

PROJECT PAWD

Portable Automated Water Detoxification

Emergency Nitrate Remediation for the Lower Umatilla Basin

THE CRISIS

Groundwater in Oregon's Lower Umatilla Basin has reached **63 mg/L nitrate-nitrogen** — over **630% of the EPA safe drinking water limit** (MCL: 10 mg/L). Some wells exceed 75 mg/L. Residents in Morrow County have relied on bottled water for years. Voluntary administrative plans have failed to reverse contamination for over three decades.

THE SOLUTION

PAWD is a modular, containerized **Moving Bed Biofilm Reactor (MBBR)** denitrification system. It uses engineered biofilm media in a controlled anoxic environment to convert dissolved nitrate into harmless nitrogen gas (N_2). The biological process is the same one nature uses — accelerated by engineering.

What makes PAWD different: Industrial waste heat from data center cooling infrastructure is captured and used as the thermal driver for biological treatment. This **doubles denitrification rates** compared to ambient-temperature systems, eliminates seasonal performance variation, and converts a waste stream into a public health asset.

PERFORMANCE (Single 40-ft Containerized Unit)

Treatment Capacity	Nitrate Removal	Human Impact
5.1 million gal/year	Converted to harmless N_2 gas	~149 people with safe water

Discharge target: ≤ 5 mg/L NO_3^- -N (design capability: 2–3 mg/L). Salmon-safe thermal discharge ($<18^\circ C$) via integrated chiller.

SAFETY ARCHITECTURE

PAWD operates on a **“Fail-Closed”** principle: no treated water is released until industrial-grade optical sensors independently verify nitrate levels meet discharge standards. The sensing architecture uses YSI/Xylem NitraVis optical nitrate probes, dissolved oxygen, pH, ORP, and temperature monitoring at influent, reactor, and effluent positions. If any sensor reading is out of specification, the discharge valve remains locked. This is not software-dependent — it is hardwired into the control logic.

SCALING POTENTIAL

1 Unit	5 Units	10 Units	25 Units
387 kg NO_3^- /yr 149 people served	1,935 kg NO_3^- /yr 745 people served	3,870 kg NO_3^- /yr 1,490 people served	9,675 kg NO_3^- /yr 3,725 people served

STATUS

Three provisional patents filed (Feb 2026) • Pilot deployment target: Q2 2026 • Sensor hardware quoted (\$77K, Xylem/YSI via Whitney Equipment) • Xylem corporate engagement active (technical & strategic review) • Grant funding in pursuit (Oregon DEQ, WA Industrial Symbiosis, federal programs)

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Patent Pending • Deployment Ready Q2 2026