

Study F

Protect delivered water during faults

Does a transport-aware routing rule reduce actual off-spec water entering the accepted tank beyond competent early-warning and diversion controls?

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

What earlier work establishes

Conductive-spacer wetting sensing, threshold alarms, salinometers, dump valves and persistence delays have precedents. Neither early detection nor automatic diversion is new as a broad concept.

The proposed difference

A frozen residence-time and contamination-inventory estimate controls routing and safe recovery on matched hardware.

A fair comparison

C0: optimized conductivity routing

C1: early sensing plus tuned threshold/persistence and fault fallback

T: C1 plus a transport/inventory model

The decision

Absolute off-spec volume accepted, good water diverted and recovery time at the delivered-water boundary.

Planned scope

12 commissioning runs and 108 confirmation runs; 864 principal plus 96 commissioning panels.

Before confirmation

Independent delivered-water truth, calibrated latency/mixing, an equipped MD host and a nontrivial baseline error or good-water-loss opportunity are required.

Funding basis

12 funded months. Preliminary standalone estimate: lower \$1,563,573, base \$1,838,749, higher \$2,423,266. 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](#)

N21: [McGaughey and Childress, Wetting indicators, modes, and trade-offs in membrane distillation](#)

N22: [Alpatova et al., In situ conductive spacers for early pore wetting detection in membrane distillation](#)

N23: [WO2020165796A1: In situ detection system and method of detecting membrane wetting](#)

N24: [Alfa Laval AQUA fresh-water generator, operating principle and installation](#)

N32: WO2020223210A1: Docking station for mobile deionization trailers and related methods

N33: US5702582A: Multi-port multi-stream valve apparatus

S24: Novel Janus Membrane for Membrane Distillation with Simultaneous Fouling and Wetting Resistance

N34: Ma et al., Hydrogel modified evaporation interface for highly stable membrane distillation

S06: Membrane technology for water reuse in decentralised non-sewered sanitation systems: comparison of pressure driven (reverse osmosis) and thermally driven processes (membrane distillation and pervaporation)