



BIO PILOTE **For petroleum and oil**

DESCRIPTION

BIO PILOTE is a proprietary blend of bacterial cultures specifically designed to degrade the light-distilled oil fractions, as well the heavier fractions of hydrocarbons normally associated with #4, #5, #6 fuel oils, crude oil and coal tar. **BIO PILOTE** is able also to biodegrade aromatic hydrocarbons such as benzene, naphthalene, phenanthrene, anthracene, pyrene, etc. **BIO PILOTE** has been successfully used to rapidly degrade other compounds such as alcohols, ketones & phthalates.

BENEFITS OF BIO PILOTE

- It contains surfactants that solubilise hydrophobic compounds and thus render them bio-available for bacterial attack and degradation.
- Quickly decontaminates soil and groundwater containing hydrocarbons resulting from leaking underground storage tanks, transfer line leaks and spills.
- Eliminates or reduces further environmental damage through biodegradation of contaminant plume.
- Rapidly degrades all major organic components of #4, #5, #6 fuel oils, crude oil and coal tar.
- Remediates the site with minimal disruption.
- Provides ultimate remediation technology.
- Provides a natural and ecological sound approach to remediation.

APPLICATION

For soil decontamination (first week): Make a 1% solution of **BIO PILOTE** and vaporize this solution daily on contaminated soil. Apply this 1% twice a week starting from week 2 to 8. **BIO PILOTE** is inefficient in the presence of oxidants (chlorine) and disinfectant that inhibit the viability of the strains in **BIO PILOTE**.

For water decontamination (first week): Use a higher concentration in the first 2 weeks. The concentration is dependant upon the volume of water and the concentrations and types of wastes.



BIO PILOTE *Environment*

DESCRIPTION

BIO PILOTE is a mixture of microorganisms specially formulated to enhance the biodegradation of organic materials in water and waste-water. Due to the presence of millions of environmental bacteria per ml **BIO PILOTE**; it can reduce BOD (Biological Oxygen Demand) to low levels. **BIO PILOTE** is a mixture of *Bacillus* strains that secrete enzymes able to degrade and/or enhance the biodegradation of most organic materials including Polycyclic and Monocyclic Aromatic Hydrocarbons (PAH, MAH, etc.). These pollutants are biodegraded completely to generate CO₂ & H₂O.

BIO PILOTE works by « space competition » with other malodorous-generating microorganisms; thus, it prevents the growth of unwanted microorganisms such as algae, yeast, mold and strict anaerobic bacteria that cause malodors. **BIO PILOTE** reduces also the turbidity and the concentration of solids in suspension and makes the water clear. Therefore, **BIO PILOTE** helps to clarify water by biodegrading completely the organic materials in suspension and provides better environment by controlling the odor.

The strains in **BIO PILOTE** were selected for their ability to produce essential enzymes. Thus, it initiates the biodegradation of the majority of aquatic pollutants.

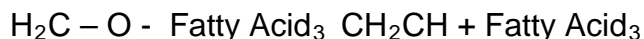
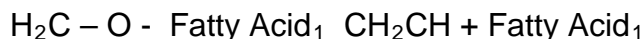
Use **BIO PILOTE** at a concentration of 0.5% to 5% maximum depending upon the turbidity of the medium and the amount of organic materials. **BIO PILOTE** is inefficient in the presence of oxydants (chlorine) and disinfectant that inhibit the viability of the strains in **BIO PILOTE**.



BIO PILOTE CHEMISTRY OF ACTION

Fats are esters of glycerol and fatty acids. Bacteria utilizes fats only after hydrolysis of the ester bond and extra cellular enzymes called lipases are responsible for the reaction. The end result is a formation of glycerol and free fatty acids as shown in Figure 1.

Figure 1



Glycerol

The fatty acids released by the action of lipases are further degraded by the bacteria by a process called Beta Oxidation in which two carbons of the fatty acid are split off at a time.

The fatty acid is first activated with coenzyme H₂ oxidation results in the release of acetyl Co A and the formation of a fatty acid shorter by two carbons. The process of Beta oxidation is then repeated and another acetyl Co A molecule is completely oxidized. The acetyl Co A formed is then oxidized to carbon dioxide and water by the way of the tricarboxylic acid cycle or converted to cell constituents via the glyoxylate pathway. The glycerol is easily metabolized to pyruvic acid and then to acetyl Co A.

The fats are completely degraded by the bacteria. They are not merely emulsified or solubilized and sent downstream to cause problems down line.

ENZYME ACTIVITY OF BIO PILOTE GREASE DIGESTANT

Case in solubilization units (CSU)

A bacterial culture with an activity of 1000 casein solubilization units per gram will solubilize nine (9) times its weight of casein in one hour at 40°C and pH 8.

BIO PILOTE Grease Digestant = 3000 CSU/Gram.

Fats and grease hydrolyzation Units (F-GHU)



There is no standard unit for Lipase activity except on olive oil. One part Lipase will hydrolyze 2.5 parts of olive oil. This is measured in our laboratory by measuring the degree of clearing of olive oil on the surface of an agar plate. One cm of clearing equals 1000 units.

BIO PILOTE Grease Digestant = 2500 Fat-Grease Hydrolyzing Units.

Starch Liquefying Units (SLU)

A bacterial culture with 1000 units per gram will reduce the viscosity of 300 times its weight in potato starch in ten (10) minutes and pH 6.7.

BIO CULTURE Grease Digestant = 450 SLU/Gram.

SAFETY OF BIO AUGMENTATION

Only Class 1 bacteria is defined by the American Type Culture collection are utilized in these products. Class 1 bacteria are by definition non-pathogenic and non-opportunistic pathogens. These organisms are safe and will not cause infectious or ill effects in humans, animals or plants. These microorganisms and the products have been approved by the Canadian Food Inspection Agency (CFIA). Every production batch is certified to be Salmonella-free.