

## SEEDING IMPROVES COD REMOVAL

BETHLEHEM, PA (November 18, 1999) -- Seeding with highly concentrated, specialized hydrocarbon-degrading bacteria combined with powdered activated carbon has improved chemical oxygen demand (COD) removal dramatically in a South American chemical manufacturer's wastewater treatment plant. Seeding was used after unsuccessfully trying a variety of other methods to improve plant performance. The chemical plant was faced with the difficult alternative of reducing chemical production to meet discharge limits.

The 1 MGD (3788 m<sup>3</sup>/day) wastewater treatment facility includes an aerated, mixed equalization basin, aerobic bioreactors with about 12 hours hydraulic residence time, and secondary clarifiers. The treatment plant performance was inadequate to meet national and local effluent discharge COD standards of 250 mg/l with effluent CODs typically running in the 500 mg/l range. Meeting the COD wastewater discharge limits is critical to the manufacturer since the effluent discharge is into a small inland stream that flows through nearby housing developments. In a typical month the COD concentrations in the influent to the wastewater plant average 1500 mg/l with spikes up to about 3000 mg/l. The wastewater contaminants consist of a variety of chemical intermediates.

At times the inadequacy of biological removal was so severe that chemical production had to be reduced. Seeding with municipal sludge was tried, but it was determined that the microorganisms present in the municipal sludge adapted only very slowly to the constituents in the wastewater and, therefore, did not improve performance appreciably.

To improve COD removal and to help insure against potential system upsets, plant management decided to seed (bioaugment) with a biological product containing commercially-grown specialized strains of hydrocarbon-degrading bacteria combined with selected powdered activated carbons. The product selected was MICROCAT®-HX Hydrocarbon Degradar made by Bioscience, Inc. This product was developed by the scientists at Bioscience, Inc. specifically to aid in the processing of toxic and/or difficult-to-degrade organics in industrial process wastewaters. Naturally-occurring microbial strains were isolated from nature, selected in the lab for their ability to degrade commonly-produced chemical substances,

adapted to the substances, preserved in a dry state and then combined into a “consortium”, or team, of bugs capable of degrading complex mixtures of such substances. When blended with specialized activated carbons, the team of bugs is used to augment the natural biomass in treatment systems to more consistently and completely break down the organic wastewater constituents, thus improving plant stability and effluent quality. MICROCAT-HX had been successfully used in a variety of biological systems (activated sludge, aerated lagoons, trickling filters) treating wastewaters from the textile, petroleum refining, chemical and metal processing industries leading the manufacturer to choose this product for process enhancement.

The population of selected strains in the product was established in the treatment system over a 20-day period using about 300 pounds of the microbial inoculum added to the aerated biotreater tanks. After the initial seeding phase of the program, a preventive maintenance application of about 2 lbs/day (.9 kg/day) was used to ensure a continuing inoculum of the specialized strains to the system. Since beginning the regular seeding program bioreactor activity, as measured by biomass specific oxygen uptake rate, has increased significantly and effluent discharge COD has been consistently reduced below the target level despite regular spikes in influent flow and COD concentration.

For further details on this case study, contact Bioscience, Inc., 1550 Valley Center Parkway, Suite 140, Bethlehem, PA 18017, phone 800-627-3069, fax 610-691-2170, e-mail [bioscience@bioscienceinc.com](mailto:bioscience@bioscienceinc.com), or on the Web at [www.bioscienceinc.com](http://www.bioscienceinc.com).

### About the Authors

Bioscience, Inc. Biotreatment Division, founded in 1984, specializes in identifying and developing specialized, naturally-occurring microbial strains for enhancing biological waste treatment operations from household septic tanks and fast-food grease traps to major industrial waste water treatment operations. With over 40 different products in dry and liquid form, Bioscience, Inc. has successfully attacked problems in agriculture/aquaculture, bioremediation of soils, wastewater treatment, waste transport and relative fields using a biotechnical approach while saving users money.

Bioscience's Analytical Division develops and manufactures wastewater monitoring instruments and test kits. Current research involves combining specialized on-line monitor instruments with bioaugmentation for improved and more consistent year round wastewater processing, with a special focus on more consistent ammonia removal (nitrification) even during cold weather.