HYDRA

Bio Nutrient Booster

NPK + Micro + Macro Nutrients To Boost
Bio Stimulation Hydrocarbon Breakdown

Features & Advantages

- Multi-blend of NPK fertilisers, micro and macro nutrients to speed up bioremediation of hydrocarbons.
- Provides the necessary nutrients missing from contaminated soil for maximum, bio-remediation rates.
- Improves water retention and speeds up microbial remediation by 2 to 3 times.
- Studies have proven that macro and micro nutrients are essential to induce rapid bio stimulation.
- Use with **Hydra Bio HC Buster** its liquid blend completely biodegradable and homogeneous.
- Simply dilute with water for ease of application.
- Improves nutrient retention, especially in clay or sandy soils.
- Effective Against: All Hydrocarbons including Mineral Oils - Hydraulic Oils - Phenolic Compounds, Volatile Aliphatic - Heavy Aliphatics and Aromatics, Chlorinated and Bromated Hydrocarbons.
- Synergistic blend of specially chosen natural bacteria.

The Problem

When using biological methods for removing total petroleum hydrocarbons (TPH) the natural nutrients in the soil are soon exhausted by micro-organisms.

Nutrient limitations, are the one major factor, that hinders the success and speed of bioremediation. Since bioremediation depends on microbial process, there are two major approaches to speed up microbial activities in polluted sites, namely: bio stimulation and bioaugmentation.

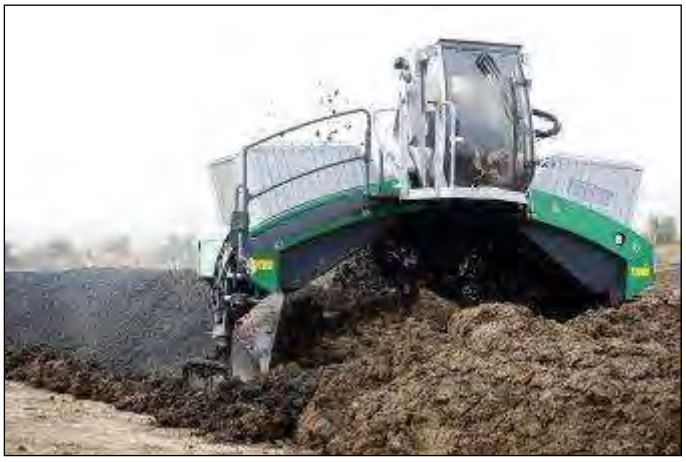
Bio stimulation involves the addition of nutrients such as **Hydra Bio Nutrient Booster** to polluted soil in order to stimulate the activities of autochthonous microbes.

As microorganisms are ubiquitous, it is apparent that pollutant degraders are naturally present in polluted sites, their numbers and metabolic activities may increase or decrease in response to pollutant concentration.

Hence, the use of **Hydra HC Buster** and **Hydra Bio Nutrient Booster** with its appropriate nutrient composition especially nitrogen, phosphorus and potassium blended with the all important essential macro and micro-organisms will help solve the challenge of nutrient limitation in most polluted sites.

On the other hand, bioaugmentation is a critical approach aimed at introducing or increasing microbial population with degradative capabilities.
Microbial consortium has been reported to degrade pollutants more efficiently than pure isolates.

Common methods of clean up of hydrocarbon contamination include Windrows, Bio Venting, Bio Slurping, Bio Spurging, Phytoremediation, Intrinsic bioremediation, Bio-Piles, and Bio Reactors.



Windrows use periodic turning of piled polluted soil to enhance bioremediation increasing degradation activities of indigenous and/or transient hydrocarbon-oclastic bacteria present in polluted soil.

Bioventing a process of stimulating the natural in situ biodegradation of contaminants in soil, providing air or oxygen to existing soil microorganisms

Bio-Slurping a combination of free product recovery and bioventing utilising vacuum enhancement technology.

Bio-Sparging is an in-situ technology that uses indigenous microorganisms to biodegrade organic constituents in the saturated zone. Air (or oxygen) and nutrients (if needed) are injected into the saturated zone to increase the biological activity of the indigenous microorganisms.

Bio-Pile in which excavated soils are mixed with soil amendments, formed into compost piles, and enclosed for treatment.

Bio-Reactor refers to any vessel or container where biological degradation of contaminants is isolated and controlled.

Description

Hydra Bio Nutrient Booster is the result of extensive field trials. It has been specially formulated to provide hydrocarbon consuming micro-organisms with the optimum blend of the NPK, macro and micro nutrients.

This ensures a synergistic action with **Hydra Bio HC Buster** giving the ideal conditions to maximise the growth and performance of its bacteria blend.

Resulting in 2 to 3 times faster results, from when a nutrient package is not used.

Bioremediation Against TPH's
♦ General Hydrocarbons
♦ Polycyclic aromatic hydrocarbons
♦ Diesel range hydrocarbons / Lubricating oils
♦ Semi-volatile organic compounds
♦ Phenolic compounds
♦ Cresols
♦ Mineral oils
♦ Hydraulic oils
♦ Phenolic compounds
♦ Volatile and straight chain aliphatics
♦ Heavy Aliphatics
♦ Aromatics chlorinated / Bromated Hydrocarbons

Where it is used

Use in any large spill situation, where clean-up will take more than 4 weeks, its water soluble, easy to dilute and easily added to soil or fresh, brackish or sea water.

How To Use

Dilutions
Dilute 1:10 - 1:50 with water, depending on application, method of use and equipment present.

Ships Bilges
Treat at 25ml concentrate per m^3 capacity - apply once only.

Existing Hydrocarbon Deposits
Use **Hydra Bio Nutrient Booster** diluted with water for spraying, watering or injection methods.

Continuous Hydrocarbon Feed Systems
If large amounts of sludge are present ensure that there is adequate aeration.

Remember
When bacteria have available nutrients, oxygen and function aerobically, they produce roughly 20 times as much energy as anaerobic activity yields.

This results in faster, more aggressive bio remediation.

Ships Bilges
End result, bilges can be safely emptied overboard without any danger of pollution.

Soils
End result, is ground that is now healthy and supporting macro life it can now be used for any application including farming.

Hydra Bio HC Buster & Hydra Bio Nutrient Buster – Windrow Bio-Remedia on Method

DESCRIPTION

All bio-remediation treatments of Total Petroleum hydrocarbons (TPH) to be successful, require four different factors.

1. The use of a highly efficient hydrocarbon breakdown bacteria such as **Hydra Bio HC Buster**.
2. Additional NPK with nano and micronutrients e.g. **Hydra Bio Boost,** this is regularly added to the soil, to supply the bacteria's needs.
3. Oxygen i.e. air, which contains 20% oxygen is introduced to the treatment pile of contaminated soil by turning it, this ensures that bacteria work aerobically which is approximately 20 times more efficiently than anaerobic bacteria (bacteria that do not require oxygen).
4. Plus using liquid blends of bacteria and nutrients to ensure easy dilution and mixing.

WINDROWS TREATMENT METHOD

As one of "ex situ" bioremediation techniques, "Windrows" rely on periodic turning of piled polluted soil to enhance bioremediation, this increases degradation activities of indigenous and/or transient hydrocarbonoclastic bacteria present in polluted soil.

The periodic turning of polluted soil, together with addition of water bring about increase in aeration, uniform distribution of pollutants, nutrients and microbial degradative activities, thus speeding up the rate of bioremediation, which can be accomplished through assimilation, biotransformation and mineralisation.

Windrow Treatment, when compared to bio-pile treatment, showed higher rate of hydrocarbon removal. Nevertheless, due to periodic turning associated with windrow treatment, it is more labour intensive.

HOW TO USE

1st APPLICATION - 1,000 litres mix of both products treats 200m³ contaminated soil

Using a 1,000 litre IBC, dilute **Hydra Bio HC Buster** at 1:10, i.e. 100 litres per 1,000 litres water.
Add **Hydra Nutrient Booster** at 1:1:50, i.e. 20 litres per 1,000 litres water to the above IBC.
Stir, the IBC and the mix is ready to use, both products will readily mix into the water.
Apply at a rate of 5 litres diluted mix to every m³.
The Windrow must now be turned on to mix solution into soil.
Cover the Windrow with geo-textile or similar this will ensure maximum temperature for bioremediation and moisture retention.
Leave for 4 weeks then treat with **2nd Application**.
The Windrow soil should be kept at 30-40% moisture turning over regularly if required and not allowed to dry out.

2nd APPLICATION - Use only Hydra Bio Nutrient Boost, 1,000 litres mix treats 200m³ contaminated soil

Using a 1,000 litre IBC, dilute **Hydra Nutrient Booster** at 1:50, i.e. 20 litres per 1,000 litres water.
Stir, the IBC and the mix is ready to use, product will readily mix into the water.
Apply at a rate of 5 litres diluted mix to every m³ soil.
The Windrow must now be turned on to mix solution into soil.
Cover the Windrow with geo-textile or similar this will ensure maximum temperature for bioremediation and moisture retention.
Leave for 4 weeks then retreat with **2nd Application**.
The Windrow should be kept at 30-40% moisture content turning over regularly if required and not allowed to dry out.

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