A photograph of an industrial facility, likely a coking plant, featuring several tall, cylindrical smokestacks and a complex network of metal pipes and walkways. The scene is set against a clear blue sky. A semi-transparent white box is overlaid on the image, containing text. A small yellow square is visible in the top-left corner.

**Water & Waste Management**

# **BioRemove™ COD**

**General Industry**

Case study: Ensured compliance and stable effluent in a coking plant's treatment system

Rethink Tomorrow

novozymes® 

The application of BioRemove™ COD to a coking plant's wastewater treatment system helped ensure compliance and stable effluent.

## Benefits

- **Reduced Sludge Volume Index by 40%**
- **Maintained COD removal efficiency despite 43.2% increase in influent COD**

## Background

A treatment plant of a particular

company's coking branch operated under strict management and high environmental protection standards. Overall, the operation of the wastewater treatment system at the plant was good; however, the treatment plant hoped to further ensure compliant and stable effluent.

The secondary sedimentation tank effluent COD fluctuated greatly between 145-307 ppm, and large amounts of chemical flocculants had to be added to ensure effluent water quality (Figure 1).

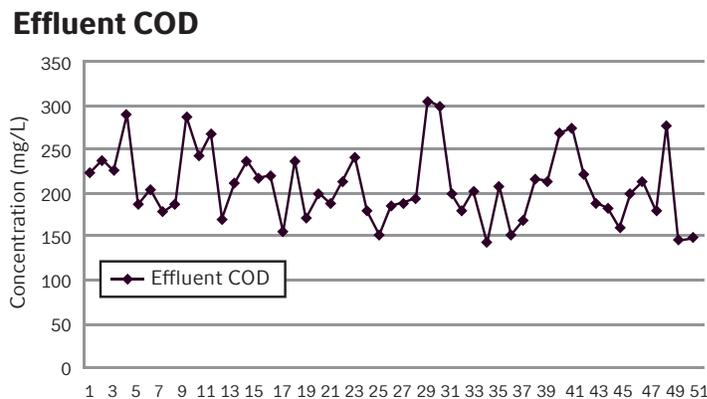


Fig. 1. Effluent COD of secondary sedimentation tank.

## Application

Novozymes Technical Service team designed a bioaugmentation program for the plant based on their specific situation, recommending BioRemove™ COD for a dosing period of 60 days.

The goal of the program was to improve the biomass' COD removal capabilities at higher loading rates, while improving floc structure to improve settling.

# Results

System data from May 1 to July 31 was analyzed to determine the effect of the bioaugmentation program on the system in reference to COD changes, sludge concentration changes, dilution water and flocculant reduction.

Over the course of the program,

influent COD increased, due to an increase in influent volume after the bioaugmentation program began. The use of BioRemove™ COD maintained a relatively stable COD effluent under substantial increases in the influent loads. (Figure 2).

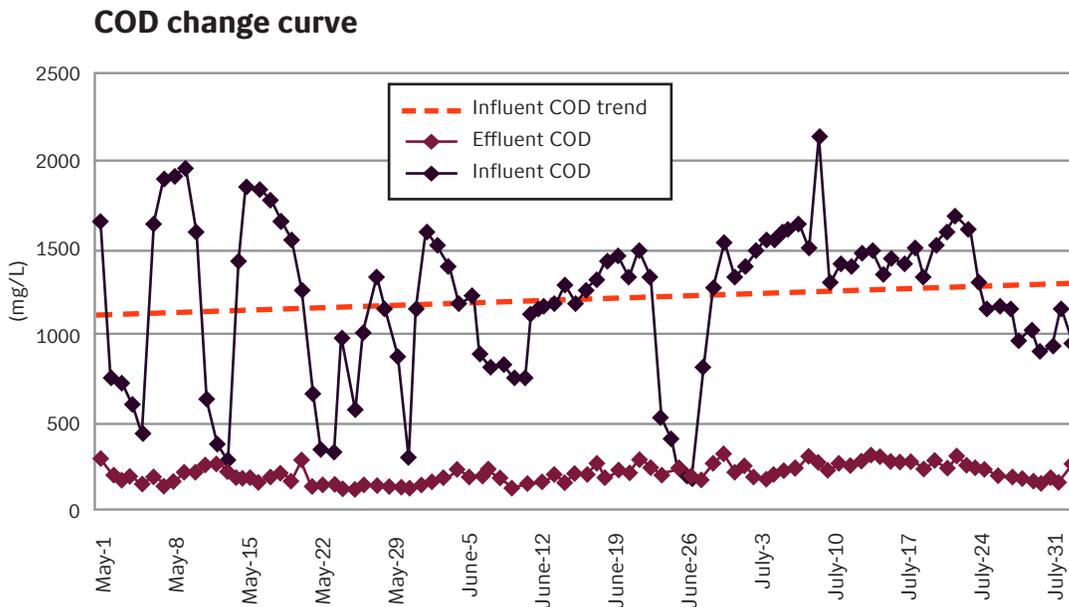


Fig. 2. COD change curve.

After the bioaugmentation program, the system’s sludge activity improved significantly (Figure 3).

Furthermore, bioaugmentation significantly improved sludge settling (Figure 4).

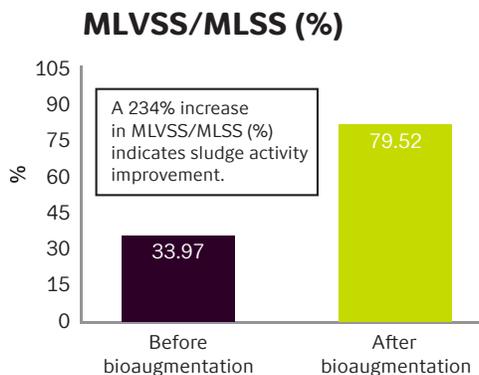


Figure 3. Comparison of MLVSS/MLSS (%) before and after bioaugmentation.

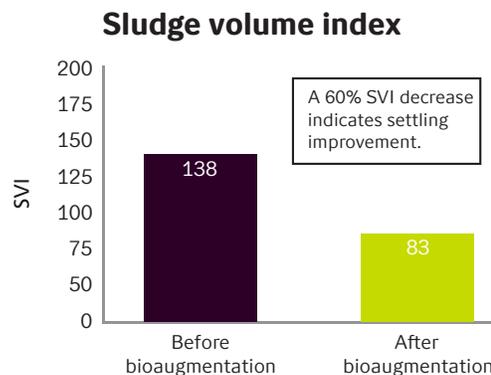


Figure 4. SVI decrease indicates settling improvement.

Despite an increase in water flow during the program—the effluent COD remained

stable, representing improved COD removal efficiency (Figure 5 and 6).

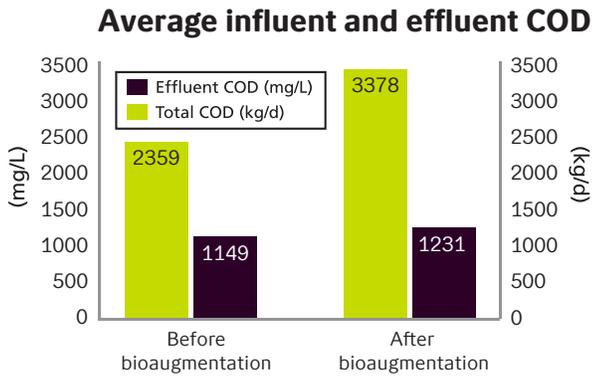


Figure 5. Average influent and effluent COD, before and after bioaugmentation began.

\*Note: After bioaugmentation, the absolute value of influent COD increased by 7.1% and the total COD increased by 43.2%, but the COD level of effluent remained the same due to bioaugmentation.

For multiple reasons (oils, greases, filaments, poor settling, etc.), foam is a common problems for the coking waste water treatment. After adding



Figure 9. Tank before bioaugmentation.

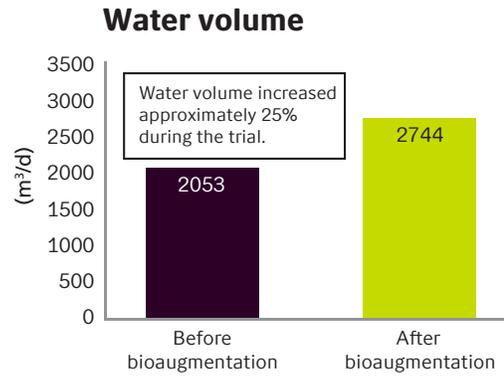


Figure 6. Water volume before and after bioaugmentation began.

BioRemove™ COD, foam was significantly reduced due to the reduction of oils and greases and improved settlement.



Figure 10. Tank after bioaugmentation

## Conclusion

Novozymes' biological program was easy to implement and provided significant benefits over alternatives, increasing COD removal efficiency. The use of

BioRemove™ COD resulted in:

- **Improved plant efficiency**
- **Simplified operations**



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### About Novozymes

Novozymes is the world leader in biological solutions. Together with customers, partners and the global community, we improve industrial performance while preserving the planet's resources and helping to build better lives. As the world's largest provider of enzyme and microbial technologies, our bioinnovation enables higher agricultural yields, low-temperature washing, energy-efficient production, renewable fuel and many other benefits that we rely on today and in the future. We call it Rethink Tomorrow.

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