

Nitrification System



Strict Nitrification Regulations Are Here - And Tougher Ones Are Coming!

Ammonia removal requirements are becoming increasingly difficult to meet. Regulatory agencies are imposing ammonia limitations on smaller and smaller facilities, and lowering allowable effluent ammonia concentrations in existing plants. And as flow increases at a given facility, it becomes more difficult to sustain nitrification (aerobic ammonia removal) at adequate levels.

Nitrification Biochemistry Makes the Job Tough

From a biochemical standpoint, the nitrification process has major limitations. For example, there are only two species of nitrifying bacteria. The first, *Nitrosomonas*, converts ammonia to nitrite. The second, *Nitrobacter*, converts nitrite to nitrate. Any shock to the treatment system - chemical, hydraulic, pH, or temperature - which upsets either *Nitrosomonas* or *Nitrobacter* will upset the nitrification process. The removal of organic carbon (carbonaceous BOD) is quite different in this respect. Here, there are hundreds of bacterial types present in the biological sludge to do the job. The diversity of bacteria that remove BOD makes carbonaceous removal more resistant to upset. But with only two bacterial species, nitrification is subject to shock, which makes controlling the process more challenging.



Nitrifying bacteria have a relatively slow growth rate. As a result, it is difficult to establish a healthy nitrifier population. Most plant operators feel that 30 to 60 days of reduced wasting, higher sludge age, and increased aeration are required to move into nitrification.

Another factor is that nitrifying bacteria require a low soluble BOD environment to grow. The natural habitat of nitrifying bacteria is the aerobic zone of soil. Nitrifying bacteria will not grow in an environment rich with BOD, such as human waste. While many thousands of bacterial types will thrive in typical raw sewage, nitrifiers will not. Since nitrifiers do not grow in raw sewage, plant influent does not contain sufficient nitrifiers to start nitrification rapidly, or to re-establish nitrification rapidly after an upset.

- Improve Nitrification And Meet Permit
- Rapid Nitrification Start Up • Rapid Recovery from Toxic Shock

The GES Solutions:

Patented GES technology provides massive numbers of highly active nitrifying bacteria for your facility at a minimum cost. With the GES approach, you dose your plant with more nitrifiers in one day than you would normally find in your raw influent in an entire month. This means that borderline systems attain comfortable compliance, that onset of nitrification due to seasonal permits will take days rather than weeks, and that you will rapidly recover from chemical, hydraulic, or other shocks. GES even offers you a choice of systems:

The Continuous Feed Nitrification System: Our most powerful system, for plants with more severe nitrification problems.

The Emergency Restart System: For plants with an occasional need to rapidly restart nitrification after an upset.

(See reverse side for schematics and descriptions of each system)

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**