CAMBRIA COMMUNITY SERVICES DISTRICT

MEETING	TIME & DATE	LOCATION
Resources & Infrastructure Committee	12:00 PM Tuesday, December 2, 2025	990 San Simeon Creek Road Cambria, CA 93428

AGENDA

Karen Dean, Chair of the Resources & Infrastructure Committee, hereby calls a Special Meeting pursuant to California Government Code Section 54956.

The Special Meeting will be held on Tuesday, December 2, 2025, from 12:00 PM to 2:00 PM at 990 San Simeon Creek Road, Cambria, CA 93428. The purpose of the Special Meeting is to discuss or transact the following business:

NOTICE OF SPECIAL MEETING

RESOURCES & INFRASTRUCTURE COMMITTEE

Tuesday, December 2, 2025
12:00 PM TO 2:00 PM
990 San Simeon Creek Road, Cambria, CA 93428

Copies of the staff reports or other documentation relating to each item of business referred to on the agenda are on file in the CCSD Administration Office, available for public inspection during District business hours. The agenda and agenda packets are also available on the CCSD website at https://www.cambriacsd.org/. In compliance with the Americans with Disabilities Act, if you need special assistance to participate in this meeting or if you need the agenda or other documents in the agenda packet provided in an alternative format, contact the Confidential Administrative Assistant at 805-927-6223 at least 48 hours before the meeting to ensure that reasonable arrangements can be made. The Confidential Administrative Assistant will answer any questions regarding the agenda.

1. **OPENING**

2. **PUBLIC COMMENT ON AGENDA ITEMS**

   Members of the public may now address the Committee on any item on its agenda today.

3. **REGULAR BUSINESS**

   3.A Tour of the Water Reclamation Facility (WRF) and Zero Liquid Discharge (ZLD) Project

   No formal action of any kind will be taken.

4. **FUTURE AGENDA ITEMS**

5. **ADJOURN**

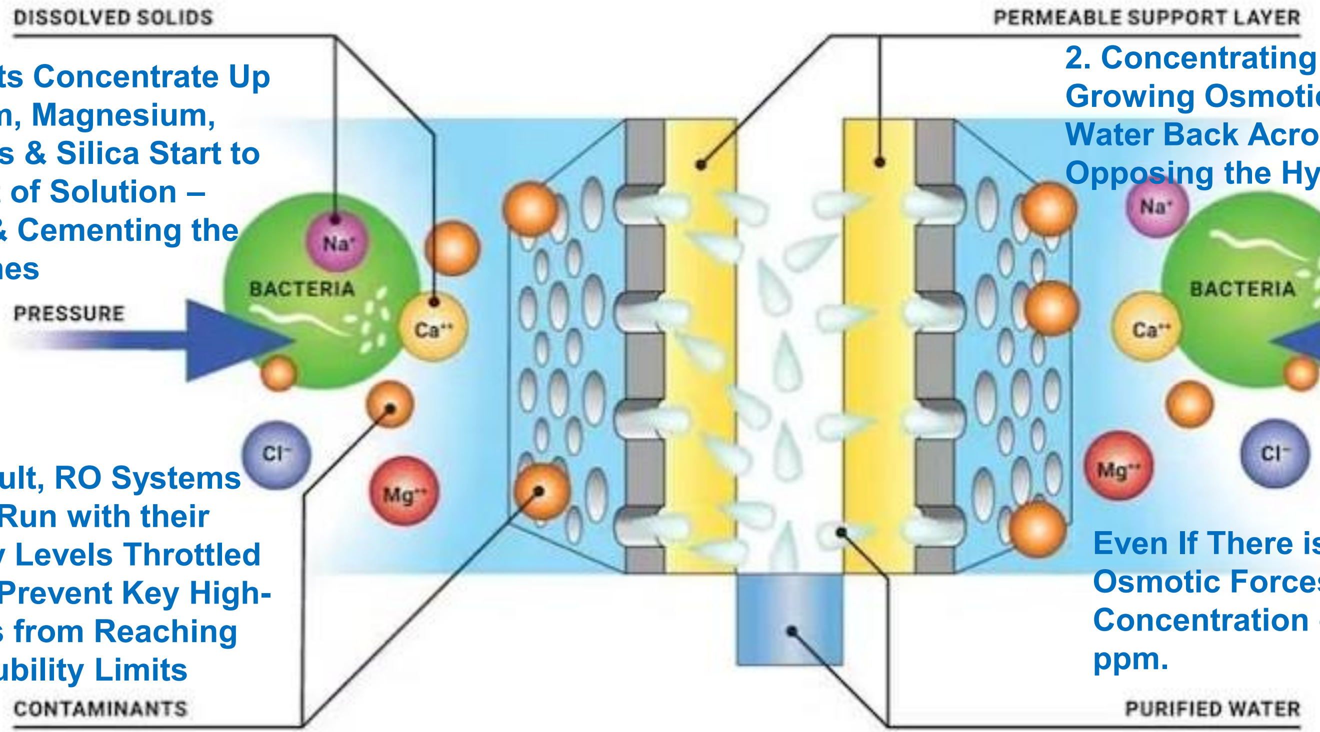
GLOBAL WATER INNOVATIONS, INC.

WE ARE PROJECT DEVELOPERS - WORKING TO CREATE COST-EFFECTIVE NEW WATER SUPPLIES
BY TREATING BRACKISH GROUNDWATER & BY RECOVERING WATER FROM RO BRINES & OTHER IMPAIRED WATER SOURCES

Why Is Brine Created in the First Place by Reverse Osmosis Processes?

1. As Salts Concentrate Up – Calcium, Magnesium, Sulphates & Silica Start to Drop Out of Solution – Scaling & Cementing the Membranes

2. Concentrating Salts Up Also Creates Growing Osmotic Forces that Pull Fresh Water Back Across the Membranes – Opposing the Hydraulic Pump Pressure.



As a Result, RO Systems Must Be Run with their Recovery Levels Throttled Back, to Prevent Key High-Risk Ions from Reaching their Solubility Limits

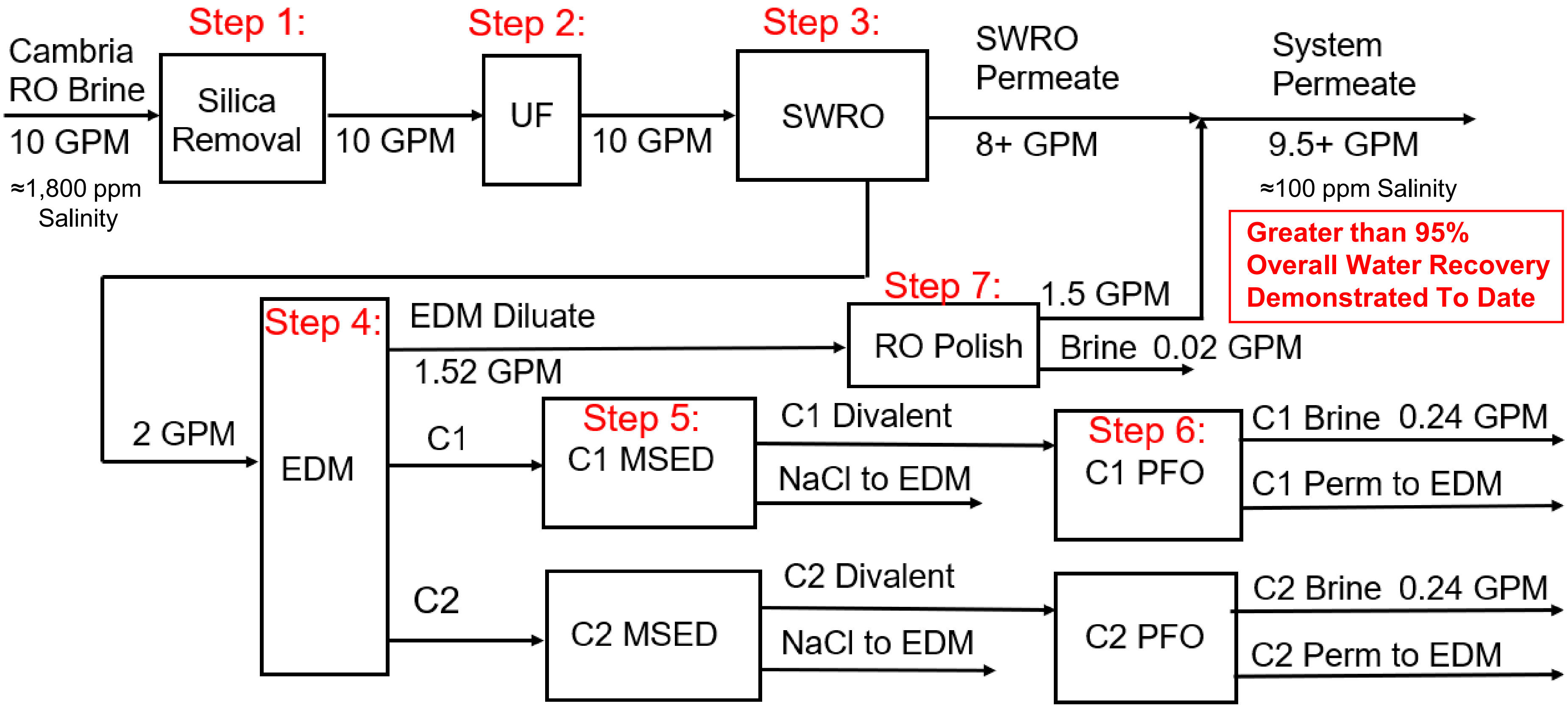
Even If There is No Scaling Risk, Osmotic Forces Generally Stop the Concentration of Brine above 70,000 ppm.

Risk of Scaling and/or Growing Osmotic Counterforce Limit Possible RO Water Recovery Levels – Resulting in Brine

The Goals of these 5 NAWI Pilots:

- Recover at least 95% of the water from RO brines by neutralizing traditional "scaling" and "osmotic pullback" water recovery limits.
- Accomplish this by first successfully softening the RO brine to significantly reduce the risk of scaling.
- Then concentrate that softened brine much higher by harnessing Osmotic forces to work in conjunction with Hydraulic forces - using Trevi's specialized PFO Membrane design.
- Leave only a "salt mush" behind of 100,000 – 200,000 ppm salinity with < 5% of the original brine weight/volume
- Achieve a levelized cost of ≈ $6/m^3$.
- Gain the needed experience to move these technologies into widespread commercial use.

GWI/Trevi System for Cambria Water Recovery and Brine Concentration



Step 1:

Cambria RO Brine → Silica Removal → 10 GPM

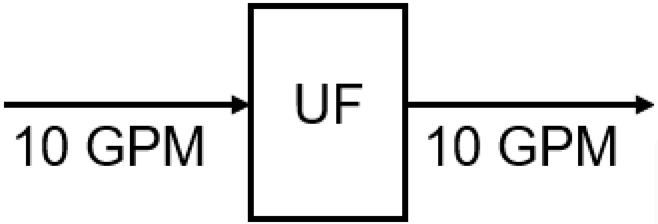
10 GPM

Input Content:
260 ppm

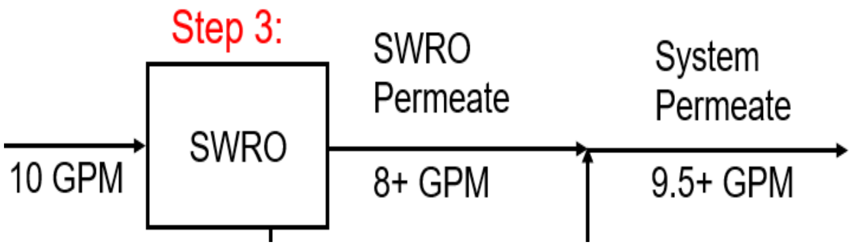
Output Content:
<30 ppm

Function : Remove Silica from this RO Brine to Prevent Membrane Scaling at Higher Recovery Levels. In Cambria's RO Brine, High Silica Levels Present the First Key Limit to Recovering Water from the RO Brine.

Step 2:



Ultra Filtration (UF) Membrane Function: Remove any Organics Present in the Cambria RO Brine In Order to Prevent Any Possible Downstream Membrane Biofouling

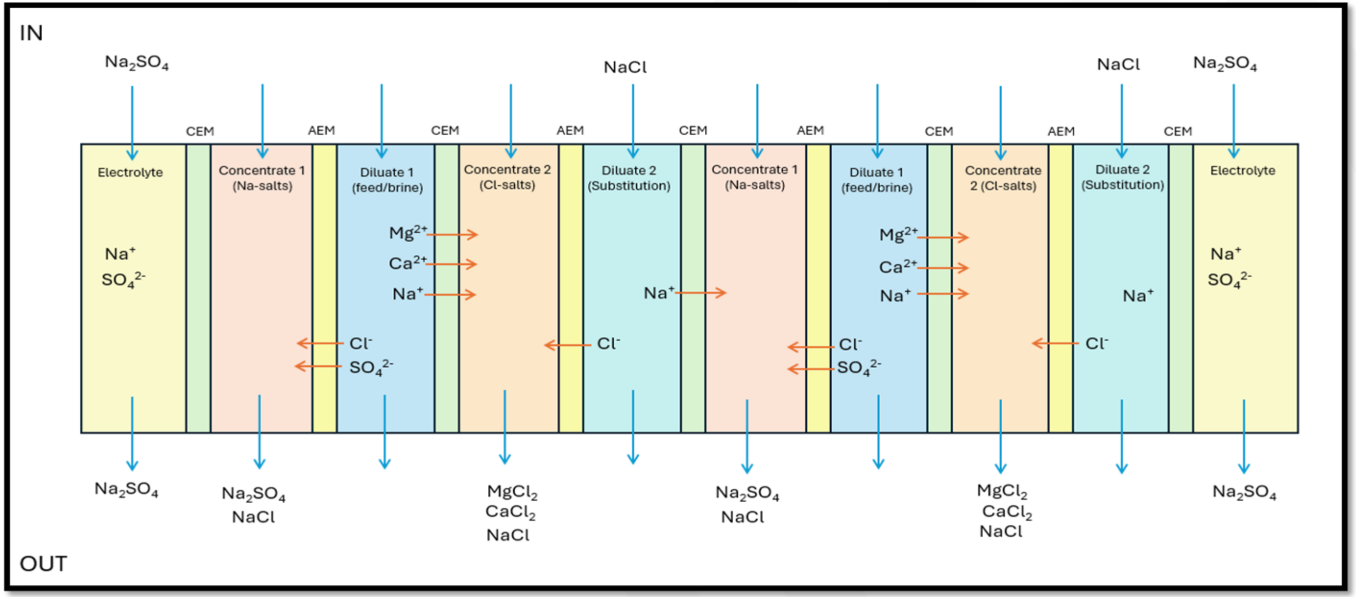


Function : With Silica Scaling Risk Removed – We Use SWRO Membrane to Recover First 80%+ of the Water in Cambria's RO Brine

	Cambria RO Brine Input Content	Permeate Content	Output Final Brine Content
Na	214 ppm	6.5	832 ppm
Ca	113 ppm	0	867 ppm
K	7 ppm	0.9	40 ppm
Mg	125 ppm	0	951 ppm
SO_4	251 ppm	0	1479 ppm
Cl	678 ppm	9.7	4289 ppm
PO_4	2 ppm	0	7 ppm
TDS	≈1,600 ppm	25 ppm	≈8,665 ppm

Electrodialysis Metathesis – The Second Key To Softening Cambria's Brine and Bypassing Existing Scaling Limits:

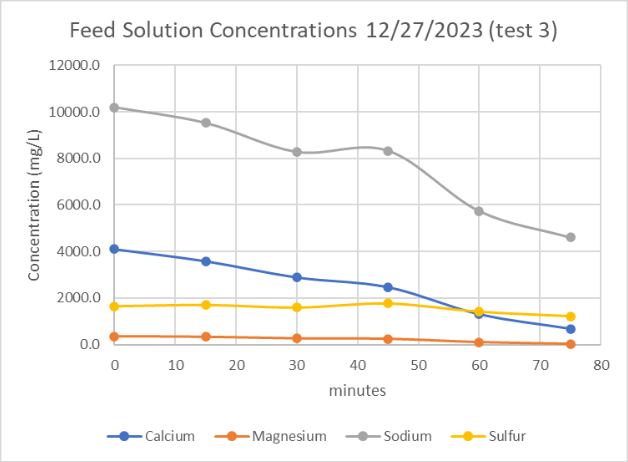
- **Uses a stack of ion selective membranes to remove and reassemble ions from a brine stream into new compounds**.
- Electrodes at each end of the membrane stack and D.C. electrical current is flowed from anode to cathode, driving the ion exchange.
- Alternating Cation Exchange Membranes ("CEM") and Anion Exchange Membranes ("AEM") remove Cations and Anions from the incoming RO brine and splits them into **two separate brine concentration streams** – one with a high concentration of Calcium Chloride and Magnesium Chloride, and the other full of Sodium Sulphates
- Separating the Calcium and Magnesium Ions from the Sulphate Ions dramatically reduces each brine stream's scaling potential.

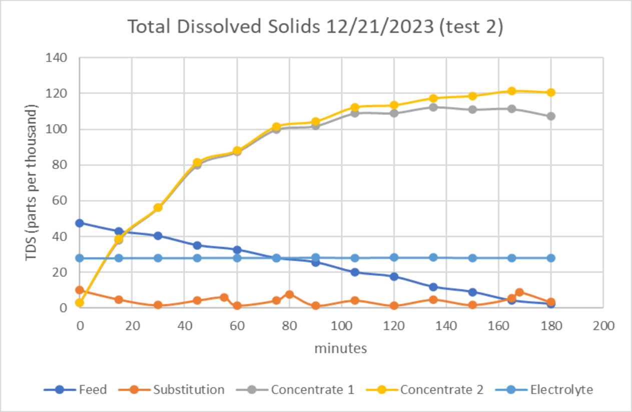


Step 4 - EDM:

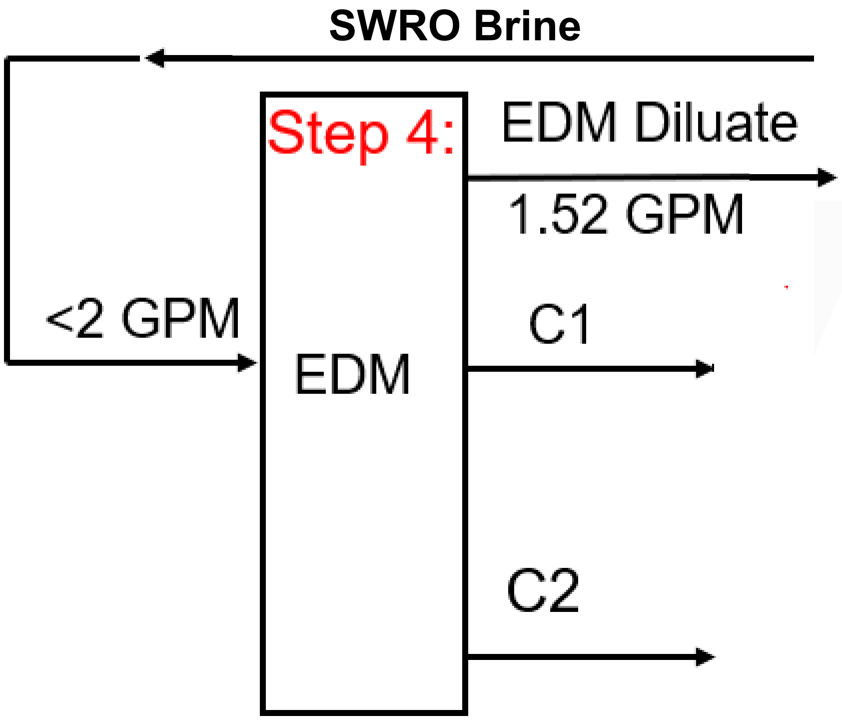
Global Water Innovations, Inc.

Step 4 - EDM:


Feed Solution Concentrations 12/27/2023 (test 3)
Concentration (mg/L)
12000.0
10000.0
8000.0
6000.0
4000.0
2000.0
0.0
0
10
20
30
40
50
60
70
80
minutes
Calcium
Magnesium
Sodium
Sulfur

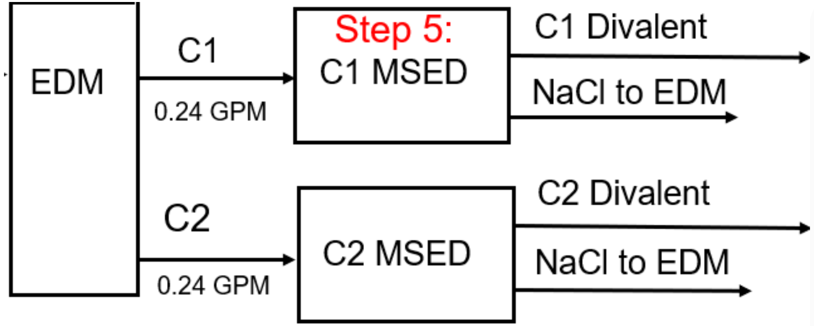

Total Dissolved Solids 12/21/2023 (test 2)
TDS (parts per thousand)
140
120
100
80
60
40
20
0
0
20
40
60
80
100
120
140
160
180
200
minutes
Feed
Substitution
Concentrate 1
Concentrate 2
Electrolyte

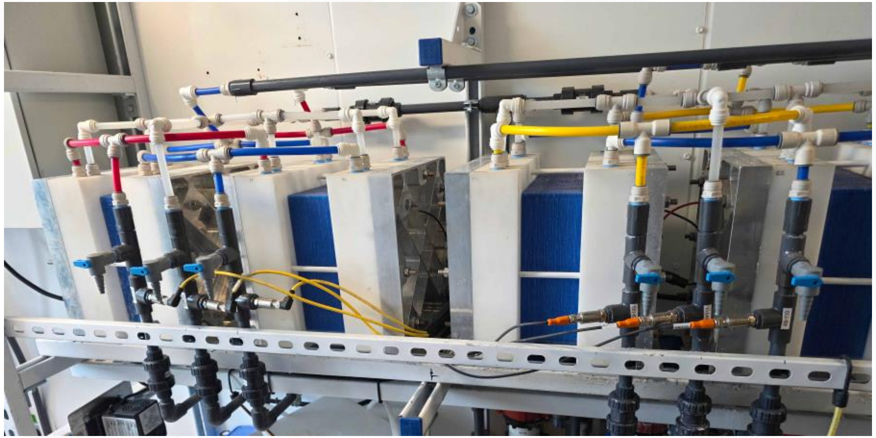
EDM Function : Removes Key Scaling Salts from RO Process Brine - Reduce $CaSO_4$ by 80%+



	Feed Content	Diluate Output Content	Concentrate 1 Content	Concentrate 2 Content
Na	832 ppm	139 ppm	4472 ppm	889 ppm
Ca	867 ppm	14 ppm	34 ppm	800 ppm
K	40 ppm	2 ppm	13 ppm	34 ppm
Mg	951 ppm	29 ppm	18 ppm	925 ppm
SO_4	1479 ppm	97 ppm	1450 ppm	131 ppm
Cl	4289 ppm	170 ppm	5626 ppm	6546 ppm
PO_4	7 ppm	3 ppm	7 ppm	0 ppm
TDS	8465 ppm	455 ppm	11630 ppm	9420 ppm

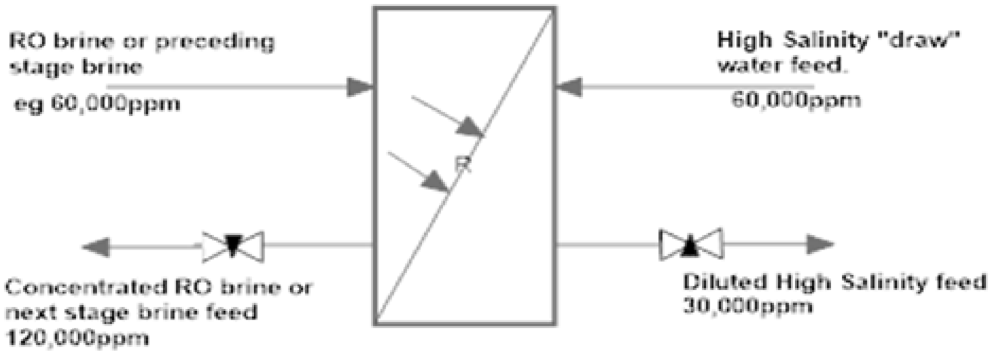
Monovalent Selective Electrodialysis (MED) Function : Recover & Recycle 90% of Monovalent Salts (Na & Cl) from EDM Process Brines for Needed Reuse Back in EDM Process





With the Brine Softened Sufficiently, It Can Now Be Concentrated Much Higher by Using PFO Technology. Water Molecules in the RO Brine Get Pushed Hydraulically Across Membrane from Left to Right Side While Potential Opposing Osmotic Forces are Neutralized in Same Direction by Matching Salinity on Other Side of Membrane

Step 6 - PFO:



PFO Membrane(s) - each membrane doubles and halves the TDS when fed equivalent RO brines and Draw salinities.

Fig 1. Simplified PFO membrane element

PFO Function : Concentrate C1 and C2 Brines – Achieved 95%+ Overall Recovery on Cambria RO Brine

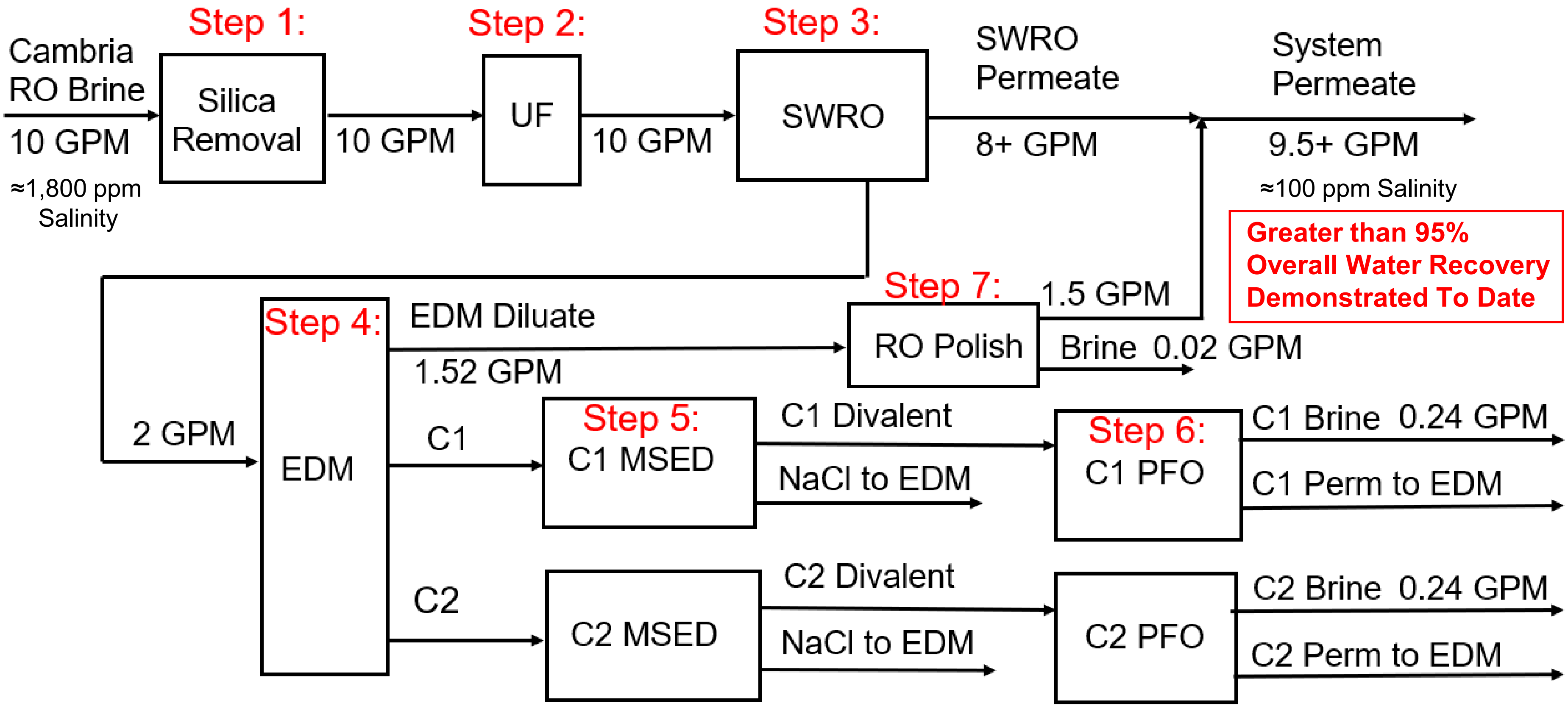
C1 Divalent → Step 6: C1 PFO → C1 Brine 0.24 GPM; C1 Perm to EDM

C2 Divalent → C2 PFO → C2 Brine 0.24 GPM; C2 Perm to EDM

	C1 Input Content	C1 Output Content	C2 Input Content	C2 Output Content
TDS	11600 ppm	26530 ppm	9200 ppm	54710 ppm

3A

GWI/Trevi System for Cambria Water Recovery and Brine Concentration



Note: We have demonstrated 95%+ overall water recovery at Cambria so far in the pilot. And this is without fully optimizing the PFO process yet. The single stage PFO in the pilot trailer can easily concentrate water up to 110,000 ppm, and we are currently at less than half of that. This is due to the fact that the Cambria RO brine is starting at a lower salinity than we expected, and therefore would need an additional concentration step in order to fully load the PFO – full loading needs the incoming feedwater to be at ≈ 60,000 ppm. We hope to add this additional concentration step over the next few days in order to demonstrate full PFO capability by pilot's end. That optimization should push overall water recovery past 97.5%.

Questions?

Contact Clark Easter –
Clark@GlobalWaterInnovations.org