Commercial Fish Operations

The application rate for ESpt® is determined by the nutrient load of the water. Intensive fish culturing and densely populated fish ponds will have higher levels of organic waste than a backyard pond with few fish, high oxygen levels, good circulation, etc. The fish farm condition will be vastly different from any other water source due to the number of variables related to the commercial fish operation.

It is important to realize that changing conditions such as fish growth and subsequent increase in feed level will increase the levels of organic waste in the system. An increase in the dosage rates of ESpt® will be required to degrade these higher levels of waste matter at the same rate at which the previous levels had been degraded. When you notice that the maintenance rate is not keeping up with the organic wastes (odors, changes in water clarity, algae growth, etc.) increase the maintenance rate to weekly and the dosage rate in 20% increments until you have again obtained control of the pond. ESpt® should not be used when fish are being treated with medication.

The living microorganisms in ESpt®, like treating any complex system, require your monitoring and adjustments to guarantee a successful program of organic control and tap water quality.

Eco*Solutions*, LLC
PO Box 2049
Council Bluffs, IA 51502
Phone: (402) 657-4540
Fax: (712) 545-3029

Commonly Asked Questions

What causes algae blooms and how does ESpt® help?

Algae are mainly caused by excess nutrients in the water. Most ponds and lakes become overloaded with nutrients, nitrogen, phosphorus and organic carbon. These excess nutrients overcome the pond's ability to naturally clean itself up. This upset of nature's balance creates an environment for poor water quality and clarity. ESpt®'s microorganisms use nutrients in their cell mass and breakdown organic substances and greatly improve water quality and reduce bottom solids.

How does ESpt® deal with Nitrogen?

In the water, nitrogen is found in several forms; ammonia, nitrites, and nitrates. Through a process known as nitrification and denitrification, the ESpt® formula breaks complex forms of nitrogen down into molecular nitrogen, a gaseous form. This nitrogen will be degassed through the water, escaping to the surface and leaving the aquatic environment.

Are there ponds or lakes where the product should not be used?

Any pond or lake which loses 45% or more of its liquid volume in any given day should not be considered for ESpt® because of the high turnover rate.

Is ESpt® bacteria safe to use?

ESpt®'s bacteria/enzyme strains are indigenous, non-pathogenic, naturally occurring bacteria. They are completely safe and FDA GRAS listed as safe for humans, animals and plant life.

What can you expect after application?

In 2 to 4 days there will be a reduction in nitrogen and phosphorus levels.

In 3 to 4 days there will be a reduction in odors.

EcoSolutions, LLC
Solutions for a Cleaner Environment

ESpt®

Restoring

Natural

Balance to

Lakes & Ponds

"Solutions **for a cleaner environment"**

ESpt® is designed to improve water clarity and quality in commercial aquaculture, aquariums, decorative fountains and pond situations, at less than a fraction of a penny per gallon of water treated.

Proven effective in both salt and fresh water, ESpt® accelerates organic waste degradation under both aerobic and anaerobic conditions. The result: a conditioned marine environment close to nature's own, complete with reduced ammonia, hydrogen sulfide, and other contaminates that are harmful to your ecosystem. Effectively digesting and degrading heavy concentrations of organic mass within an aquatic system, ESpt® ensures a healthy environment for fish, shrimp and prawn stock, eliminating odors and reducing ammonia while increasing the harvest size, weight and survivability of the stock.

ESpt®

Eliminates odors by breaking down organic bottom solids where gas is created and released. Specialized bacteria and enzymes also break down ammonia before it causes a problem.

Is safe for Irrigation Ponds - ESpt® will not damage grass like algaecides. Your grass actually benefits from the bacteria applied during watering.

Reduces Bottom Solids. ESpt® bacteria and enzymes accelerate the degradation of the dead organic matter.

Improves water clarity and quality by digesting suspended organics in the water column and degrading ammonia, hydrogen sulfide, and other contaminates that are harmful to your ecosystem.

Eliminates Pond Scum by digesting the primary food source (nitrogen and phosphorus), making it unavailable for aquatic weeds.

Stops aeration equipment fouling due to organic build up.

Does not require permits or licenses because ESpt® is not an algaecide. The bacteria only attack dead organic matter. Therefore, it does not fall under FIFRA review and does not require a permit license to apply.

Costs less than a fraction of a penny per gallon of water treated.

Ammonia Reduction Through Bioaugmentation

Wastewater treatment is one of the earliest large-scale applications of biotechnology. It differs from other industrial microbiological processes in that there is little or no control over the raw material and only moderate control over the operating conditions, yet the process is expected to produce a uniform finished product. The goals of the process normally include the removal of organic pollutants and nutrients (i.e. nitrogen) before discharge.

Removal of "nitrogenous compounds is critical" as excessive amounts of ammonia and nitrite/nitrate levels are detrimental to water quality. Ammonia exerts an oxygen demand in aquatic environments; 4.7 grams of oxygen are required to oxidize one gram of ammonia. Nitrite is toxic to marine life and can induce methemoglobinemia (a reduction in the oxygen-carrying capacity of the blood) in humans. These factors call for effective removal of nitrogen from the wastewater before it is discharged to natural water systems.

The conventional method of removing nitrogen from wastewater starts with oxidation of ammonia to nitrite/nitrate (nitrification) and ends with reduction of nitrite and nitrate to nitrogen gas (denitrification).

This conventional approach to ammonia removal only converts one form of nitrogen (ammonia) to another (nitrite or nitrate).

Nitrogen exists in wastewater in four different forms:

- Organic nitrogen (amino acids, proteins, purines, pyrimidines, and nucleic acids);
- Ammonia nitrogen (NH3-N);
- Nitrite nitrogen (NO2-N); and
- Nitrate nitrogen (NO3-N)

In an untreated wastewater sample, the major fraction is usually ammonia nitrogen and the organic nitrogen. These are oxidized to nitrite and then to nitrate in the environment.

The conventional biological nitrification, a two-step process, begins with ammonia being converted to nitrite by Nitrosomonas bacteria, followed by nitrite being oxidized to nitrate by Nitrobacter bacteria. These bacterial species are typical examples for the nitrification process. They are autotrophic in nature and use carbon dioxide as their cell carbon source.

Because of the sensitivity of the process, relying on the ammonia nitrification step to convert ammonia to nitrate using the autotrophic bacteria has some problems.

The process requires long mean cell retention time (MCRT) of up to a few days and hence, huge storage requirements. The bacteria are very sensitive to cold temperatures as well as the presence of toxic chemicals in the system. The rate of nitrification slows down significantly during colder weather. Temperatures below 50º F [10ºC] can stop growth with 86º F [30ºC] being the optimum.

United-Tech, Inc.'s specially selected microorganisms consume a wide range of organic substances effectively. This results in an increased carbon uptake and consequently, an increased nutrient uptake, so their ammonia uptake as a nitrogen source (nutrient for growth) is higher than that for the naturally occurring microbial population in the waste water treatment system. They are capable of utilizing nitrite and nitrate for respiration (denitrification) as well as for growth as nitrogen sources.

The bacteria used in the United-Tech, Inc. products are heterotrophic and utilize organic carbon as their source for food and energy. First, the organic matter is oxidized by bacterial cells to obtain energy. Simultaneously, organic carbon is assimilated into the new cells using the energy produced with ammonia as a preferred nitrogen source.

Organic matter +O2 + nutrients (nitrogen, phosphorous) = new cells.

During this process the overall nitrogen removal occurs through three separate mechanisms.

The specially selected United-Tech, Inc. microorganisms are very efficient organic degraders and also have a wider organic substrate range (including many toxic compounds). Consequently, their carbon uptake is much higher than what is normally encountered in a wastewater treatment system. With a higher carbon uptake the nutrient requirement is also increased. Since ammonia is available as a nitrogen source, the ammonia levels are reduced in the treatment water. Further, with increased carbon uptake the BOD - as well as the chemical oxygen demand (COD) - discharge levels drop below the normal values, resulting in an increased operational efficiency.

United-Tech, Inc.'s microorganisms are considered some of the most active denitrifiers present on earth. They will utilize nitrite/nitrate for respiration if the dissolved oxygen drops below the critical level. Even in a completely mixed stirred system, low dissolved oxygen concentrations can be commonly found. This denitrification allows for a complete oxidation of organic substrate to CO2, and water.

The third mechanism involves the use of nitrite and nitrate as nutrient sources by the United-Tech, Inc. bacteria during the assimilation process. Studies on these products have revealed that they are capable of utilizing nitrites as well as nitrate for growth purposes if ammonia is no longer available in the system.

Similar results have been seen in livestock operations, meat processing plants and in petroleum refinery applications. The specially selected strains of United-Tech, Inc.'s microorganisms are capable of efficient ammonia breakdown coupled with natural digestion of some toxic organic compounds, this provides industrial and municipal wastewater treatment plants a cost-effective solution to a common problem. Bioaugmentation with United-Tech, Inc. bacterial/enzyme formulas results in removal of nitrogen from the wastewater rather than a conversion of one form of nitrogen (e.g. ammonia) to another form (nitrite of nitrate). United-Tech products are safe to handle and non-pathogenic to humans.