



NONTOX™ General Description

PETROLEUM HYDROCARBON REMEDIATION/CLEANING

Is a biocatalytic system in a liquid concentrate form that stimulates and accelerates natural biological reactions.

When combined with fresh or salt water and oxygen, the product will cause crude oil, jet fuel, diesel oil and other organic substances to rapidly decompose, eventually biodegrading them to carbon dioxide and water as end products.

- It is non-toxic and safe to humans, animals, marine life and plant life. It is 100% biodegradable.
- Works in concert with indigenous bacteria. No cultured or foreign bacteria are introduced into the ecosystem.
- Is nonflammable. It will reduce fire hazards by increasing flash points and auto ignition threshold points in substances such as gasoline or fuel oil.
- Eliminates obnoxious odors associated with crude oil, petroleum derivatives and other organic molecules that are proceeding through the natural decomposing process.
- Is fully compatible with most types of application equipment now in use. The product may be easily applied by hand or power sprayers, helicopter, airplane or floating equipment. Its application requires no special safety equipment.



TARGETED HYDROCARBON CONTAMINANTS

In this case, the hydrocarbon compounds found in water, soil and air are the selected targets of NONTOX. This would include such petroleum derived products as crude oil, drilling mud's, creosote, kerosene, coal tars, gasoline, diesel, bunker fuels, lubricating and hydraulic fluids. Other contaminant groups would include aliphatic and aromatic hydrocarbons, poly nuclear aromatic hydrocarbons, chlorinated aliphatic compounds, chlorinated aromatic compounds and chlorinated and non-chlorinated phenols.

It has been shown that the product has unique features in odor elimination of such gases as hydrogen sulfide, ammonia, mercaptan and other noxious odors emanating from anaerobic decomposition. The odor degradation activity happens in a very short period and effectively eliminates volatilization of light chain organic molecules, such as the BTEX group of petrochemicals, into the atmosphere.

TREATMENT METHODOLOGY

The product is fully compatible with most types of application equipment now in use. NONTOX may be easily applied with hand or power sprayers, standard educator tubes, helicopters, airplane or floating equipment. No special nozzles or hoses are required.

Each treatment site may differ in its requirements and modality of treatment.

Factors that can influence the tactical use of NONTOX are:

- Redox Potential Temperature
- Availability of Nutrients and Concentration of Contaminants
- pH or Heavy Metals

Should these variables complicate the application and treatment procedures, the NONTOX works well with other commonly accepted treatment modalities such as venting, injection aeration, aeration lagoons and inoculants' for removal of heavy metals.



Water or Beach Spills

Reducing the danger of oil reaching beaches and shore structures is best achieved by spraying the oil slick perimeter with a diluted solution of 10 gallons of NONTOX mixed with 150 gallons of sea water or fresh water for each 40,000 square feet of surface area to be treated. If the slick has a heavy consistency, it is recommended that a 1:15 diluted NONTOX solution is applied over a three-day period, using one-third of the mixed solution each day. For best results, the product should be applied at a high pressure – generally above 500 psi.

TECHNICAL DATA

Bacterial Proliferation

The successful biodegradation of petroleum is dependent on two factors: 1) having the bio-organic catalyst reduce the petroleum to a form, which can be readily assimilated, by bacteria and 2) stimulating the proliferation of naturally occurring nonpathogenic heterotrophic bacteria. NONTOX to significantly increase beneficial bacterial activity in bay water by 12,857% and ocean water by 14,333%.

Accelerated Bioremediation

Independent laboratory studies from specialists in petroleum technology have quantified the ability of NONTOX to dramatically reduce petroleum contaminants. showing a 90% reduction in Jet-A, Diesel-2 and Heavy Duty Lube Oil within 96 hours. While treatment time required may vary dependent on conditions previously noted, the mode of action is the same. NONTOX is a unique biocatalytic system that accelerates natural biological reactions with hydrocarbon products in water.

METAL CONTAMINANT PRECIPITATION

Another benefit of NONTOX use is its ability to break the matrix that suspends metals.



FLAMMABILITY REDUCTION

Open cup flash points and auto ignition temperature tests quantify the ability of NONTOX to render petroleum products nonflammable and dramatically increase their auto ignition temperatures. NONTOX alters the molecular structure that dramatically reduces flammability and the elimination of volatile organic compounds (VOCs) and their odors. The importance of this feature cannot be overstated in terms of shipboard safety and survivability. In addition, the use of other ecologically incompatible materials, such as AFFF Foam, may be significantly reduced.

SAFETY PROFILE

Extensive independent laboratory testing utilizing accepted standards for dermal and ocular effects on animal and human subjects have been performed. Phytotoxicity, bacteria community and internal aquatic organism safety studies are well documented.

OTHER POSSIBLE APPLICATIONS

- Initial Actions for Fire Fighting, i.e. cover the fire hazard with a layer of AFFF and flash point reducing product.
- Fuel or Oil Tank Cleaning
- Engine / Generator Wipe down
- Galley Drain Line Unclogging
- CHT Tank Cleaning / Degreasing
- Flight Deck Cleaning (should be able to hose it over the side).
- Trough Cleaning



Ecological Restoration of Petroleum Hydrocarbon (TPH) Pollutants

Oil spills in a marine environment presents massive challenges to the entire ecological chain of life. The toxicity of petroleum hydrocarbons can wreck damage to marine life and significantly compromise the invisible microscopic living organisms that support the entire food chain.

The blockage with booms, and the absorption of the oil spill through a wide variety of equipment and systems, has evolved over the years with oil spill response services. What has remained the greatest challenge has been how to mitigate the resulting toxicity and vast contamination of seawater and shoreline habitats impacted by widely dispersed petroleum pollutants.

Scientific studies of previous oil spills, such as Exxon Valdez, have shown that the most effective approaches have been those that enhanced the natural microbiological ecologies that consume these pollutants. Unleashing nature's own mechanisms through supplemental nutrients, such as fertilizers and organic carbon sources, allow much higher populations of indigenous microbiology to work in digesting the pollutants, and reducing them into harmless bio-products.

Bacterial/enzymatic cultures exhibiting hydrocarbon preferences can be useful in depleted soils and some water bodies, but in oceans and seawater bodies there is abundance of complex and interconnected microbiological ecologies that overwhelm any additional seeding of bacterial/enzymatic cultures. In fact, they could be counterproductive in the ecology's own vitality being activated. However, nutrient, or metabolic stimulation, additives can be very useful in supportive in establishing an ecological restoration of these marine environments.

Over the past decade, extensive work has been underway in using innovative bio-catalytic compositions to enhance and accelerate the inherent biological processes that are essential in all waste pollution reduction. Rather than attempting to supplement the indigenous microbiological with cultured stains of foreign colonies of organisms, a new appreciation of releasing the natural biocatalysts' mechanisms within the existing microbiological ecology has been developed. Understanding Nature's own inherent dynamic mechanism for regeneration has illuminated the synergistic confluence of air and water.

The beauty of utilizing a bio-catalytic agent in triggering accelerated bioremediation of petroleum hydrocarbon (TPH) pollutants within the marine environment lies in unleashing the natural ecological processes that ultimately must be called upon to bring about the health and vitality of the ecosystem to support the viability of marine and shoreline species. Their stimulation of the proliferation of microbiological communities, and promotion of higher oxygen transfer and dissolved oxygen penetration, within the seawater and shoreline soils, supports the entire shellfish and fish mortality.



The most toxic and insidious of petroleum hydrocarbon pollutants (TPH) are the generally invisible and rapidly diffused light volatile components, as they are absorbed within the metabolisms of living species and either kill, or mutate, the populations at levels they are unable to tolerate. Oil spill capture approaches are unfortunately limited in their ability to stop these components from escaping into the environment. However, these pollutants have been shown to be particularly responsive to bio-catalytic reduction, with instantaneous effectiveness, and substantial bioremediation accomplished within hours.

Oil spills are very illustrative by their adhesion characteristic of coating surfaces and living creatures with a slick, oily, sheen that can form globs of tar-like clusters. The emulsification of these clusters into smaller sizes is the objective of the dispersants used in oil spills to minimize these elements, but they have the disadvantage of both diffusing the petroleum hydrocarbons over larger areas, plus they have their own biodegradation problems. Bio-catalytic reductions of the petroleum hydrocarbons will both initiate an acceleration of the bioremediation of the diffused dispersed oil spill components, as well as accelerate the bioremediation of the dispersants themselves.

In an oil spill incident, there is the challenge of reducing the immediate toxicity of the petroleum hydrocarbon pollutants, especially the light volatile components that travel quickly, poisoning the ecologies that are immersed within the water borne environment. There is also the simultaneous requirement to stimulate the indigenous microbiological systems that will need to be called upon to as rapidly as possible to consume these pollutants and render them harmless byproducts of their digestive work. Bio-catalytic reactions can offer an invaluable tool to supporting these ecological restoration aspects.

The extensive expanse of oil spills across vast stretches of open ocean and coastal waters requires approaches that are not limited to enclosed containment strategies, but allow broad and readily delivered coverage with high dilutions of bioremediation agents. Bio-catalytic solutions are by design highly water soluble and are able to be used effectively at extremely high dilution through any water spraying system. The safety and economy of using bio-catalytic compositions surpasses any alternative chemistry, or biological additive, in addressing the primary challenges and underlying ecological restoration mechanisms that are required in oil spills in a marine environment.

