

The General Environmental Science Corp.

# Efficiency Enhancement System



**It's a Fact: LLMO E1 "The Original LLMO", Has Been Used to Improve BOD Removal for Over 25 Years**

LLMO E1, the original GES product, was developed in 1973. The LLMO E1 System has been applied successfully in thousands of wastewater treatment applications during the past 3 decades. No other product has proven as effective in speeding the establishment of a diverse biomass capable of handling both municipal and industrial wastewater. The LLMO E1 System has been successful in applications ranging from the start-up of small package treatment systems to assisting systems as large as 60 mgd recover from toxic shocks.



The key to the GES Efficiency Enhancement System is the synergism of the eight bacterial strains contained in E1. The bacteria in LLMO have been selected to work together in degrading a wide variety of organic compounds. While any one bacterium may be able to degrade a particular organic compound it may not be able to further process the by-products. The bacteria in LLMO E1 were selected so that any by-products from one bacterium's metabolic process will be considered a food source by one or more of the other bacteria in the product.

The bacteria in LLMO E1 grow at a very rapid rate compared to the bacteria normally found in a treatment plant. This makes them particularly effective at speeding restart after plant upsets and initial starts of new systems.

## The GES Efficiency Enhancement System

The GES Efficiency Enhancement System is a patented process for introducing large numbers of a variety of bacterial species to the treatment plant on a continuous basis. The system has three components as shown in the table below. The Delivery System is a continuous flow on-site bioreactor which produces a stream of active, concentrated bacteria. The Delivery System uses tap water as the flow through water source. LLMO E1 and Activator are added to the Delivery system. The Activator provides the ideal nutrient environment for bacterial growth. With a twenty-four hour hydraulic residence time, proper nutrients, selected bacteria, and proper aeration and temperature control, the Delivery System is a simple to operate yet extremely effective on-site breeder of bacteria.

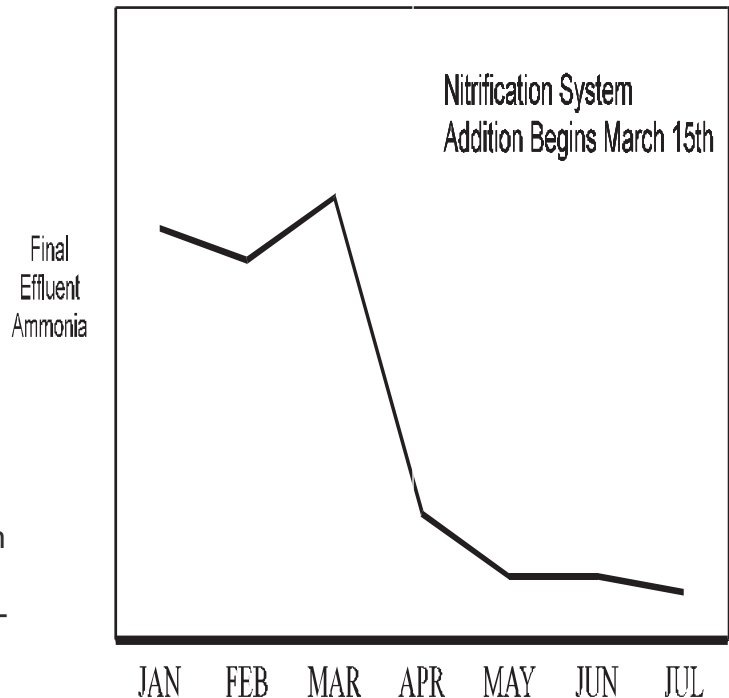
Component	Description
LLMO	Liquid suspension of multi-strain bacteria for degrading a wide variety of compounds. Added into Delivery System.
LLMO Activator	Liquid nutrient solution formulated for rapid growth of LLMO bacteria. Added directly to Delivery System.
Delivery System	Aerated reactor for on-site growth of LLMO bacteria. Uses tap water, LLMO, and LLMO Activator.

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## Typical Applications

Any waste water treatment system with a mandated ammonia permit can benefit from the GES Nitrification System. The Nitrification System is designed to function in many different types of biological treatment facilities, including activated sludge, trickling filters and aerated lagoons. All aerobic biological treatment systems can benefit from the GES Nitrification System. Typical applications include the removal of additional ammonia at facilities that are unable to meet permit, rapid re-start of nitrification at facilities that have experienced a toxic shock and additional ammonia removal at facilities that need to meet a seasonal permit requirement.

In facilities where ammonia removal is difficult the large numbers of nitrifying bacteria produced by the GES Nitrification System will provide the required to meet permit compliance. Usually within a few weeks of initiation of the system. Typical results of the GES Nitrification System are shown in the attached graph.



- **Remove an Additional 2 to 10 ppm of Ammonia and Meet Permit**
  - **Speed Recovery from Periodic Industrial Toxic Shock**
- **Rapidly increase Ammonia Removal to Meet Seasonal Permit Changes**