CASE STUDY

MIDWEST WWTP OVERLOADED BY INDUSTRIAL INFLUENT RESCUED FROM PERMIT PROBATION BY EOSI'S MICROC® 2000

When a small midwestern municipal WWTP overwhelmed by local pork-processing industrial inflow suffered regulatory probation and hefty fines from numerous pH and ammonia discharge violations, EOSi's MicroC® 2000 carbon sources helped them enhance biomass growth, boost denitrification — and avoid the potential loss of their operating permit.

Client: Municipal Wastewater Treatment Plant

Location: Midwest, USA

Flow Design/Actual: 1.5 MGD/1.2 MGD

Treatment Technology: Oxidation Ditch

Ammonia Discharge Limit:
2.3 mg/L (monthly average in summer);
3.5 mg/L (weekly average in summer),
4.6 mg/L (monthly average in winter),
and 6.9 mg/L (weekly average).

pH Discharge Limit: 6-9

Background: Exceeding Stringent Limits

A small midwestern USA municipality owning and operating a 1.5 MGD wastewater treatment plant (WWTP) was treating both municipal and industrial wastewater, including substantial inflow from a local pork-processing facility. The municipality's WWTP uses oxidation-ditch technology — circular or oval-shaped aeration-activated sludge basins — to achieve biochemical/biological oxygen demand (BOD) removal, nitrification, and denitrification (see Process Flow Diagram).



An evaluation of the WWTP's influent wastewater characteristics highlighted a significant shortfall in the BOD loading compared to its ammonia loading. The high ammonia levels in the influent resulted from the WWTP receiving more than 50% of its inflow from a local pork-processing industrial discharger. The WWTP was required to meet strict weekly and monthly average ammonia and pH effluent limits but was frequently exceeding those limits — and endangering their operating permit.

Restoring BOD & Proper pH

More than half of the incoming wastewater treated at the WWTP originated from the pork-processing facility, and that high proportion and unique concentration of industrial effluent created



significant operational challenges for the municipal WWTP. Although pretreated, the pork-processing wastewater was very high in total Kjeldahl nitrogen (TKN) and very low BOD levels.

As a result, the WWTP experienced difficulties maintaining its biomass and proper pH range within their treatment process. The insufficient influent alkalinity caused a drop in the wastewater pH and inhibited effective nitrification— leading directly to numerous pH and ammonia permit violations. Following a high frequency of permit discharge violations, the WWTP was facing significant financial state penalties and was placed on probation. The WWTP needed to demonstrate consistent compliance for 11 months through corrective action or else incur significant fines with every permit violation.

MicroC® Premium Carbon Sources

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PROCESS FLOW DIAGRAM

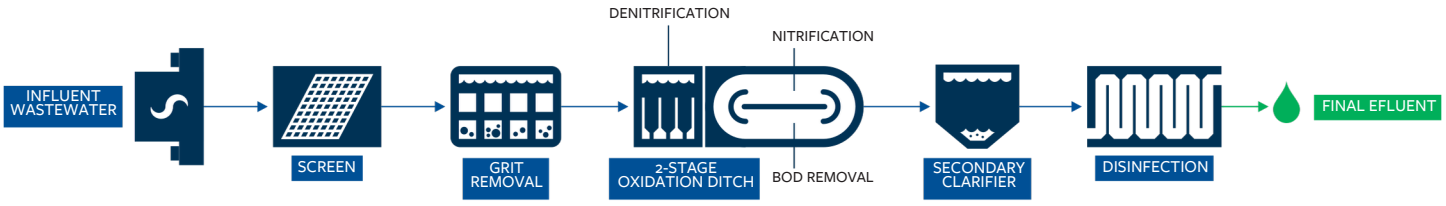

FIGURE 1 Process Improvements with MicroC® 2000 Addition

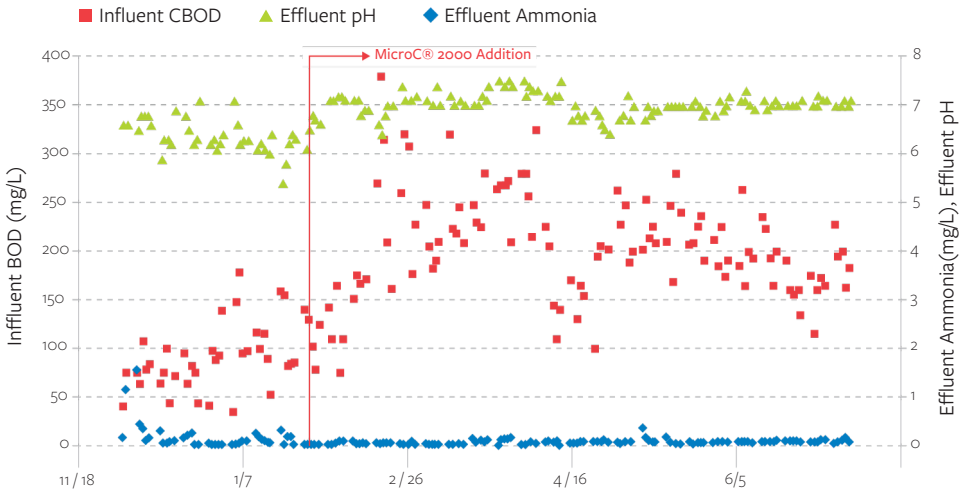

FIGURE 2 MicroC® 2000 Tanks at the WWTP



EOSi's MicroC® 2000 Carbon Sources

The WWTP decided to utilize a carbon source to enhance denitrification for alkalinity recovery which results in better pH control and subsequently improved nitrification performance. An evaluation of the WWTP influent wastewater characteristics highlighted a significant shortfall in the BOD loading compared to the ammonia loading, which resulted in difficulties with maintaining biomass. Also, the WWTP used a significant quantity of lime as an alkalinity source.

EOSi's MicroC® 2000 was identified as a high quality, non-flammable, and consistently performing carbon source that could be readily implemented with minimal capital investment. Besides increasing influent BOD to maintain a healthy biomass population, MicroC 2000 also enhances denitrification for alkalinity recovery that results in better pH control and improved nitrification.

EOSi worked with the WWTP's consultant team to implement a full-scale evaluation of MicroC 2000. EOSi provided temporary storage and feed equipment to dispense MicroC 2000 to WWTP headworks to increase the BOD:TKN ratio of the raw influent. This BOD supplementation program enabled partial denitrification in the WWTP anoxic zone, alkalinity recovery, better pH control, and improved nitrification process.

Figure 1 shows the addition of MicroC 2000 resulted in increased influent BOD and improvements in effluent pH. Following a successful evaluation of the MicroC 2000 ME&AS program, the WWTP converted an existing chemical storage tank into a tank for storing and dispensing MicroC 2000 (Figure 2).

Denitrification Improved & Alkalinity Regenerated

EOSi-provided chemical feed equipment, chemical inventory management using EOSi's MicroC-IM, and ongoing technical support enabled the municipality to accomplish a dramatic turnaround. As a result of the MicroC® 2000 addition, the WWTP's biomass was rapidly restored, denitrification performance improved, and alkalinity regenerated, leading to better pH control and full nitrification in the aerobic zone. Further, the quantity of lime used as an alkalinity source was also significantly reduced.

The WWTP completed its 11-month permit probationary period without any further violations in pH or ammonia permit limits, and the municipality continues to utilize MicroC 2000 on an ongoing basis to sustain its biological process and meet its ammonia and pH permit values.