ENGINEER'S OPINION

Full-Scale Pilot for Treated Lagoon Water Reuse
(On-Site Livestock Drinking) – NW Ohio Dairy

Date: February 4, 2026

Authorization (Conditional)

This opinion provides conditional engineering authorization for a full-scale pilot, and—upon successful completion—routine on-site reuse of treated lagoon water for livestock drinking, only in diluted form and only under one of the two treatment options defined below.

The pilot's purpose is to validate site-specific operating parameters and document that diluted treated water consistently meets internal animal-safety criteria.

Purpose and Scope

To evaluate BDDE-treated final-stage lagoon effluent, after mandatory dilution, as livestock drinking water within the same permitted Ohio CAFO.

The pilot confirms treatment performance under site-specific chemistry and establishes safe operating setpoints before any routine adoption.

Regulatory Context (Ohio)

This activity is on-site reuse, not a public water supply and not an off-site discharge. It is managed under Ohio CAFO waste and nutrient controls. The proposed approach is more protective than baseline lagoon watering practices because it introduces advanced oxidation, monitoring, and mandatory dilution.

Treatment Options (Select One Based on Preliminary Results)

Option 1 – Chlorine + BDDE Ammonium Degradation (Primary Pathway)

Process:

Add sufficient NaCl (common salt-dose to be determined) to the water to trigger oxidation of ammonium (NH_4^+) to nitrogen gas (N_2) when exposed to the BDDE electrode.

Rationale:

From the limited preliminary analysis, this pathway appears capable of reducing nitrogen risk without introducing a desalination step.

Dilution:

The resulting treated water may be safely diluted between 6:1 and 8:1 (fresh:treated) for animal consumption, subject to pilot confirmation.

Option 2 – Reverse Osmosis (RO) as a Polishing Step (If Needed)

When Required:

If preliminary water analysis and pilot tests indicate excess salts and/or residual contaminants that cannot be adequately controlled by Option 1 alone.

Process:

Install a small RO unit downstream of BDDE to remove salts and remaining dissolved contaminants.

Dilution:

After RO, the treated stream may also be diluted 6:1 to 8:1 for safe livestock drinking.

Note: All other process features not directly supporting Options 1 or 2 are excluded from this abbreviated protocol.

Monitoring (Pre-Use)

Before any animal access, analyze treated effluent based on local livestock drinking water standards The testing parameters shall include, at a minimum: Total Nitrogen (TN), pH, COD, and E. coli. Any exceedance of internal action thresholds requires immediate corrective action or suspension.

Mandatory Blending

All treated water must be diluted prior to livestock access.

The final blend ratio is to be confirmed by pilot results, bust must be safe for animals to drink.

Release Condition

Treated lagoon water may be released for livestock drinking only after pilot data demonstrate that the selected option (Option 1 or Option 2) consistently meets acceptance targets at the defined dilution and operating setpoints are documented.

Conclusion

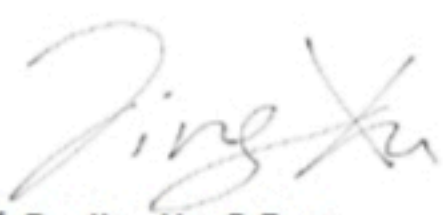
This streamlined pilot validates a two-path treatment framework—

(1) Chlorine + BDDE ammonium-to-N_2 conversion, or

(2) BDDE + RO polishing—

Both incorporating mandatory dilution at a ratio to be finalized by pilot data, ensuring all treated water meets animal health standards and maintains regulatory defensibility.

Respectfully submitted,



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