

# Sludge Reduction System



## It's a Fact: Sludge Processing and Disposal Costs Continue to Rise!

Sludge disposal regulations are becoming increasingly difficult to meet. Regulatory agencies continue to close or limit landfill and other disposal sites, while processing costs continue to increase. Dewatering, digestion, equipment maintenance and locating suitable disposal sites can challenge even the most sophisticated treatment plant operator.

### Solubilization is the Key to Sludge Reduction

From a biochemical standpoint, particulate and colloidal organic waste are much more difficult to degrade than simple soluble material. It is the particulate and colloidal material rather than the soluble that causes excess sludge production. The soluble substrate is removed by bacterial action, while colloidal and particulate material cannot be consumed by bacteria. Bacteria have a semipermeable cell wall that allows only small soluble organic material to pass through effectively removing colloids and particulates as a food source. Most of the material that passes through the cell wall is converted into carbon dioxide and water which reduces the amount of excess sludge produced. The higher the fraction of soluble material in the waste stream the lower the amount of excess sludge produced.



The key is solubilization. Solubilization is the conversion of colloidal and particulate organic material into low molecular weight soluble compounds that can pass through the bacterial cell wall, be used as food and be converted, in part, into carbon dioxide and water. It is well documented in the scientific literature that if you enhance the rate at which colloidal and particulate substrate is solubilized, your sludge production will decrease.

LLMO Sludge Reduction System	
<b>LLMO S-1</b>	Liquid suspension of heterotrophic bacteria. Designed for broad spectrum degradation of municipal and industrial wastes. Used with LLMO Activator in Delivery System.
<b>LLMO Activator</b>	Liquid suspension of nutrients and bacteria. Designed to promote optimum growth and activity of GES bacteria. Used with LLMO S-1 for sludge reduction.
<b>GelPac S</b>	Bacteria and nutrient laden gel. Same bacteria species as LLMO S-1 and Activator. Used in conjunction with Delivery System for sludge reduction.
<b>Delivery System</b>	Automated, convenient, cost effective system for on-site activation of LLMO and GelPac bacteria. Patented system which provides best results at minimum cost.

In wastewater treatment, solubilization is caused by extracellular enzymes produced by bacteria that hydrolyze colloidal and particulate materials. Many bacterial species produce extracellular enzymes, but these enzymes are not produced all of the time. Extracellular enzymes are generally produced only under starvation conditions. As long as soluble food is present and the bacteria are growing and reproducing, they do not produce extracellular enzymes in appreciable quantities.

### The GES Sludge Reduction System

The GES Sludge Reduction System is a patented process for forcing bacteria to produce increased amounts of extracellular enzymes. The process starves the LLMO or GelPac bacteria in an aerobic, nutrient deficient environment prior to their addition to the WWTP. The bacteria in GES products for sludge reduction have been selected for their ability to produce large amounts of various extracellular enzymes needed

because of the chemical complexity of wastewater.

The sludge reduction system consists of several components. LLMO S-1 bacteria are specially selected for their ability to produce extracellular enzymes. LLMO Activator provides optimum nutrients for bacterial growth and subsequent bacterial starvation and extracellular enzyme production. GelPac S combines the functions of both LLMO S-1 and Activator in a slow release gel. Automatic Bacterial Injection (ABI) Delivery Systems automate the addition of LLMO and GelPac products and provide the environment required to maximize extracellular enzyme production. The combination of bacteria, nutrients and Delivery System provides a state of the art method to reduce excess sludge.

## Typical Applications

The GES Sludge Reduction System is effective in both municipal and industrial treatment systems. Activated sludge, trickling filter, other fixed media processes and lagoon systems are all potential applications. Treatment plants with high sludge processing and disposal costs will see a reduction in Waste Activated Sludge production of up to 40 percent. Lagoon systems with large amounts of accumulated sludge typically experience a 40 to 60 percent reduction in accumulated sludge, significantly extending the operational life of the system. The GES Sludge Reduction System has been used in plants with flows ranging from 20 thousand to 200 million gallons per day. If you wish to reduce sludge processing bottlenecks, improve overall treatment, and save money on sludge dewatering and disposal, request a sludge reduction proposal for your facility today!

- **Reduce Waste Activated Sludge 20 to 40 Percent**
- **Reduce Accumulated Sludge 60 Percent and Extend Lagoon Life**
- **Meet Effluent Solids Permit**