Advanced Treatment Systems Uncovered: Pitfalls, Solutions, and Success Stories.

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The materials being presented represent my own opinions, and do NOT reflect the opinions of NOWRA.

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Introduction to ATU’S

•**1990’s** – States with stricter environmental protections (e.g., Minnesota, Massachusetts, Florida,

Washington, Oregon) started requiring advanced treatment in sensitive areas (near lakes, coastal zones,

drinking water aquifers). This drove wider use. Manufacturers like Orenco, Bio-Microbics, and Norweco

began commercializing standardized ATUs.

•**2000’s–2010’s** – Widespread adoption for compliance with **nitrogen, phosphorus, and pathogen reduction**

requirements, especially in coastal states dealing with nutrient pollution (e.g., Chesapeake Bay, Long Island,

Florida Keys). Many counties began mandating advanced treatment for new construction or replacements in

sensitive areas.

•**Today (2020’s)** – Advanced treatment systems are common in areas where:

•Lot sizes are too small for conventional drainfields

•Soils are unsuitable

•Groundwater contamination risk is high

•Regulations require nitrogen/phosphorus reduction due to size and use of the system.

Todays Topic

- Identify **common pitfalls** in advanced systems
- Share **practical solutions** that work
- Highlight **success stories** where systems thrived

The Promise of Advanced Treatment Systems

- Key technologies:
  - Recirculating media filters (sand, textile, gravel)
  - Membrane bioreactors (MBRs)
  - Aerobic treatment units (ATUs)
  - Fast Unit’s
  - Peat
  - Multi Flo’s
  - Nayadic’s
  - Eco Pod’s
  - Nibbler’s
  - Alpha onsite (MBBR)
- Potential benefits:
  - Better treatment performance
  - Smaller footprint
  - Site flexibility (poor soils, small lots)
  - High strength waste reduction
  - Meeting stricter permit limits

Pitfalls & Challenges

- **Design Issues**
  - Systems not matched to waste strength or site conditions
  - Overselling capabilities of technology
- **Installation Errors**
  - Improper leveling, tank leaks, inadequate drainage
- **Operation & Maintenance Gaps**
  - Homeowners unaware of maintenance needs
  - Inconsistent service provider expertise
- **Financial & Regulatory Hurdles**
  - High upfront costs
  - Inconsistent regulatory acceptance across jurisdictions

Installation Pitfalls

Improper Layout

•Tanks and components installed without thought to future access.

•Riser lids buried under landscaping, patios, or driveways.

•Panels mounted far from power or where they’re exposed to weather.

Piping & Access Issues

•Poorly aligned pipework makes it hard to pump chambers fully.

•No access to sample ports, filters, or UV chambers.

•Valves installed in paved areas or hidden vaults with no marking.

Ignoring Manufacturer Guidance

•Advanced systems often require specific elevations, venting, and wiring.

•Inexperienced installers may treat it “like a septic tank,” leading to performance failures.

Maintenance-Oblivious Design

No Serviceability Built In

•Systems designed for initial cost, not long-term operation.

•Lack of room for trucks/equipment to reach tanks.

•Tight spaces around risers or panels make service dangerous.

Electrical Panels

•Poorly wired, exposed to moisture, or no surge protection.

•Makes troubleshooting and replacement much harder.

Operator Hand-Off Issues

•Installers don’t train homeowners or HOAs about ongoing maintenance.

•Leads to unrealistic expectations and system neglect.

Pitfalls with Maintenance Pumping

Incomplete Pumping

- Operators may only pump the tank portion and not realize there are separate chambers, equalization tanks, or media zones that also need service.
- Sludge and scum can remain in compartments that aren't easily visible.

Media Damage

- Pumping too aggressively or using the wrong equipment can damage or dislodge media.
- Some systems require special precautions to avoid removing media with the sludge.

Component Complexity

- Pumps, blowers, and control floats can frequently get caught up with multiple float systems during a pumping where the pumper may not pay attention to the float tree.
- Some systems with low level or low-pressure alarms may go to alarm when they are pumped out.

LGU Requirements

- Some LGU's require the service provider to be onsite with the maintainer to ensure the system is being pumped properly. This is an effective way to ensure they system is being properly cleaned it can make it difficult for the customer and contractors on-site.

Difficult sites make for difficult pumping

- Sites that need advanced treatment are commonly found in remote or hard to get to places. This can also make pumping very difficult and limit when pumping can be done. (Islands, remote cabins or camps)

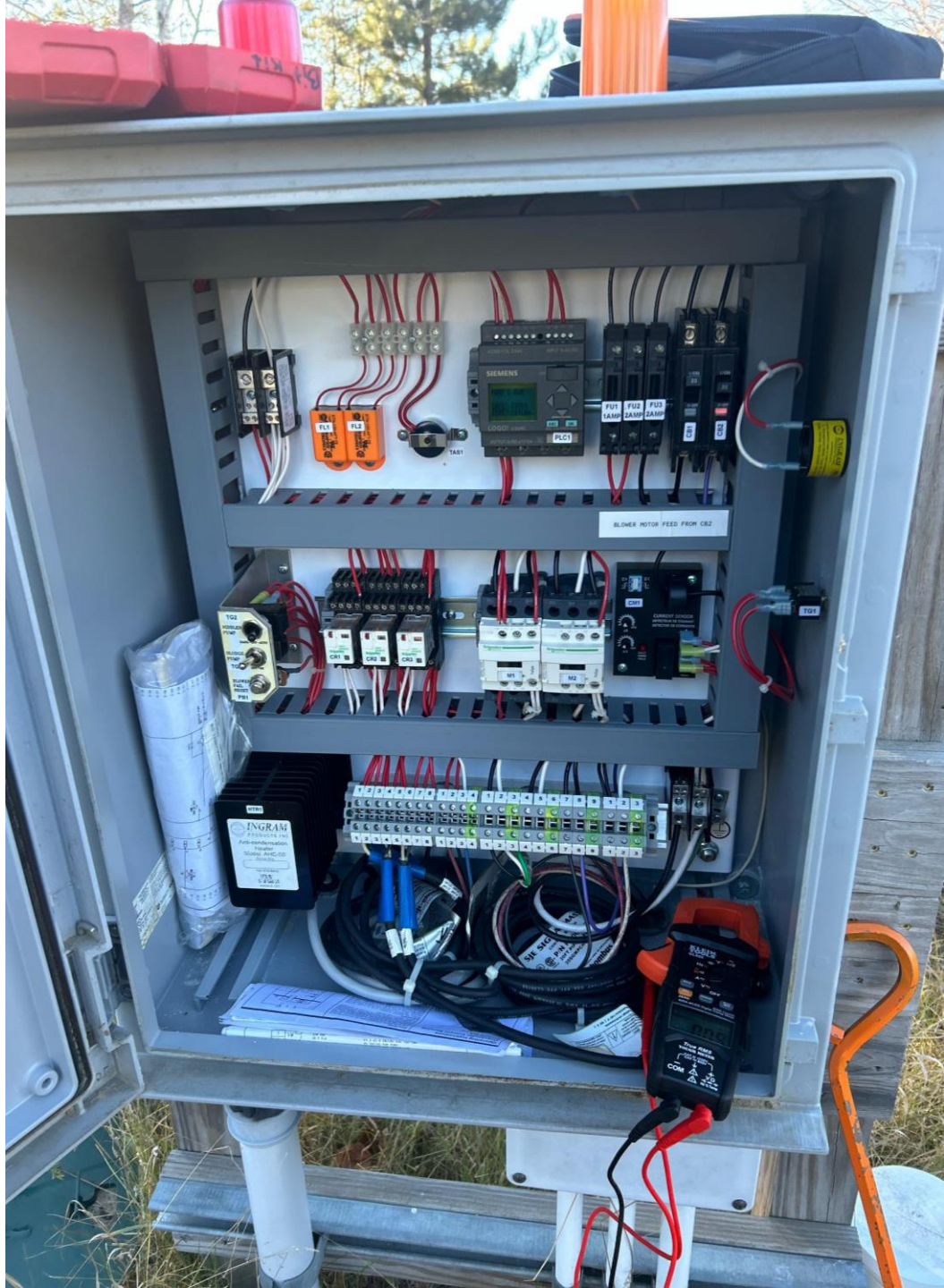
Pitfalls with Control Panels

Complexity – More than simple pump on/off → includes timers, aeration cycles, recirculation, alarms.

Programming Errors – Wrong timer settings can upset treatment (too much/too little recirculation or aeration).

Electrical Sensitivity – Lightning, surges, or moisture can fry boards → system shutdowns.

Hidden Failures – System may appear to run (lights on, blower on) but incorrect sequencing reduces performance.



Challenges for Operators (Control Panels)

Diagnostics

- Panels may include relays, printed circuit boards, programmable logic controllers (PLCs).
- Troubleshooting requires electrical knowledge *and* process understanding.

Manufacturer-Specific Programming

- Each brand has different software, timer settings, and diagnostic codes.
- Requires specialized training and sometimes direct support from the manufacturer.

Dependence on Alarms

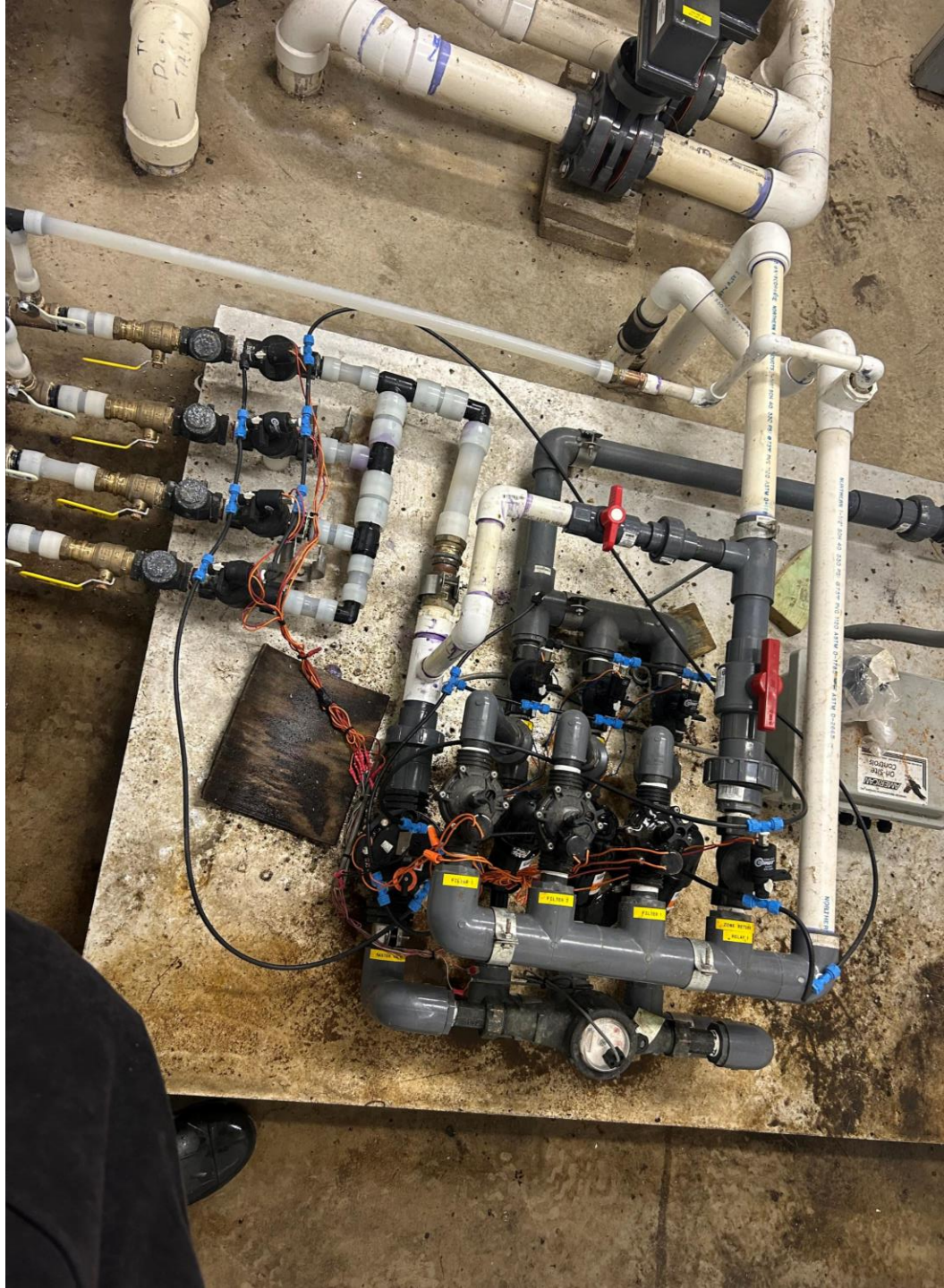
- Homeowners often ignore or silence alarms.
- By the time service is called, the system may already be overloaded.

Why Costs Are Higher?

•Advanced systems have **specialized components**: UV disinfection, blowers, aerators, control panels, multiple pumps.

•Parts are **brand-specific** and not always available locally.

•Replacement requires **trained technicians**, not just general pumping service.



Common Costly Components

UV Disinfection Units
Bulbs: Require replacement every 12–24 months.
Quartz Sleeves: Break easily, must be kept clean, expensive to replace.
Ballasts/Control Heads: Fail due to power surges or moisture → costly and sometimes only sold as assemblies.

Blowers & Aerators
•Must run 24/7 for treatment.
•Wear out in 3–7 years on average.
•High replacement cost + system goes out of compliance if offline.

Multiple Pumps
•Effluent pumps, recirculation pumps, dosing pumps (vs. one pump in a simple system).
•More pumps = more failure points.
•Each replacement can cost hundreds to thousands of dollars.

Control Panels
•Complex, with circuit boards, relays, and proprietary programming.
•Replacement parts can be **very expensive**, and sometimes the entire panel must be replaced.

Pitfalls from Costly Parts

Sticker Shock: Homeowners often expect “septic costs” to be cheap — advanced system parts can rival small appliance or HVAC repair costs.

Delayed Repairs: HOAs or individuals may put off replacing expensive parts → system operates poorly or fails.

Limited Suppliers: Some parts only available through the manufacturer or certified dealers.

Chain Reaction Failures: One failed part (ex. blower) stresses other components → bigger, more expensive issues.

Challenges for Operators & Owners

Budgeting
•Owners/HOAs need to plan for recurring UV and blower replacements.
•Many don’t budget for these long-term costs.

System Downtime
•Parts may take days or weeks to ship → system compliance at risk.

Educating Customers
•Homeowners need to understand these systems are more like small treatment plants than septic tanks.
•Service contracts and reserve funds are essential.

Alarm Fatigue

•Panels alarm for high water, blower failure, UV faults, etc.

Homeowners may:

•Ignore or silence alarms.

•Call late, after major damage.

•Leads to expensive emergency repairs instead of simple fixes.

Compliance & Risk Challenges

Regulatory Pressure

- Many advanced systems operate under permits.
- Improper maintenance can lead to violations, fines, or required reporting.

Odor & Aesthetic Issues

- If treatment drops → odors, surfacing effluent, or color/clarity issues, can quickly cause homeowner or community dissatisfaction.

Communication Gap

- Homeowners often think advanced systems are “just septic tanks.”
- Education is needed to explain costs, service needs, and complexity.

Solutions & Best Practices

Design/Engineering Fixes

- Site-specific designs, conservative loading rates

Installation Quality Control

- Pre-construction meetings, checklists, commissioning procedures

O&M Programs

- Service contracts with education for owners
- Remote monitoring & smart controls

Regulatory & Industry Collaboration

- Standardized training and certification
- Case studies proving long-term performance

Case Study - Residential Nibbler System

- Homeowner faced system failures and conflicting advice.
- Lacked system records or an operating permit.
- We educated her on her system, repaired the pump and blower, and established a bi-annual service agreement.

Case Study – Commercial Recirculating Gravel filter System

- The customer's system is over 15 years old and has undergone multiple upgrades throughout its lifespan. It has also experienced several changes in restaurant ownership, with each new owner introducing different waste streams and usage patterns. After conducting several repairs on the existing system, we discovered that the recirculation filter was severely bio-matted and non-functional in its current condition.

- Significant education was needed to help the owner understand the history of the system, the factors that contributed to its current state, and the challenges they were facing. Through our thorough assessment, we were able to recommend targeted repairs that restored the system's functionality, ultimately saving the customer $2,000 per week in pumping fees.

Case Study – LSTS Recirculation Wetland Filter System

- The wetland recirculating filter system was installed to serve around 90 homes in the homeowners association. However, the system sat idle for several years before it was ever put into use. Once the system was finally brought online, it began struggling almost immediately to meet its nitrogen permit limit of 10 mg/L.
- As time went on and the system remained out of compliance, additional problems started to appear. It became clear that the placement and overall design of the soil treatment area (STA) were poor choices, and the construction techniques used during installation further contributed to the system's premature decline.
- Over the years, countless operational changes were attempted and several repairs were made in an effort to bring the system back into compliance. Despite these efforts, the system never achieved consistent performance and continued to fail. Eventually, the entire system had to be completely redone at significant cost to the HOA.

Top 5 Lessons learned about advanced system service

- Design matters even the best operators cannot overcome fundamental design flaws.
- Involve and educate the homeowner during the design process
- Maintain thorough documentation to prevent future issues
- Ensure proper installation with accessible components for service
- Commit to ongoing operations and maintenance by a qualified provider

Q&A