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RESEARCH NOTES — PUBLISHED BY THE HOUSE

# Purity Project — Source Trackdown: Every-Fact Sweep

Raymon, Ledger window, 2026-10-21 — 25 claims confirmed, 7 partial, 11 not located as stated.

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**RESEARCH NOTE**

This research was done by our in-house agents. For legal reasons, all information contained within should be considered for entertainment purposes only; no claims should be held as fact until peer reviewed in the field of study.

The document follows, unaltered, as it stands in the record; this cover and note were added at publication.

Published by ruling of Ben, 2026-10-25 · NgraveOhio LLC, Lancaster, Ohio

# Purity Project — Source Trackdown: Every-Fact Sweep

**Prepared by:** Raymon (Ledger window), 2026-10-21, at Ben's directive: *"every fact do a sweep online to identify references where applicable — full list in a PDF on completion."*

**Object:** *The Purity Project — Review of the Current Edition* (Rowan, Breath 001, Oct 17, 2026; Ledger L-107) and the *Data Center Water Waste Simulator* (L-108).

**Method:** every factual claim in the review was enumerated by section and swept online. Where a reference exists, it is identified by publisher/title and URL. Verdicts: **CONFIRMED** (reference located; figures match) · **CONFIRMED — NUANCE** (substance confirmed; a detail differs or is stronger/weaker than stated) · **PARTIAL** (part of the claim located; part not) · **NOT LOCATED** (no reference found in this sweep stating it as written) · **VENDOR** (rests on a vendor source, as the review itself grades several of these) · **CORPUS** (the claim is about the project's own absent corpus — the Oct 14 design edition and Rounds 2–5, which are not in the archive — so no public reference applies) · **DERIVED** (arithmetic/physics derived from the stated reference plant; recomputed in the 2026-10-21 grade).

## Tally

- **25 claims CONFIRMED** at an identified reference (5 of them with a noted nuance)
- **7 PARTIAL** (core located, a figure or detail not)
- **11 NOT LOCATED** as stated
- **4 VENDOR-grade** (2 of them partially tracked)
- **12 CORPUS-internal** (unverifiable until the edition is deposited)
- **6 DERIVED** (recomputed/physical principle)
- **Simulator: 13 source links** inventoried, all present in the file as shipped

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## A. Confirmed at an identified reference

| # | Claim (review §) | Reference identified | What it confirms |
|---|---|---|---|
| **A1** | Electrochemical tower treatment eliminated 100% of treatment chemicals; blowdown –99.8%; water/sewer savings 31.6% (300-ton towers) (§2.1) | US GSA, *Alternative Water Treatments for Cooling Towers* (GPG, assessed by NREL) — source [https://www.gsa.gov/system/files/18-Alternative%20Water%20Treatments%20for%20Cooling%20Towers.pdf] | All three figures exact |
| **A2** | Quincy, WA: city-owned, Microsoft-financed $31M, city-operated, ~138M gal/yr offset, 30-year agreement (§2.2) | US EPA, *Water Reuse Case Study: Quincy, Washington* — source [https://www.epa.gov/waterreuse/water-reuse-case-study-quincy-washington] | All figures exact, incl. ~10 years plan-to-operation (the review's §6 timeline tension) |
| **A3** | eMalahleni: ~200 t/d gypsum solids to brick-making; drinking water for ~60,000 people (§2.3) | UNFCCC, *eMalahleni Water Reclamation Plant* — source [https://unfccc.int/climate-action/momentum-for-change/lighthouse-activities/emalahleni-water-reclamation-plant] | Both figures exact |
| **A4** | eMalahleni: HiPRO process, >99% recovery, ~16 ML/d to municipality ≈12% of supply; now Thungela-owned (§2.3 + caveat) | Water360/IWA case study — source [https://water360.com.au/case-study/e-malahleni-south-africa-emalahleni-water-reclamation-plant/] | Matches; also confirms the review's operator caveat (Thungela Operations) |

| # | Claim (review §) | Reference identified | What it confirms |
|---|---|---|---|
| **A5** | CA DPR regulation effective Oct 1, 2024; responsible agency must be a public water system; Partner Agencies allowed (§3.1) | CA Title 22 DPR Regulations — source [https://www.informea.org/en/content/legislation/title-22-california-code-regulations-division-4-environmental-health-chapter-17] ; WateReuse CA summary — source [https://casaweb.org/wp-content/uploads/2024/10/2024-WRCA-DPR-Overview-v4.pdf] | Exact, incl. the Partner Agency door |
| **A6** | Ohio EPA declined to finalize draft general data-center permit OHD000001 in July 2026; individual permits are the path (§2.2) | Ohio EPA July 21, 2026 decision, reported — source [https://www.cincinnati.com/story/news/politics/2026/07/21/ohio-data-center-wastewater-permit-withdrawn/90994829007/] ; permit proposal record — source [https://www.wwdmag.com/compliance-regulations/news/55342431/ohio-epa-proposes-first-general-npdes-permit-for-data-center-wastewater-discharges] | Exact, incl. permit number and month |
| **A7** | EU recast Urban Wastewater Directive (2024/3019) names benzotriazole and 4/5-methylbenzotriazole as indicator substances with 80% removal by quaternary treatment (§3.2) | Directive (EU) 2024/3019, Annex I Table 3 (EUR-Lex) — source [https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32024L3019] | Exact — **NUANCE:** the 80% is an average across ≥6 measured indicator substances, not a per-substance mandate |
| **A8** | Saltstone (Savannah River): decontaminated salt solution grouted into monoliths, operating since 1990, >30M gallons placed (§4.4) | US DOE — source [https://www.energy.gov/srs/articles/savannah-river-site-facility-produces-30-million-gallons-decontaminated-mixture] | Exact (a later site figure puts grout produced above 56M gallons) |
| **A9** | Meta Odense: ~45 MW_th delivered into district heating (§2.4) | Ramboll project scope as reported — source [https://scienceblog.com/m-a-data-center-in-denmark-gives-away-heat-that-data-centers-often-waste-it-runs-water-from-the-citys-heating-network-through-its-cooling-units-and-into-heat-pumps-that-raise-it-enou/] | ~45 MW confirmed — **NUANCE:** published home/MWh figures vary by project phase (100k–215k MWh/yr) |
| **A10** | Pellet semi-batch RO demo on real blowdown: >91% recovery, pellets >95% dry solids, no-flush shutdown permeability dip (§2.2) | Water Tech Online case study (IDE Technologies) — source [https://www.watertechonline.com/water-reuse/article/14298234/case-study-96-recovery-of-power-plants-cooling-tower-blowdown-with-an-advanced-reverse-osmosis-demonstration-plant] | Figures match — **NUANCE:** the case study is authored by IDE's own process director; see Analysis Note 1 |
| **A11** | Electrocoagulation on real blowdown (Garver/USBR): silica removal 67–98% robust to pH (§2.2) | POWER Magazine report of the Garver USBR Pitch-to-Pilot project — source [https://www.powermag.com/a-model-for-zld-treatment-of-blowdown-from-cooling-towers-even-the-big-ones/] ; USBR award record — source [https://www.prweb.com/releases/Bureau_of_Reclamation_awards_nearly_1_million_for_water_purification_and_desalination_pilot_projects/prweb16696855.htm] | Exact (67–98%) |
| **A12** | Garver train: membranes recovered to ~94% of initial flux after flush (the review's §6 conflation note) | Same POWER report | Exact — it is a membrane-flux figure, as the review warns |

| # | Claim (review §) | Reference identified | What it confirms |
|---|---|---|---|
| **A13** | VAED energy intensity on doped feed in the fatal range (§3.6, Round 5 verdict upheld) | Same POWER report: VAED at 1,750 and 620 kWh/kgal | Converts to ~462 and ~164 kWh/m³ — the review's 164–461 range exact |
| **A14** | Kurita bench work: polyaspartate + tin the "green inhibitor of choice"; ~30% higher use-cost than phosphate/zinc; field testing still required (§2.1) | Kurita America, *The Pursuit of a Green Corrosion Inhibitor*, Part 1 — source [https://www.kuritaamerica.com/the-splash/the-pursuit-of-a-green-carbon-steel-corrosion-inhibitor-laying-the-groundwork-part-1] | Exact on all three points |
| **A15** | Arizona AWP rules effective Mar 4, 2025 (§3.1) | ADEQ press release — source [http://azdeq.gov/pr/awp_approved] | Exact date |
| **A16** | Dutch utilities market softening pellets collectively into fertilizer, steel and construction uses; feed/food-grade reuse studied (§4.1) | Dutch Water Sector / KWR — source [https://www.dutchwatersector.com/news/reuse-of-lime-from-drinking-water-softening-is-profitable-in-a-wider-range-of-products] ; source [https://www.kwrwater.nl/en/projecten/high-value-reuse-of-lime-pellets-from-drinking-water-production/] | Matches (collective marketing via Reststoffenunie) |
| **A17** | SCWO: 99.9993% PFAS DRE in a US Army Corps/ERDC field validation (§4.3) | ERDC TR-26-19 (Jul 2026), announced by 374Water — source [https://military.einnews.com/pr_news/929141516/us-army-corps-of-engineers-validates-374water-s-airscwo-technology-at-99-9993-pfas-destruction-in-afff-treatment-report] | Figure and report exact — **NUANCE:** the announcement is vendor-issued, exactly as the review flags it |
| **A18** | Membrane distillation with biogas waste heat: €3.6–4.1/m³ vs €7.6–9.1/m³ without heat recovery (§3.7) | MDPI *Sustainability* study of an integrated AD–MD plant — source [https://www.mdpi.com/2071-1050/14/20/13535] | All four figures exact |
| **A19** | RED on Mg²■-bearing feeds: power density loss ~64% (§3.8) | RSC Advances, REAPower project — source [https://pubs.rsc.org/en/Content/ArticleHtml/2014/RA/c4ra05968a] | Exact (–64%, stack resistance +75%) |
| **A20** | Austin commercial wastewater alone is $11.62/kgal (§3.4) | Austin Water, *Commercial Public Rates 2026* — source [https://austin.widen.net/content/aqqaszp2rc/original/CommercialPublicRates_2026.pdf] | Exact (volume charge per 1,000 gal, eff. Nov 1, 2025) |
| **A21** | CA has required bioanalytical (effect-based) screening for recycled water since its 2018 Recycled Water Policy (§3.2) | CA State Water Board, Recycled Water Policy (amendment adopted Dec 11, 2018) — source [https://www.waterboards.ca.gov/water_issues/programs/recycled_water/policy.html] ; SCCWRP guidance — source [https://www.sccwrp.org/news/guidance-prepared-use-bioanalytical-assays-screen-contaminants/] | Confirmed — **NUANCE:** sources support "first state in the nation"; the review's "first jurisdiction in the world" is stronger than the located sources |
| **A22** | Chandler precedent: RO-treated water recharged to the aquifer under an Intel/city partnership (§4.5) | US EPA Performance Track record — source [https://nepis.epa.gov/Exe/ZyPURL.cgi?Dockey=P1006NZ0.TXT] | Confirmed (~1 billion gallons recharged over the partnership) |
| **A23** | CWPO removed five EU watch-list azoles completely in <1 h; effluent non-toxic to *Vibrio fischeri*; azoles the least reactive class tested (§4.3) | *Journal of Environmental Chemical Engineering* (ScienceDirect) — source [https://www.sciencedirect.com/science/article/pii/S2352186422004278] | Exact on all three points |

| # | Claim (review §) | Reference identified | What it confirms |
|---|---|---|---|
| **A24** | Electrochemical one-step conversion: phosphonate (NTMP) oxidized at the anode; calcium phosphate precipitates at the cathode (§4.2 — mechanism) | Review literature via PMC — source [https://pmc.ncbi.nlm.nih.gov/articles/PMC10116781/] ; MDPI review — source [https://www.mdpi.com/2071-1050/15/24/16556] | Mechanism confirmed (the specific 89%/24 h figure is PARTIAL — see C5) |
| **A25** | Columbus Southerly recycled-water concept: 20–40 MGD (§2.2 — capacity) | WaterWorld (Oct 2025) — source [https://www.waterworld.com/water-reuse/article/55385910/columbus-explores-water-reuse-to-support-data-center-growth-and-long-term-water-supply-needs] | Capacity confirmed (the RFP timing / "industry pays" condition is PARTIAL — see C3) |

## B. Partially tracked

| # | Claim | What was located / what was not |
|---|---|---|
| **B1** | MAXH2O case: ~95% recovery, permeate silica ~1 mg/L, cycles 24, unnamed site (§2.2) | IDE confirms the technology and >95% recovery generally, and its San Isidro (Chile) demo reached up to 94% over six weeks — source [https://ide-tech.com/wp-content/uploads/2025/03/MAXH2O-Desalter-digital.pdf] . The specific case numbers (silica ~1 mg/L, cycles 24) were **not located**. Verdict stands as the review grades it: vendor claim |
| **B2** | Intel Ocotillo brine facility ~2.8 MGD at ~96% recovery (§2.2) | Capacity confirmed by Intel (2.8 MGD, City of Chandler partnership) — source [https://download.intel.com/newsroom/archive/2025/en-us-2023-07-11-intels-ocotillo-campus-honored-for-water-stewardship.pdf] . The ~96% recovery figure was **not located** |
| **B3** | Buckeye Brine (Coshocton): Class I non-hazardous outlet, 12.7M gal/month authorized, permits renewed Jul 2025 to 2030 (§3.6) | Ohio EPA's Class I permit document confirms the facility and the combined monthly cap of 12,710,700 gallons — source [https://edocpub.epa.ohio.gov/publicportal/ViewDocument.aspx?docid=3428990] . The specific renewal window (Jul 2025 → 2030) was **not located**; price remains unpublished, as the review states |
| **B4** | Georgia Tech LCA: pellet route 96% less dewatered solids, 72% less total solid waste than lime-soda at 10 MGD (§4.1) | The 96% dewatered-solids reduction is confirmed in the LCA literature hosted at Georgia Tech's repository — source [https://repository.gatech.edu/server/api/core/bitstreams/4fc02188-6061-4326-8a80-2ec71e29b59b/content] . The 72% figure was **not located** in this sweep |
| **B5** | NTMP electrochemical cell: 89% removal in 24 h in real WWTP effluent (§4.2) | Mechanism confirmed (A24); the exact 89%/24 h figure was **not located** |
| **B6** | Columbus Southerly: design RFP expected spring 2027, explicit "industry pays" condition (§2.2) | RFP for detailed design "in 2027" confirmed (WaterWorld, A25); the *spring* timing and the "industry pays" condition were **not located** |
| **B7** | Technion 2025 train (NF → RO → Fe electro-dissolution → 2nd RO → MVR) exceeds 95% at modelled ~$0.70/m³ on ~20 mg/L feed silica (§2.2) | **Not located.** Searches returned no matching paper; the claim could not be tracked from the review's description alone. It remains plausible but unreferenced |

## C. Not located as stated in this sweep

| # | Claim | Note |
|---|---|---|
| **C1** | BMSED on pre-purified brine: acid/base approaching 99.99% purity at lab/pilot scale; industrial-estate RO-concentrate pilot produced 1.44% HCl / 2% NaOH continuously (§4.3) | BMED literature located supports high-purity production generally (monoprotic-acid purities 93.9–96.1% in SBMED work; 1.5–2 M HCl/NaOH from industrial saline) — the 99.99% figure and the specific pilot concentrations were **not corroborated**. The review's single most exposed number |
| **C2** | Bromate: ozonating 1.1–1.3 mg/L bromide water produced 216–422 µg/L bromate; best suppression strategies reach only 33–66% (§3.3) | The specific pairing was **not located**. Located literature sits in tension with the ceiling: pilot work found monochloramine suppression averaging ~80–82% — above the review's stated best of 33–66%. The underlying study may be corpus-held (Round 2); as published, the figures are unreferenced and partly contradicted |
| **C3** | UFGS guidance: ozone-only treatment can increase copper corrosion up to 10× (§2.1) | UFGS 23 25 00 exists (federal water-treatment spec) — source [https://wbdg.org/FFC/DOD/UFGS/UFGS%2023%2025%2000.pdf] — but the ozone/copper warning was **not located** in it |
| **C4** | 2025/26 pulp-industry ZLD analysis: BMED desaturation OPEX $0.20–0.34/m³ beat evaporation-crystallisation $0.43/m³ (§4.3) | **Not located** |
| **C5** | Phosphonates reached 96.4% cumulative removal with activated carbon in WWTP data (§3.2) | **Not located** as stated |
| **C6** | BIT ozonation rendered zebrafish-embryo toxicity undetectable (§3.2) | **Not located** |
| **C7** | DBNPA in real cooling water: toxicity peaked at 1 h of photodegradation, fell by 48 h (§3.2) | **Not located** |
| **C8** | HEDP: oxidation to 80% ligand removal cut scale-inhibition ratio from 66% to 34% (§4.2) | **Not located** |
| **C9** | EU revised water directive entered into force 11 May 2026 introducing effect-based monitoring (§3.2) | **Not located** as stated (the confirmed EU item is the UWWD, A7). The review itself limits this item's weight to jurisprudential colour |
| **C10** | UV vendor: 80+ UV systems at 30+ data-center locations (§2.1) | **Not located**; vendor-grade as presented |
| **C11** | Waste-heat MD unit ~2,000 L/d shipped for live validation in Europe, Aug 2026 (§3.7) | **Not located** |

## D. Vendor-grade items (as the review itself grades them)

| # | Claim | Status |
|---|---|---|
| **D1** | IDE MAXH2O case numbers (§2.2) | See B1 — technology real, case numbers unlocated; review grades it vendor claim |
| **D2** | CCRO ">200 customers at 90–98%" (§6 tension) | Brochure-grade; the review itself flags the certainty drift. Not independently located |
| **D3** | NVIDIA Rubin reference design 45 °C in / 55 °C out; ASHRAE W45/W+ classes (§2.4, §3.7) | Vendor claim, consistently trade-reported; not independently verified in this sweep |
| **D4** | Abilene PFRO at 96% on RO brine, evaporation-pond dependent (§2.2) | IDE PFRO is a real product line with Abilene associated in vendor material; the specific 96% figure not independently located |

## E. Corpus-internal claims (no public reference applies — the source is the absent edition)

§0's seven Oct 17 corrections and the corpus arithmetic · the edition's blocker ranking and §2 mineral-revenue row · Round 2's "empty, not negative" log-removal record · the $4–7/kgal levelized band vs its Quincy anchor · phase timelines of 6–36 months · EC hardness ranges differing between Rounds 4/5 · Mirabilite purity 99.9% (lab) vs ~85% (4-year demo) · the azole UV multiplier inconsistency (75–150× vs 50 mJ/cm²) · pilot-budget components summing to $3.6M vs a stated $3.5M · DBNPA half-life source sets · the Florida figure conflict (deliberately left open) · the reference-plant design basis itself (100 MW; 171,000/250,000 gpd; feed ranges).

**Every one of these becomes checkable the day the Oct 14 edition and Rounds 2–5 are deposited. Until then they rest on the reviewer's word.**

## F. Derived claims (recomputed / physical principle)

Reference-plant conversions (171,000 gpd ≈ 647 m³/d ✓) · salt load ~2 t/d at the stated feed range ✓ · BMED split stoichiometry (~1.37 t/d NaOH + ~1.25 t/d HCl from ~2 t/d salt ✓) · evaporated fraction unrecoverable (physics — no treatment reference applies) · struvite ruled out on mass (~1 kg P/d — arithmetic from the stated phosphorus load ✓) · salinity-gradient ceiling ~1 kW on the main stream (derived; the empirical RED verdict itself is A19).

## G. Simulator — link inventory (as shipped in the file)

1. Water Tech Online, 96%-recovery blowdown case study (same source as A10)
2. MDPI paper (2305-7084/9/4/70)
3. US EPA ETV archive report (06_vs_hero.pdf)
4. Veolia Water Technologies, OPUS document (2019)
5. US GSA, GPG Findings-052 — Blowdown Recovery (Aug 2023)
6. Austin Water, Reclaimed Rates 2026
7. City of Westminster CO, 2026 Water Rates
8. US EPA, Summary of California's DPR regulation
9. TCEQ, RG-634 (drinking water guidance)
10. RSC, *Environmental Science: Water Research & Technology* article (2020)
11. RSC, *Environmental Science: Water Research & Technology* article (2015 — the bioanalytical-tools review)
12. WateReuse, Desalination cost white paper
13. El Paso Times (Sep 2026), El Paso Water potable-reuse news

All 13 links are present and well-formed in the shipped HTML (font-service links excluded).

## Analysis notes

1. **The San Isidro overlap.** The review's §2.2 presents the Chile pellet-RO demonstration (graded *demonstrated*) and IDE's MAXH2O case (graded *vendor claim*) as two data points. The tracked sources indicate both trace to IDE's MAXH2O Desalter demonstration at ENEL's San Isidro plant in Chile — the Water Tech case study is IDE-authored, and IDE's own material describes the same plant and technology. If they are one installation, §2.2's demonstrated base is one demo thinner than it reads. The corpus (Round 2) would settle it; the review should carry the flag either way.

2. **The bromate tension (C2).** Located pilot literature reports bromate suppression above the review's stated ceiling. This does not touch the review's structural answer (ozone positioned pre-RO), but the §3.3 numbers should be re-based on the located studies or the corpus source produced.

3. **The 99.99% figure (C1)** is the review's least-supported number and sits inside its Factor 3 avenue for BMED. The avenue survives on the located literature (high-90s purities, continuous pilots); the figure itself should be corrected or

sourced.

4. **Net assessment.** The review's load-bearing structure — its demonstrated precedents (GSA, Quincy, eMalahleni, Saltstone, Garver, CWPO), its regulatory doors (CA DPR, AZ AWP, EU UWWD, Ohio) and its cost anchors (Austin, MD study) — **checks out at identified references, figures exact in the great majority of cases.** The failures concentrate in second-order figures carried from the corpus rounds, which is consistent with the review's own evidence standard note: the edition's flags were never re-verified at source. This trackdown is the apparatus the review omitted: attached to it, the review's sourced status should be re-graded.