



### ***NOVO Biological Treatment System***

NOVO's Biological Treatment System is comprised of NOVO Microbes and may require Bio-nutrients (Nitrogen, MAP) which are mixed into petroleum-hydrocarbon waste to reduce its concentration of petroleum hydrocarbon analytes.

#### ***Microbes Composition***

- NOVO microbes are classified as 'heterotrophic aerobes' containing a mixture of several strains of bacteria known to consume petroleum hydrocarbons
- Microbes contain genera of Pseudomonas, Sphingomonas, Brevibacterium, Arthrobacter, Nocardioideae, and Mycobacterium
- Microbes are supplied in 5-gallon pails (25-lbs) or a cultured liquid solution
- Microbes are cultured in a laboratory forming a concentrated liquid which is then saturated into wheat germ granules and packaged into 5-gallon buckets.

#### ***Mode of Action***

- Microbes are 'activated' on-site in water over a 1 to 3-day period or supplied in a liquid solution ready to use.
- Microbes are sprayed onto and then mechanically mixed into the waste.
- A dose of 1-3 gallons of liquid to 1 cubic yard of soil is recommended.
- Use of bacteria alone is recommended when Total TPH concentration in the waste is <20,000 mg/Kg
- Aggressive mixing is critical. In solid waste media such as sands and gravels, mixing using an excavator is adequate. If the solids media is silty or clayey mechanical mixing using a soil shredder or pugmill may be necessary
- Use of microbes alone generally reduces TPH concentrations by >80% over a 2–3-month period with aeration performed at least monthly
- Microbes create no toxic residuals and work on contact over short periods of time
- When Total TPH concentrations approach toxicity levels of 50,000 mg/Kg or higher; or in extreme environmental conditions Use of Chemionyx-103 and bio nutrient may be necessary to meet treatment targets

The system has been used with considerable success and is used regularly at the Greenleaf Environmental Mesa Disposal Facility located in Western Colorado and on pad remediation projects in the DJ, Piceance Basins in Colorado. The system has been used historically in Texas, North Dakota, Wyoming, California, and Alaska.