

Study A

Diagnose the cause of mineral buildup

Can separate tests of process liquid and reused gypsum seeds choose corrective actions more economically than calibrated crystallization kinetics and a tuned operating rule?

Candidate decision-method contribution; novelty unresolved. This is a proposed study; no result or novelty is established.

What earlier work establishes

Antiscalant removal, seeded precipitation, seed reuse, kinetic diagnosis, dual-probe monitoring and seed attrition have precedents. The proposed contribution is the incremental value of a specific crossed assay in an operating decision.

The proposed difference

A crossed liquid-by-seed response informs a frozen action table. Its own water, analysis, delay and handling costs are charged to the proposed policy.

A fair comparison

C0: tuned host treatment and seed-management rule

C1: calibrated kinetics and practical seed-state rule

T: C1 with the crossed liquid/seed assay

The decision

Operating burden per qualifying volume of treated concentrate at matched throughput, plus downstream RO compatibility.

Planned scope

72 development assay vessels; 36 confirmation campaigns of three decision cycles; 216 diagnostic vessels within the proposed-policy campaigns; 18 downstream RO compatibility runs. 1,368 principal panel equivalents.

Before confirmation

A gypsum-limited brackish RO concentrate, interpretable liquid/seed reference assay, different feasible best actions, and a qualified host are required.

Funding basis

12 funded months. Preliminary standalone estimate: lower \$1,763,996, base \$2,079,632, higher \$2,775,124. All studies use the same rates and cost rules, including founder coordination, scientific staff, analyses, equipment, institutional costs and reserve. These are unquoted planning estimates; shared execution requires an itemized combined scope.

Methods and source review

Complete methods and reading limits · Editable unified budget

N03: McCool, High Recovery Desalination of Brackish Water by Chemically-Enhanced Seeded Precipitation

N04: McCool, Rahardianto and Cohen, Antiscalant removal in accelerated desupersaturation of RO concentrate via chemically-enhanced seeded precipitation (CESP)

- N05: Choi et al., Desupersaturation of RO concentrate and gypsum removal via seeded precipitation in a fluidized bed crystallizer
- N06: Lei, A Continuous Process for RO Concentrate Desupersaturation
- N07: Xu et al., Reverse Osmosis with Intermediate Chemical Demineralization: Scale Inhibitor Selection, Degradation, and Seeded Precipitation
- N08: A dual-probe approach for evaluation of gypsum crystallization in response to antiscalant treatment
- N09: Schwiebert et al., Turbidity-based scaling detection system for batch reverse osmosis combined with gypsum crystal recovery
- N10: WO2009152148A1: Method and system for high recovery water desalting
- N11: US10589188B2: System and method for removal of scale forming components
- N01: ASTM D4516-19a: Standard Practice for Standardizing Reverse Osmosis Performance Data
- N02: LG Water Solutions, Technical Service Bulletin 111: Data Logging and Performance Normalization