Technical Validation & Water Reuse Evaluation at a Midwest Meat Processing Facility

ReclaimX™ WT Demonstrates Substantial Water Reuse Benefits for Meat Processing

THE SITUATION

Large meat processing facilities generate wastewater with extremely high concentrations of blood, fats, oils, grease (FOG), and organic material. In smaller communities, a single facility can consume the majority of the local Publicly Owned Treatment Works (POTW) capacity.

This Midwest meatpacking plant generated approximately 1.5 million gallons of wastewater per day, creating significant hydraulic and organic loading on the municipal treatment system.

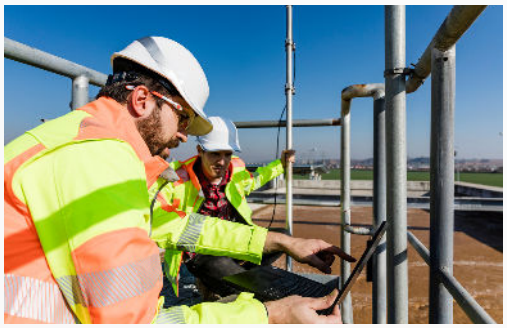
The facility faced two options:
- Help finance municipal treatment expansion
- Reclaim and reuse wastewater within the facility

To evaluate the second option, the facility partnered with Apex to pilot the ReclaimX™ WT Platform.

THE CHALLENGE

Initial testing quickly identified the biggest obstacle.

Simply filtering the secondary DAF effluent through a 0.1 µm ultrafiltration membrane was not possible. Although the water appeared relatively clear, the high concentration of dissolved organics rapidly fouled the membranes.



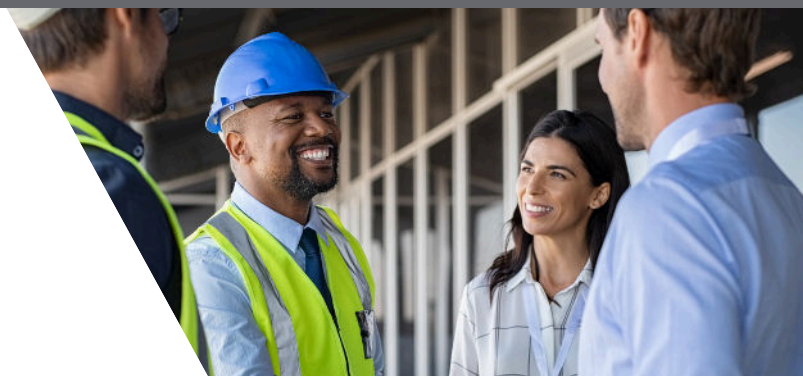
CUSTOMER PROFILE

Industry:
Meat Processing

Location:
Midwest, USA

Wastewater Flow:
~ 1.5MGD

Primary Challenge:
Limited municipal treatment capacity and pressure to reduce wastewater discharge



Bench testing showed the UF system required chemical cleaning after less than 30 minutes of operation.

The engineering team concluded:

> **With high BOD water it is necessary to digest the BOD prior to UF, or the untreated organics will quickly foul the membrane.**

The challenge became:

How do you remove enough biological oxygen demand (BOD) before membrane treatment without constructing an entirely new biological treatment system?

THE RECLAIMX™ WT SOLUTION

Instead of building an entirely new biological treatment system, Apex repurposed the customer's existing equalization basins into aerobic digesters.

By increasing retention time to more than 24 hours, naturally occurring bacteria significantly reduced biological oxygen demand (BOD) before membrane treatment.

Following biological pretreatment, the wastewater passed through:

- Advanced Oxidation (Ozone)
- Optimized Coagulation
- Ultrafiltration (UF)
- Reverse Osmosis (RO)

The integrated treatment train produced a stable feed stream, minimized membrane fouling, and generated high-quality reclaimed water suitable for plant reuse.

RECLAIMX™ WT PILOT RESULTS

The ReclaimX™ WT pilot successfully demonstrated strong technical performance and economic impacts.

1.0 MGD WATER REUSE OPPORTUNITY

Potential reclaimed water available for plant reuse

30–50 LMH UF FLUX ACHIEVED

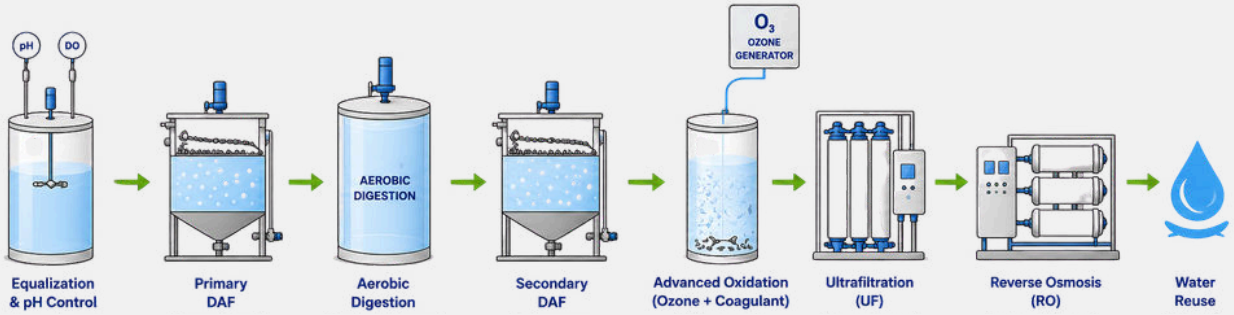
- Routine operation around 30 LMH
- Peak 23-hour run at 50 LMH
- Typical industry performance: 15–25 LMH

~$600K ANNUAL NET BENEFIT

Estimated based on 10-year depreciation of capital and OPEX

The ReclaimX™ WT Process

An integrated treatment platform designed to consistently produce high quality reclaimed water.



WATER REUSE OPPORTUNITIES

The ReclaimX™ pilot transformed high-strength wastewater into high-quality reclaimed water, reducing conductivity, COD, and TSS by more than 98%.

The treated water could be reused in a variety of non-product-contact applications, providing up to 1.0 MGD of reclaimed water while reducing both freshwater demand and wastewater discharge.

Water Quality Comparison:

Key Parameters	Secondary DAF	ReclaimX™ Treated
Ca Hardness (mg/L as CaCO3)	62	3.5
Mg Hardness (mg/L as CaCO3)	87	5.7
Conductivity (µmho)	2,911	44
Chloride (mg/L)	791	20
Sodium (mg/L)	553	11
Phosphate (mg/L)	2.4	<0.1
Silica (mg/L)	8.6	0.7
Sulfate (mg/L)	112	8
Barium (mg/L)	<0.1	<0.1
Strontium (mg/L)	0.1	<0.1
Iron (mg/L)	0.55	<0.1
COD (mg/L)	525	<1.0
TSS (mg/L)	41	<0.1
pH	6.3	6.7

WATER REUSE APPLICATIONS

Up to 1.0 MGD of reclaimed water can be used for non-product contact applications

- Barn Water
- Scald Tanks
- Process Screens
- Boilers
- Evaporative Condensers

ADDITIONAL BENEFITS

- Reduced municipal water purchases
- Lower wastewater discharge
- Reduced hydraulic & BOD loading to the POTW
- Increased water self-sufficiency
- Improved operational resilience
- Supports future production growth

KEY LEARNINGS & TAKEAWAYS

1. Repurpose Existing Infrastructure
Existing equalization basins can often become highly effective biological pretreatment systems, reducing project costs while minimizing new construction.

2. Pretreatment Determines Performance
Biological digestion combined with optimized coagulation and advanced oxidation dramatically reduces membrane fouling and creates a stable feed stream for ultrafiltration.

3. Higher Flux Improves Economics
Achieving sustained UF flux rates around 30 LMH, with peaks reaching 50 LMH, reduces membrane area requirements, lowers capital costs, and improves project economics.

4. Utility-Grade Reclaimed Water Has High Value
Large volumes of reclaimed water can replace municipal water in non-product-contact applications such as barn water, scald tanks, process screens, evaporative condensers, and boilers.

5. Water Reuse Creates More Than Savings
Water reclamation reduces operating costs, strengthens water security, improves plant resilience, reduces dependence on municipal infrastructure, and supports future growth.

CONCLUSION

Water is too valuable to use only once.

Water scarcity, rising utility costs, and aging municipal infrastructure are changing how industrial facilities manage water.

For protein processors, wastewater should no longer be viewed as something to dispose of; it is a valuable resource capable of delivering measurable operational, environmental, and financial value.

The ReclaimX™ WT pilot project demonstrated that high-strength meat processing wastewater can be successfully transformed into reliable utility-grade water through an integrated process of biological treatment, advanced oxidation, ultrafiltration, reverse osmosis, and strategic approach to water reuse.

IS RECLAIMX™ WT RIGHT FOR YOUR FACILITY?

If your facility is experiencing:

- Rising water costs
- Wastewater discharge limitations
- Municipal treatment constraints
- Sustainability initiatives
- Water reuse goals

Team Apex can evaluate your process and identify opportunities to recover more water, reduce operating costs, and improve long-term water resilience.

Why Apex?

- Simplified Compliance
- Tailored Solutions
- Reliable Operations
- Timely Support

CONTACT US

Learn more about how Apex can help you simplify water and process so you can focus on running safe, efficient, and sustainable operations.

APEX

1 (844) 603-4077 Info@TeamApex.com TeamApex.com

12270 43rd Street NE, St. Michael, MN 55376 | © 2026 Apex Water and Process Inc. All rights reserved.