

# Advantages of a Rotating Biological Contactor Packaged Wastewater Treatment for Remote Mining Operations

Remote mining operations face unique challenges when it comes to wastewater treatment. Limited infrastructure, harsh environmental conditions, and the need for reliable, low-maintenance systems make the choice of treatment technology crucial. Among the available options, packaged plants using Rotating Biological Contactor (RBC) technology stand out as an optimal solution for these demanding locations. Compared to alternative systems like Membrane Bioreactors (MBR), RBC-based packaged plants offer several key advantages that align with the needs of remote mining sites.

## What is a Packaged Wastewater Treatment Plant?

A packaged wastewater treatment plant is a pre-engineered, self-contained system designed for wastewater treatment in locations where traditional infrastructure is unavailable or impractical. These plants are modular, transportable, and designed for quick deployment, making them ideal for remote applications such as mining camps, construction sites, and small communities. They are essentially a plug-and-play option for remote decentralized areas that lack hard infrastructure.



Packaged plants typically include primary treatment (settling), secondary treatment (biological), and sometimes tertiary treatment (filtration/disinfection), all within a compact footprint. RBC-based packaged plants, such as the [River Birch Biodisk](#), offer a particularly robust and energy-efficient biological treatment process compared to other technologies.

## Key Considerations for Mining Wastewater Treatment

When selecting a wastewater treatment system for a remote mining location, the following factors must be considered:

- **Operational Simplicity:** Limited access to skilled operators requires systems that are easy to manage.

- **Energy Efficiency:** Remote sites often rely on diesel generators or limited renewable energy sources.
- **Reliability in Extreme Conditions:** Systems must withstand cold climates, fluctuating flows, and remote access constraints.
- **Low Maintenance and Longevity:** Reducing the need for frequent part replacements and chemical dosing is essential.

## Why RBC Treatment is Ideal for Remote Mining Locations?

RBC systems, such as the [River Birch Biodisk](#) packaged plants, offer unique advantages tailored to mining applications:



### 1. Minimal Operator Intervention

RBC technology operates with a simple, passive biological treatment process that requires significantly less operator oversight compared to MBR systems, which demand frequent membrane cleaning and monitoring. This makes RBC an excellent fit for remote locations where trained personnel may not always be available.

Skill Required	MBR System Requirements	RBC System Requirements
<b>System Monitoring</b>	Frequent membrane performance tracking	Periodic checks for biofilm health
<b>Membrane Cleaning &amp; Maintenance</b>	Chemical cleaning protocols	Occasional media cleaning
<b>Aeration &amp; Blower Operation</b>	High-energy aeration required	Simple air recycling
<b>Sludge Management</b>	High sludge yield, frequent handling	Low sludge yield, minimal handling

Skill Required	MBR System Requirements	RBC System Requirements
SCADA & Automation	Advanced automation needed	Basic control system knowledge, can be upgraded as needed
Chemical Handling	Coagulants and antiscalants needed	Minimal chemicals needed, but can incorporate chemical optimization

## 2. Superior Energy Efficiency

RBC systems consume substantially less power than MBR systems, which require high-energy aeration and pumping to maintain membrane performance. In mining camps relying on off-grid power sources, reducing energy demand translates to lower fuel consumption and operational costs.

System	Energy Consumption (kWh/m <sup>3</sup> )	Annual Energy Cost (\$0.15/kWh, 100 m <sup>3</sup> /day)
RBC System	0.1 – 0.2	\$547.50 – \$1,095
MBR System	0.45 – 0.64	\$2,467.50 – \$3,504

**10-Year Energy Savings with RBC: \$19,200 – \$24,090**

**\*Figures are approximations in CAD**

## 3. Resilience in Harsh Environments

RBC-based packaged plants are designed to withstand the extreme conditions commonly encountered in mining operations, including:

- Temperature Resilience:** RBC systems are designed to function reliably in extreme climates, including sub-zero and high-heat environments. While microbial activity is temperature-dependent, the biofilm structure in RBCs provides thermal buffering, allowing the system to maintain treatment performance more consistently than suspended growth processes in fluctuating conditions.
- Variable Flow Adaptability:** RBC systems are well-suited for mining camps where wastewater flow varies due to workforce shifts. Unlike MBRs, which require precise hydraulic balancing to prevent membrane fouling, RBCs can accommodate moderate fluctuations without immediate performance degradation. However, excessive overloading can impact efficiency, making proper system sizing and design essential for long-term reliability.

- **Power Interruption Tolerance:** RBC systems can maintain biological treatment even during power outages, as the passive biofilm process remains active. Additionally, these plants require minimal energy and can efficiently operate on small backup generators, ensuring continued performance in remote locations.
- **Minimal Chemical Dependency:** Do not require frequent chemical dosing unless required for specific treatment objectives, thus reducing the need for chemical transport and storage in remote areas.
- **Longevity & Durability:** Engineered with robust materials, precision fabrication, and a proven mechanical design, RBC systems are built for long-term performance. Designed for a 20-25 year service life, many systems have demonstrated 35+ years of continuous operation with proper maintenance, making them a reliable, cost-effective choice for remote mining sites.

#### 4. Lower Lifecycle Costs & Longevity

With proper maintenance, the [River Birch Biodisk](#) RBC systems are designed for a **20-25 year life expectancy**, with many units exceeding **35 years** in operation. This longevity, combined with minimal part replacements and reduced chemical usage, significantly lowers the total cost of ownership compared to MBR plants.

Category	RBC System (10-Year Cost)	MBR System (10-Year Cost)	Savings with RBC
<b>Energy Costs</b>	\$6,570 – \$13,140	\$29,560 – \$42,020	<b>\$22,990 – \$28,880</b>
<b>Operator Costs</b>	\$312,000	\$624,000	<b>\$312,000</b>
<b>Replacement &amp; Consumables</b>	\$10,000 – \$25,000	\$100,000 – \$150,000	<b>\$75,000 – \$140,000</b>
<b>Total 10-Year Cost</b>	<b>\$328,570 – \$350,140</b>	<b>\$753,560 – \$816,020</b>	<b>\$424,990 – \$465,880</b>

\*Figures are approximations in CAD

#### In Summary

For remote mining operations, selecting the right wastewater treatment technology is critical for operational efficiency, cost control, and environmental compliance. While MBR systems have advantages in certain applications, RBC-based packaged plants offer superior energy efficiency, low maintenance, and operational simplicity, making them the optimal choice for remote and off-grid locations.

[River Birch Biodisk](#) RBC technology provides a proven, cost-effective, and resilient solution tailored to meet the unique challenges of mining wastewater treatment. With a legacy of durability, minimal operator requirements, and unparalleled efficiency, Biodisk systems ensure long-term sustainability and reliable performance for decades to come.

## **Get in Touch**

If you're interested in learning more about our products you can also reach out to River Birch Global Water Inc. for water, wastewater and stormwater solutions. Contact us today

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