

# **ACCEL™**

## *NUTRIENT ADDITIVE FOR TREATMENT OF PETROLEUM HYDROCARBON WASTES*

**ACCEL™** is a concentrated water soluble nutrient for microorganisms. It promotes the reproduction and growth of naturally occurring microorganisms in the soil which have adapted over time to feed on hydrocarbon pollutants. Use of **ACCEL™** accelerates the consumption of hydrocarbons naturally by serving as the energy source for this process. The resulting biodegradation is also a natural process that reduces the hydrocarbons to biomass and subsequently to carbon dioxide. When the hydrocarbon food supply is exhausted, the microorganism population diminishes back to normal levels.

Bioremediation is the most natural and cost effective technology in the environmental field. With **ACCEL™**, remediation can be accomplished quickly and easily, avoiding more costly options.

Application of **ACCEL™** is easy. The product is applied to the affected soils in-situ. It can be sprayed directly onto the affected area, or injected into the soil. Tilling is recommended for faster results. Soil conditions will determine the application concentrations.

Treatment with **ACCEL™** liquid nutrient is a quick, easy, and economical way to remediate petroleum hydrocarbon wastes.

### **About ACCEL™:**

*Promotes the growth and activity of microorganisms present in the soil.*

*Provides concentrated nutrition to microorganisms.*

*Non-toxic and non-hazardous.*

*Cost-effective way to remediate petroleum hydrocarbon wastes.*

*Environmentally safe, poses no health threat to humans or animals.*

*Easy to apply.*

## **ACCEL™ ....Nutrient additive for accelerated hydrocarbon degradation**

*"In March of 1989, the supertanker Exxon Valdez ran aground on Bligh Reef in Prince William Sound, Alaska, flooding one of the nation's most pristine and sensitive environments with approximately 11 million gallons of crude oil in about 5 hours. In the aftermath of the accident a massive cleanup was organized. Many conventional techniques were used in an effort to remove the oil from the contaminated shorelines and beaches. Methods like booms, skimming, spraying and actual scrubbing of the rocks were unable to clean up all of the oil in the soils."*

*"To enhance cleanup efforts the EPA suggested bioremediation be tried. On the basis of favorable results of field tests where remediation occurred two to four times faster than if unaided, a large scale application of nutrients began on August 1, 1989. Findings from follow up field and laboratory tests conducted then and now, indicate that using nutrients to enhance biodegradation is effective and environmentally safe."*

Bioremediation uses naturally occurring microorganisms, such as bacteria, fungi, or yeast to degrade harmful chemicals into less toxic or non-toxic compounds. Microorganisms, like all living organisms, require nutrients e.g., nitrogen, phosphorous, and trace metals. Microorganisms also break down a wide variety of organic compounds (hydrocarbons) found in nature and are considered nature's recyclers. Some species of soil bacteria process hydrocarbons as a food source converting the contaminant into carbon dioxide, water and fatty acids. Bioremediation recognizes these phenomena and builds upon them.

### **HYDROCARBON IMPACTS**

Oil contaminated soils and waters typically contain high concentrations of hydrocarbons. Hydrocarbons have detrimental effects on soil, water, and the surrounding environment. In plants and crops, high hydrocarbon concentrations cause reduced plant growth, yield and germination. Hydrocarbons, when released to surface soils, penetrate to varying

## ***ACCEL™***... Nutrient additive for accelerated hydrocarbon degradation

depths depending upon the soil type. Oil has an affinity for clay. As a result, oil does not penetrate deeply into clay soils. However, oil penetrates deeply into sandy soil. The parameter used to measure hydrocarbon contamination in both soil and water is Total Petroleum Hydrocarbons (TPH). Studies have shown that hydrocarbon loadings of > 1 percent TPH (10,000 ppm) have adverse impacts on plants, crops, and the environment. Regulatory authorities usually require that soils contain < 1 percent TPH.

### **BIOSTIMULATION**

A unique characteristic of bacteria is the fact that as certain microorganisms become exposed to hydrocarbon contaminants, they tend to develop an increased tolerance and ability to degrade those substances. New strains of bacteria naturally appear at hazardous waste sites and begin to degrade the wastes. The art of bioremediation consists of identifying and creating a favorable environment for the growth of the 5 to 10 percent of all microbes in-situ that perform the desired remediation function, thus accelerating the time frame in which these cleanup processes unfold. Since they are acclimatized to the environment, the naturally occurring microorganisms are most effective in the field of bioremediation. ***ACCEL™*** is a water soluble concentrated nutrient for the microorganisms.

***ACCEL™*** serves as the energy source for microorganisms, improving the organism's rate of reproduction and in turn, increasing the rate of decomposition of hydrocarbons into carbon dioxide. This product does not conflict with EPA policies or Toxic Substances Control Act (TSCA) regulations concerning the use of microorganisms for the purpose of bioremediation.

### **OPTIMIZING ENVIRONMENTAL CONDITIONS**

Bioremediation ultimately depends on the activities of the microorganisms. Microbial population size may be limited by the existing environmental conditions. By optimizing environmental factors such as; water content, temperature, pH, the presence of toxic materials such as metals and

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sodium, the type and amount of organic material present and the availability of nutrients such as nitrogen and phosphorous, regulatory compliance levels can be achieved in minimal amounts of time.

### **INCREASED NITROGEN UPTAKE**

**ACCEL™** supplies existing microorganisms with a highly concentrated source of nitrogen. Nitrogen is necessary for the synthesis of proteins and nucleic acids. Exhaustion of available nitrogen inhibits the growth rate of the microbial populations. **ACCEL™** offers optimum nitrogen efficiency. When applying **ACCEL™**, the microorganisms receive a sufficient supply of nitrogen, increasing the growth rate of the population and reducing the amount of time needed to break down petroleum hydrocarbons.

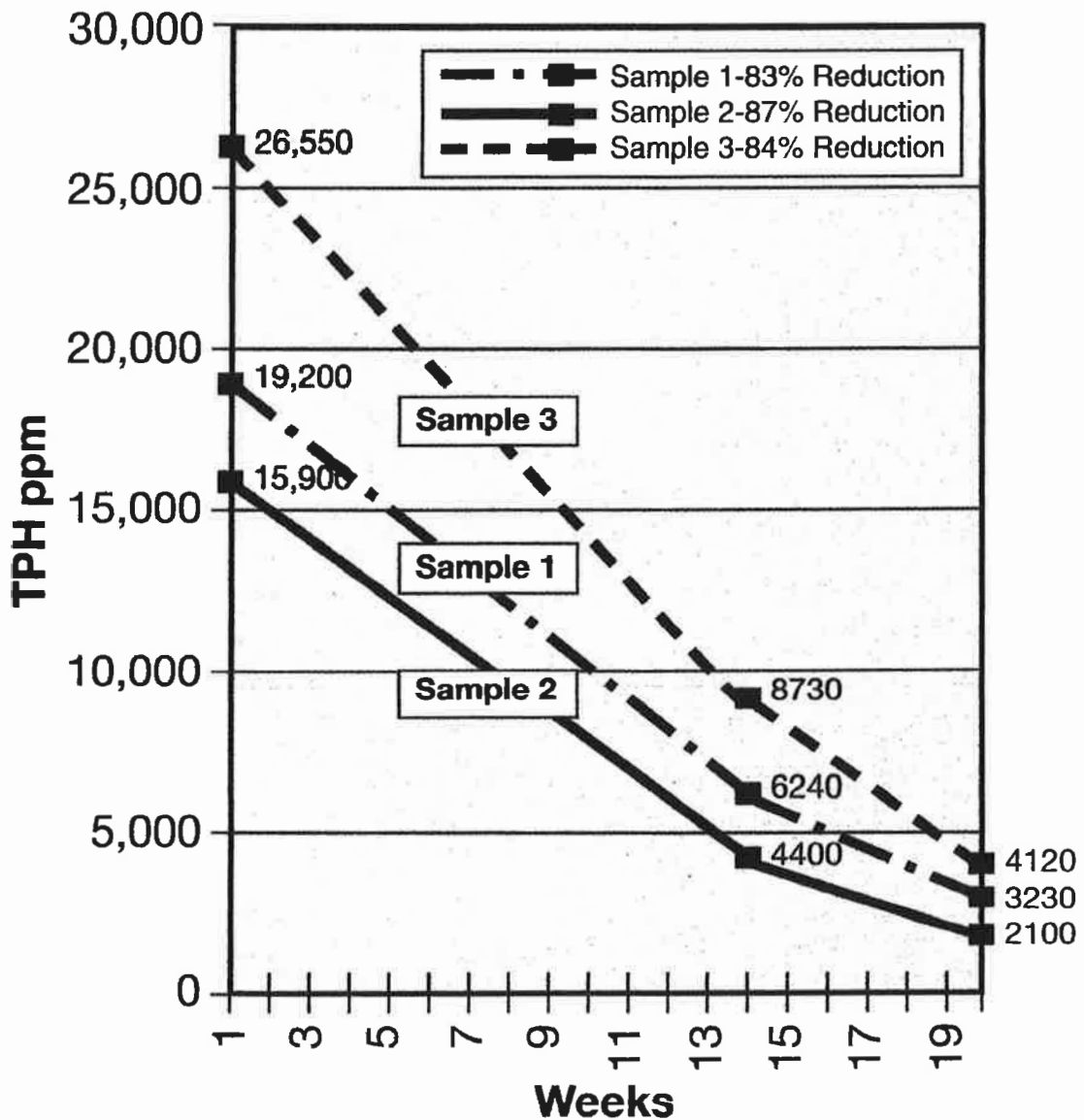
### **IN SITU TREATMENT**

**ACCEL™** is a cost-effective, in situ bioremediation product that can be surface applied or injected into the soil. In the case of surface remediation, necessary oxygen is available directly from the atmosphere, whereas in subsurface remediation, oxygen must be supplied by physically delivering water or air to the contaminated material. The top 6 to 18 inches of the contaminated soil is usually treated by tilling the soil to provide aeration, and adding water and nutrients to stimulate bacterial growth. Bioremediation has taken a prominent place among today's technologies used to clean up and protect the environment. **ACCEL™** is an easy-to-apply, nondisruptive, cost-effective, and efficient method of enhancing and accelerating bioremediation.

# HYDROCARBON STUDY

## TPH REDUCTION (HYDROCARBON REDUCTION) with *ACCEL*<sup>TM</sup>

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### **APPLICATION GUIDELINES**

#### **-SITE SPECIFIC-**

1. Sample soil to establish existing contaminant levels.
2. Remove excess free oil and treat sodium damaged soil before applying.
3. Apply **ACCEL™** solution into the soil.
4. Irrigate soil to optimize the bacterial process.
5. Note and adjust soil pH if necessary.
6. Till soil frequently for oxygenation.
7. Highly contaminated sites may require additional treatments.

*Petroleum hydrocarbons consist of hundreds of constituents.*

*High sodium chloride levels and standing oil are toxic to microbes.*

*Tilling aids penetration, spraying ensures surface coverage.*

*The remediation process requires:*

- *nutrients*
- *water*
- *oxygen*
- *sufficient temperature*
- *Proper pH*

Application rates may vary due to varying conditions. Depending upon the levels of TPH damage, the depth of contamination and soil type, a wide range of effective product usage rates can be applied. Consult your local **Environmental Recovery** Sales Representative for recommendations.

**Call (501) 827-9982 for assistance**