



BIOREMEDIATION

Bioremediation is the restoring of a surface or object to a condition which is not harmful to plant or animal life. There are four (4) subcategories of bioremediation.

BIODEGRADATION: The degrading or breaking up of a substance or compound with living organisms. Bacteria and fungi are nature's most common degraders.

BIORESTORATION: The restoring or bringing back to an original or near original state using living micro-organisms. Nature has a built-in check and balance system in everything it does. If there is too much or too little of something nature will use various life forms to try to re-establish a balance.

BIOSTIMULATION: The process of engineering or manipulating a site or surface to enhance the growth of existing or added micro-organisms to do a desired function. Nature, in a short time will populate an area with micro-organisms to start a natural remediation process. Stimulation is used to speed up the remediation process. **BIOSTIMULATION is the traditional approach. It is minimally effective because it relies on stimulating bacteria that "are already" in the soil.**

BIOAUGMENTATION: The adding of specific living forms to augment or help to reach the desired effect. Bioaugmentation is a recently perfected technology, surpassing all conventional methods. It uses large volumes of contaminant specific bacterial from outside the area to accomplish degradation.

BIOAUGMENTATION is much faster, more predictable, and more cost effective than biostimulation because contaminant specific bacteria are introduced in quantities which exceed the natural population levels of the resident bacteria. These microbes are placed where needed. Integrated products now exist which provide the microbes with all the nutrients necessary to assist the microbes to rapidly multiply and consume the hydrocarbon.

Local microbes if they exist "may" consume the hydrocarbon over a protracted period; petrophilic microbes "can only" and "will always" consume petroleum hydrocarbons.

The major benefit of bioremediation is *transformation and not transportation*. The cost of transformation is always lower and does not require specialized personnel or expensive equipment. Bioremediation is a new tool in dealing with hydrocarbon contaminants in this environmentally conscious world we live in.