1,284	0.48	0.73	1.30	0.78
Ca ⁺²	962.6	962.6	1,261	1,727	2,407	0.88	1.35	2.39	1.44
Sr ⁺²	7.16	7.16	9.38	12.85	17.91	0.01	0.01	0.02	0.01
Ba ⁺²	3.14	3.14	4.12	5.63	7.85	0.00	0.00	0.01	0.00
CO ₃ ⁻²	26.92	1.50	2.99	6.95	17.77	0.00	0.00	0.00	0.00
HCO ₃ ⁻	8,035	4,344	5,687	7,777	10,818	17.41	21.35	31.21	22.15
NO ₃ ⁻	1.70	1.70	2.22	3.04	4.22	0.02	0.02	0.04	0.02
F ⁻	0.64	0.64	0.84	1.15	1.59	0.00	0.00	0.01	0.00
Cl ⁻	87.56	2,263	2,965	4,060	5,659	2.06	3.17	5.64	3.39
Br ⁻¹	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SO ₄ ⁻²	241.0	241.0	315.9	432.6	603.2	0.06	0.10	0.17	0.10
PO ₄ ⁻³	1.23	1.23	1.61	2.20	3.06	0.01	0.01	0.01	0.01
SiO ₂	120.0	120.0	157.1	214.9	299.1	0.52	0.80	1.43	0.86
Boron	0.23	0.23	0.29	0.38	0.50	0.03	0.04	0.07	0.04
CO ₂	631.7	3,315	3,319	3,320	3,324	3,313	3,314	3,317	3,315
TDS*	11,162	9,620	12,600	17,244	24,021	24.96	32.85	51.53	34.41
Cond. µS/cm	9,870	11,635	14,738	19,345	25,708	71	75	90	76
pH	7.0	6.0	6.1	6.2	6.3	3.9	4.0	4.2	4.0

Footnotes:

*Total Dissolved Solids includes ions, SiO₂ and B(OH)₃. It does not include NH₃ and CO₂

RO Design Warnings

None

Special Comments

None

RO Flow Table (Element Level) - Pass 1

Stage	Element	Element Name	Recovery (%)	Feed Flow (m³/h)	Feed Press (psi)	Feed TDS (mg/L)	Conc Flow (m³/h)	Perm Flow (m³/h)	Perm Flux (LMH)	Perm TDS (mg/L)
1	1	SW30HRLE-400	8.3	13.3	405.8	9,632	12.2	1.10	29.6	15.06
1	2	SW30HRLE-400	8.6	12.2	398.8	10,496	11.2	1.05	28.2	17.22
1	3	SW30HRLE-400	8.9	11.2	392.6	11,479	10.2	1.00	26.8	19.82
2	1	SW30HRLE-400	9.6	10.2	384.3	12,601	9.20	0.98	26.3	22.39
2	2	SW30HRLE-400	10.0	9.20	379.6	13,935	8.28	0.92	24.7	26.37
2	3	SW30HRLE-400	10.3	8.28	375.5	15,473	7.43	0.85	23.0	31.42
3	1	SW30HRLE-400	10.5	7.43	369.0	17,245	6.65	0.78	20.9	38.27
3	2	SW30HRLE-400	10.6	6.65	366.0	19,248	5.95	0.70	18.9	46.89
3	3	SW30HRLE-400	10.5	5.95	363.4	21,510	5.33	0.62	16.8	58.35

Footnotes:

*Total Dissolved Solids includes ions, SiO₂ and B(OH)₃. It does not include NH₃ and CO₂

RO Solubility Warnings

Warning	Pass No
Stiff & Davis Stability Index > 0	1
BaSO ₄ (% saturation) > 100	1
CaF ₂ (% saturation) > 100	1
SiO ₂ (% saturation) > 100	1
Anti-scalants may be required. Consult your anti-scalant manufacturer for dosing and maximum allowable system recovery.	1

RO Chemical Adjustments

	Pass 1 Feed before pH Adjust	Pass 1 Feed After pH Decrease	RO 1 st Pass Conc
pH	7.0	6.0	6.3
Langelier Saturation Index	2.3	0.99	2.04
Stiff & Davis Stability Index	1.8	0.52	1.21
TDS ^a (mg/l)	11,162	9,620	24,021
Ionic Strength (molal)	0.19	0.19	0.48
HCO ₃ ⁻ (mg/L)	8,035	4,344	10,818
CO ₂ (mg/l)	631.7	3,315	3,324
CO ₃ ⁻² (mg/L)	26.92	1.50	17.77
CaSO ₄ (% saturation)	13.2	13.2	39.1
BaSO ₄ (% saturation)	3,381	3,386	9,175
SrSO ₄ (% saturation)	3.7	3.7	10.3
CaF ₂ (% saturation)	14.1	14.1	159.8
SiO ₂ (% saturation)	92.4	82.3	211.5
Mg(OH) ₂ (% saturation)	0.01	0.00	0.00

Footnotes:

*Total Dissolved Solids includes ions, SiO₂ and B(OH)₃. It does not include NH₃ and CO₂



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