CASE STUDY
MICRODYN BIO-CEL®-MCP MBR
Tuna Wastewater Treatment Plant

MICRODYN NADIR
ADVANCED SEPARATION TECHNOLOGIES

Project Goal
Enhance the company's WWTP to comply with regulations and reuse water at the plant.

Feed
Tuna processing wastewater

Membranes
10 MICRODYN BIO-CEL® 400 Modules

MBR Pollutant Removal
- BOD: 98.8%
- COD: 95.5%
- TN: 96.8%
- TP: 80.0%
- TSS: 97.7%
- Turbidity: 99.5%

Objective
Located in Mazatlán, Mexico, a tuna cannery needed to update their wastewater treatment plant (WWTP) to comply with new regulations. MICRODYN BIO-CEL®-MCP MBR process was chosen for its small footprint and low chemical costs. Needing to treat 1150 m^3/day (304,000 GPD) of wastewater from tuna processing, this waste stream has exceptionally high total nitrogen (TN), total phosphorus (TP) as well as higher organics (COD/BOD) concentrations.

Materials & Methods
Ten MICRODYN BIO-CEL® BC400 membrane modules were installed at the plant. Unit operations for the WWTP are as follows:

- Dissolved Air Flotation (DAF) treatment
- Equalization tank
- 1 mm Rotating mechanical screen
- 1 Anoxic basin
- 1 Aeration basin (2 dissolved oxygen zones)
- 2 Filtration basins
- Tertiary treatment

Table 1. Plant BIO-CEL MBR operational parameters.

Parameter	Value
Commissioning	May 2012
Number of BIO-CEL® 400 Modules	10
Mixed Liquor Suspended Solids (MLSS)	9-12 g/L
Solids Retention Time (SRT)	21 Days
Average Flux	13.9 LMH (8.2 GFD)
Average Transmembrane Pressure (TMP)	70 mbar (1.01 psi)
pH	7.2
Temperature	35°C (95°F)

Results
After almost 6 years in operation, the plant continues to deliver excellent results in regard to effluent quality and flow (Table 2). All permit requirements are being met, virtually all solids are being removed and the MBR effluent has an SDI < 3 and turbidity < 1 NTU which allows for further tertiary treatment to treat color and odor by reverse osmosis, ozone, and carbon filters.

The MICRODYN BIO-CEL®-MCP MBR process allows the company to limit their maintenance cleanings (MC) quarterly and extended maintenance cleanings (EMC) annually.

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Table 2. Water quality from different unit operations at the WWTP.

Sampling	BOD (ppm)	COD (ppm)	TN (ppm)	TP (ppm)	TSS (ppm)	Turbidity (NTU)
Raw Influent	5790	12310	785	243	2580	2134
DFA Effluent	2100	3235	472	25	87	75
MBR Effluent	25	147	15	5	2	0.35
Tertiary Effluent	0	0	1	0	0	0

Figure 1. From left to right: raw influent, DAF effluent, MBR permeate and tertiary effluent.

About 35% of the tertiary treated water (400 m^3/day or 106,000 GPD) is reused for the following applications at the plant:

- Cooling towers
- Washing docks/boats
- Bathrooms
- Cleaning the WWTP
- Preparing chemicals for the WWTP

Table 3. Cost savings of reusing tertiary treated water versus using municipal water.

Parameter	Value
Cost savings of tertiary treated water vs. municipal water	$10 pesos / m^3
Volume of water reused daily	400 m^3
Daily water savings	$4,000 pesos
Monthly water savings	$120,000 pesos
Annual water savings	$1,440,000 pesos (~$77,350 USD)

Conclusion

Utilizing the MICRODYN BIO-CEL®-MCP MBR process allowed the tuna plant to dramatically reduce BOD, COD, TN, TP, TSS and Turbidity concentrations in their wastewater and feed a tertiary treatment system. After tertiary treatment, about 35% of the waste water was resued in other parts of the plant and has saved them ~$77,350 USD annually in water costs. This system allowed the plant to meet their environmental permit requirements while utilizing less space compared to a Conventional Activated Sludge (CAS) waste treatment plant. The MCP allowed the plant to reduce their annual chemical usage for system cleaning.

Note: We would like to thank SSOZ for providing data and pictures for this case study.

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