

Sludge Pre-treatment for Municipal and Industrial Wastewater Treatment Plants

- *Increase digester capacity*
- *Reduce residuals for disposal*
- *Increase biogas production*
- *Reduce odour*



MicroSludge® is a powerful, robust, and compact system that liquefies waste activated sludge (WAS), boosting the ability of anaerobic digesters to convert WAS to biogas, and reducing the volume of sludge for disposal.

CUSTOMER BENEFITS

- Increases capacity of anaerobic digesters
- Reduces quantity of sludge for disposal
- Increases methane gas production
- Reduces odour of sludge residuals
- Reduces greenhouse gas emissions
- Provides on-going operating savings
- Provides a fast payback

✦ Benefits

FASTER ANAEROBIC DIGESTION

Tests show that MicroSludge can reduce the time for anaerobic digestion by 50% or more. This allows wastewater treatment plants to avoid large capital expenditures to build more digesters to accommodate population growth or to meet environmental standards.

REDUCED RESIDUALS FOR DISPOSAL

Commercial scale trials have conclusively demonstrated that MicroSludge achieves extraordinary levels of WAS solubilization. At the Joint Water Pollution Control Plant (JWPCP) in Los Angeles County, North America's third largest wastewater treatment plant (WWTP), MicroSludge processing of WAS radically changed the distribution of volatile solids from the solid phase to the liquid phase by up to 100 times. This is unmatched by any other technology.

WAS, after being solubilized by MicroSludge, degrades quickly and easily in anaerobic digesters, increasing volatile solids reduction (VSR) of WAS. This reduces the amount of sludge requiring disposal, providing considerable savings for sludge dewatering, handling, and transportation.

INCREASED METHANE

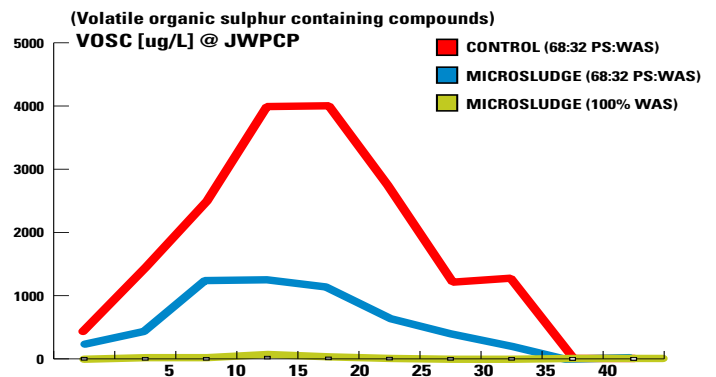
MicroSludge enables anaerobic digesters to produce considerably more biogas with higher methane content from WAS, to produce electricity and heat. By generating and utilizing methane on site, wastewater treatment plants can extract the maximum energy and economic value from sludge with minimum environmental impact.

REDUCED DIGESTER FOAMING

MicroSludge destroys filamentous microbes that can cause foaming. This reduction in foaming enables wastewater facilities to process a higher proportion of WAS to primary sludge in their digesters, and even to operate WAS-only digesters.

REDUCED ODOUR OF SLUDGE

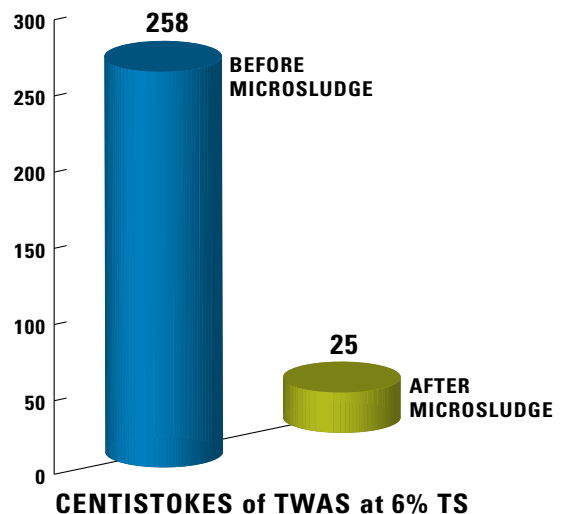
Odour of sludge residuals is the greatest single source of complaints by the general public concerning wastewater treatment plants. An independent industry study by the Water Environment Research Foundation (WERF), found that MicroSludge reduced the odour of co-digested sludge at the JWPCP by more than 50%, and of the WAS only residual sludge by 99.8%. No other pre-treatment technology or chemicals tested by WERF caused a similar decrease in odour.



INCREASED DIGESTER CAPACITY

MicroSludge can reduce the viscosity of thickened waste activated sludge (TWAS) by up to 90%. This allows easier pumped and digester mixing. Most importantly, viscosity reduction enables digesters to be fed thicker sludge, increasing digester capacity and saving capital costs of building more digesters.

Viscosity Reduction



Benefits

NO ADVERSE IMPACTS

At the three treatment plants where it has been used at commercial scale, MicroSludge has caused no adverse downstream effects. The quality of the dewatering liquid, as measured by the concentrations of nitrogen, phosphorus, metals, and biological oxygen demand (BOD), is not significantly affected by the upstream processing of WAS by MicroSludge. Additionally, MicroSludge does not negatively effect the ability to dewater digested sludge residuals.

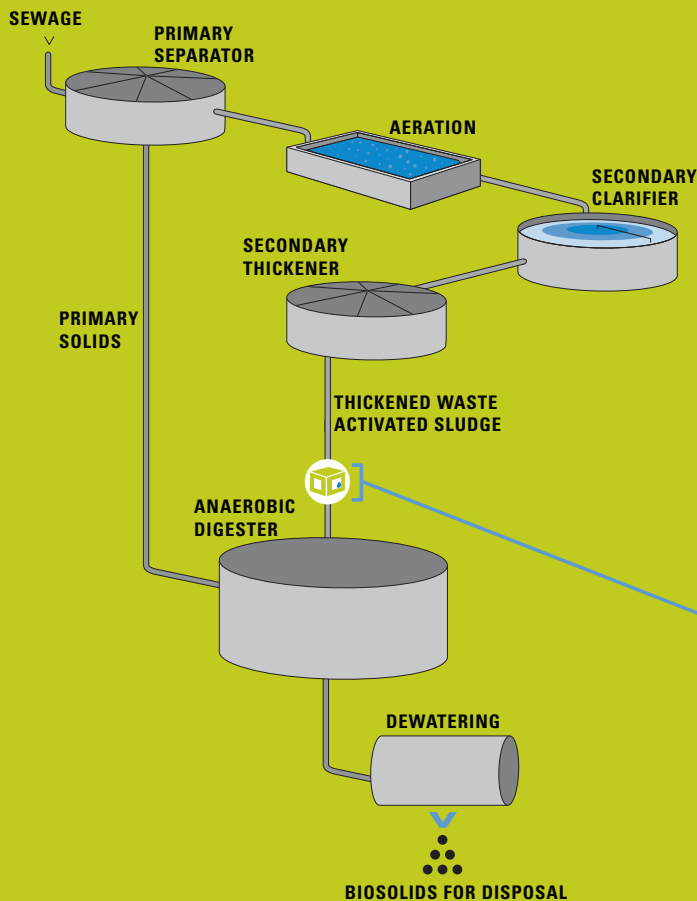
REDUCED GREENHOUSE GAS EMISSIONS

By decreasing the quantity of sludge for disposal, MicroSludge decreases fugitive greenhouse gas emissions from land application, landfills, or incineration.

BELT FILTER PRESS RETURN STREAM (Full Scale Results)

Parameter	Digester without MicroSludge [mg/L]	Digester with MicroSludge [mg/L]
Fixed Solids	4,180	5,820
Volatile Solids	2,830	2,500
Total Solids	7,010	8,320
BOD	390	385
TKN	477	480
NH ₃ -N	475	472
T. Phosphorus	10.6	9.60

Where MicroSludge Fits

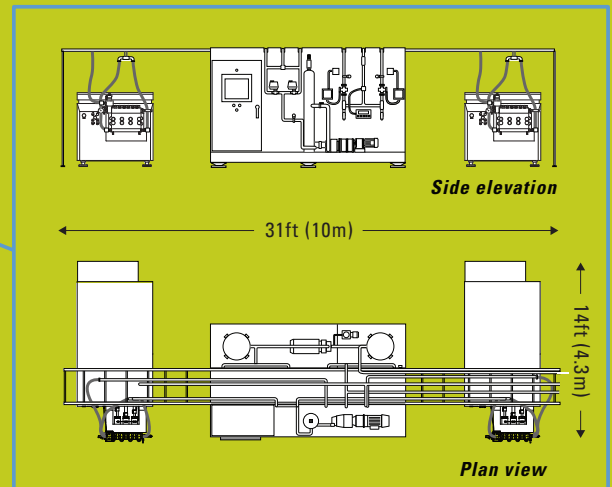


A SIMPLE RETROFIT

MicroSludge is an easy add-on at most wastewater treatment plants to pre-treat WAS prior to anaerobic digestion. A MicroSludge system can be delivered in five months, and be up and running in weeks, with minimal disruption to plant operations.

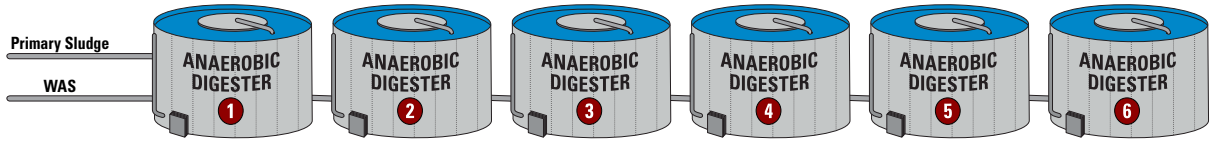
The small MicroSludge icon in the illustration on the left indicates the size of a system in relation to an anaerobic digester. The footprint of a MicroSludge System 25 is shown below.

MICROSLUDGE

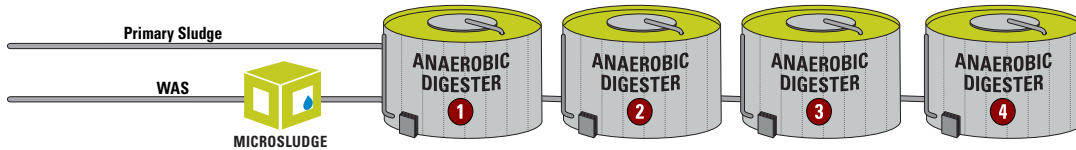


Example of digester volume reduction with MicroSludge

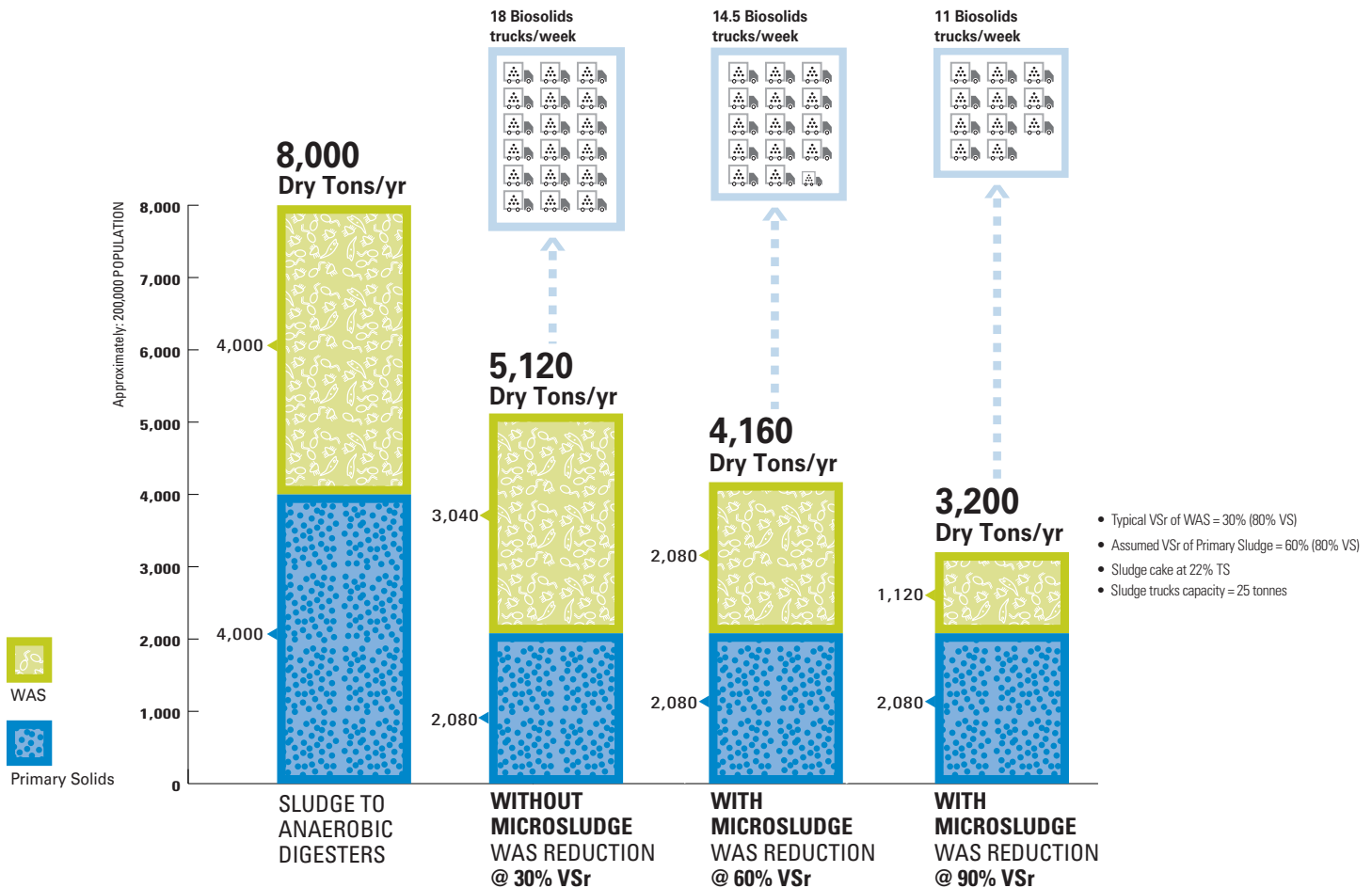
Without MicroSludge



MicroSludge



Example of sludge reductions with MicroSludge



BENEFITS AT A TYPICAL WWTP

The example above illustrates the range of digester performance improvements possible for a typical WWTP in North America serving about 200,000 people. Even a moderate 30% increase in VSr of WAS can provide a plant with considerable savings in sludge disposal costs.

The increase of sludge reduction and biogas production enabled by MicroSludge will vary from plant to plant. The benefits depend on the biodegradable fraction of volatile solids in WAS, the efficiency of digester operations, and a number of other factors.

⌘ Commercially Tested and Independently Assessed



The MicroSludge Central Processing Skid

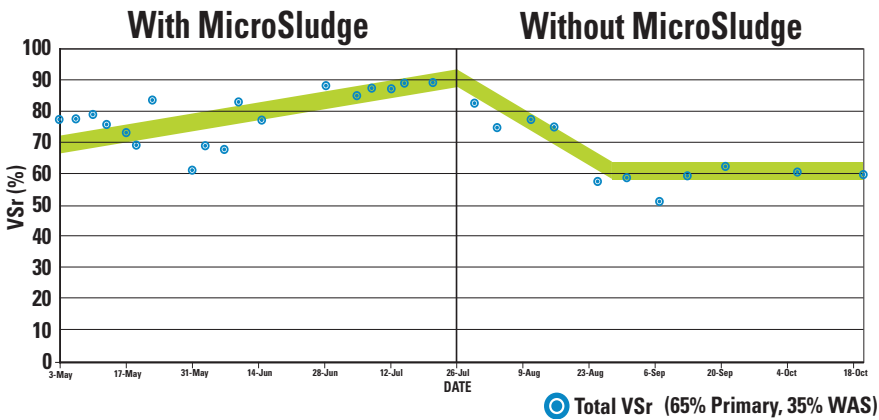


Two Cell Disrupter units

CH2MHILL REPORT

CH2M HILL, one of North America's largest wastewater treatment engineering firms, conducted an independent assessment of full scale testing of MicroSludge at a

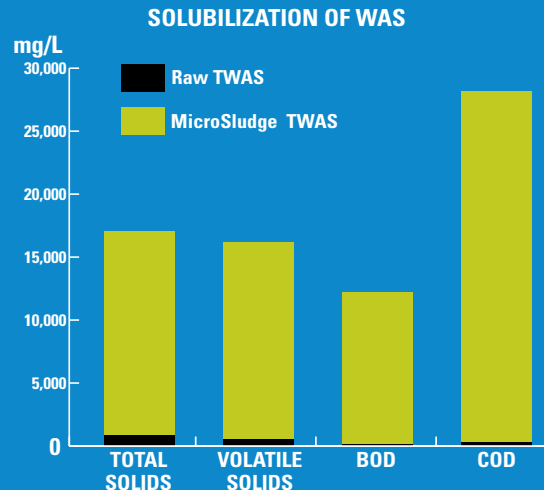
Canadian WWTP serving 70,000 people. Their report concluded that:



- MicroSludge increases the extent that WAS is degraded in anaerobic digesters to up to 90% VSr compared to 30% VSr without MicroSludge.
- MicroSludge increases the rate that WAS is degraded in digesters, thereby increasing digester capacity at WWTPs.
- MicroSludge does not alter the performance of downstream dewatering or other WWTP operations.

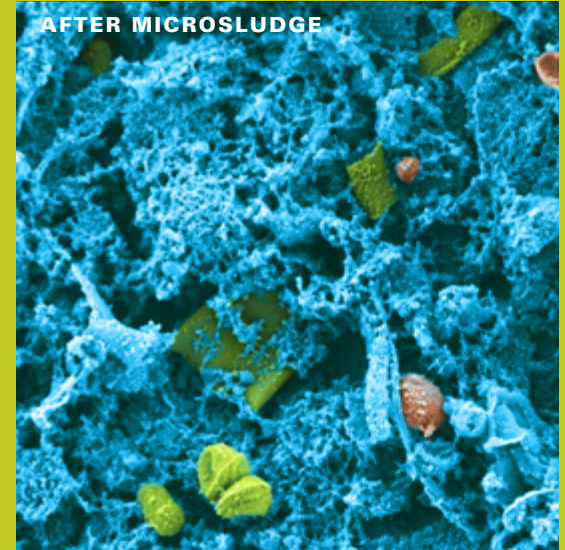
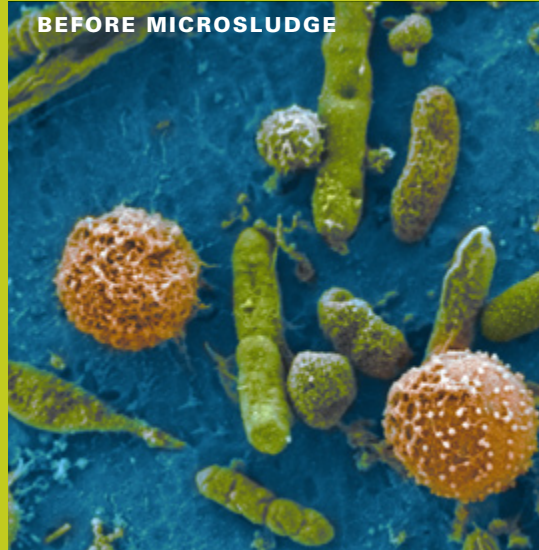
MICROSLUDGE INCREASES SOLUBILIZATION

MicroSludge liquefies WAS to radically change the distribution of Total Solids (TS), Volatile Solids (VS), Biological Oxygen Demand (BOD), and Chemical Oxygen Demand (COD) from the solid phase to the liquid phase. The figure on the right illustrates the effect of MicroSludge on the soluble concentrations of TS, VS, BOD, and COD (mg/L) in WAS at the JWPCP.

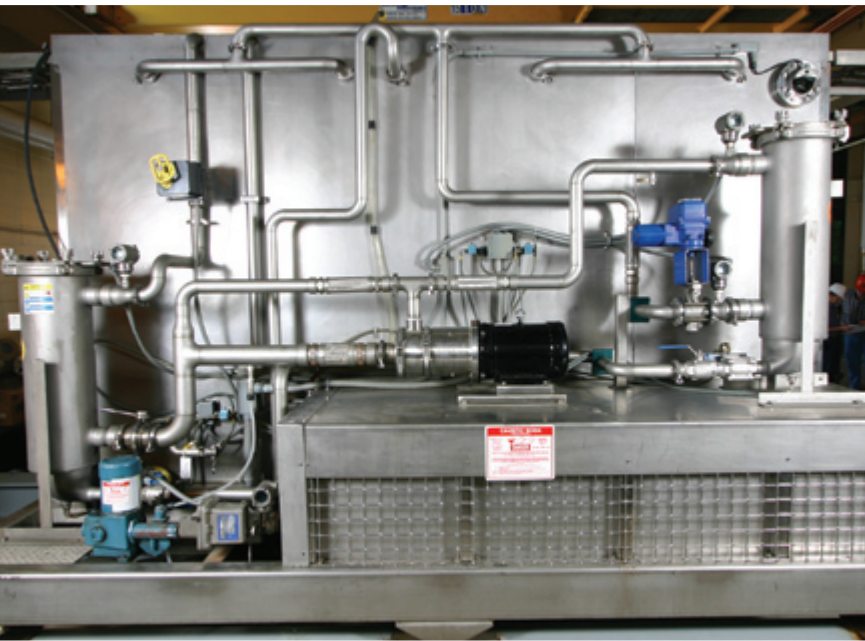


⌘ How MicroSludge Works

Waste activated sludge (WAS) is a slurry of microbes that is generated as a by-product of secondary treatment at wastewater treatment plants. These microbes have extremely resilient cell membranes which limit the extent and rate that they are degraded in anaerobic digesters. The Water Environment Federation Manual of Practice states that typically only 30% of WAS volatile solids are destroyed, leaving the remainder to be dewatered and disposed of at significant expense. MicroSludge works by destroying the microbial cell membranes, enabling anaerobic digesters to achieve roughly double the volatile solids reduction of WAS to 60% or more in a shorter period of time.



The image on the left shows intact bacterial WAS microbes magnified 20,000 times. The image on the right shows WAS microbes following MicroSludge. The cell membranes have been destroyed and the liquid cellular contents have been released for easier digestion. No other technology is able to achieve this extent of cell lysis.



Left: The back of the MicroSludge Central Processing Skid showing filters and high-shear mixer.
Right: The advanced touch-screen controls of the MicroSludge System.

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