RemBind®

RemActiv™

Application Note

Applying RemActiv™ to Accelerate the Bioremediation of Petroleum Hydrocarbons in Soil

Purpose

The purpose of this application note is to describe the step-by-step process for adding RemActiv™ to petroleum hydrocarbon-contaminated soil to accelerate bioremediation. Following this methodology will help to optimise the biodegradation of Total Petroleum Hydrocarbons (TPH) in the soil. The process is relevant for *ex-situ* stockpiles or *in-situ* biofarms.

Instructions

1. Calculate how much soil requires treatment. Look up the amount of RemActiv™ required to be added to the soil using Table 1 below:

Table 1: RemActiv Application Rates

Application	TPH Contamination		Application Rate of Diluted Product: 20:1
Land Farms	Low	<5,000 mg/kg	0.5 L/m²
	Medium	5,000 to 25,000 mg/kg	1.75 L/m²
	High	>25,000 mg/kg	3.0 L/m²
Biopiles	Low	<5,000 mg/kg	10 L/m³
	Medium	5,000 to 25,000 mg/kg	42.5 L/m³
	High	>25,000 mg/kg	75 L/m³
Spill	Low	<5,000 mg/kg	0.25 L/m²
	Medium	5,000 to 25,000 mg/kg	0.625 L/m²
	High	>25,000 mg/kg	1 L/m²

2. Stir the RemActiv™ concentrate thoroughly. An 'air wand' can be used if required. This can be made by using a thin PVC pipe (around 50mm diameter) with holes drilled in one end (the mixing end) and blowing air through the other end of the pipe to generate bubbles to assist in the mixing process. If using an IBC container, ensure that any RemActiv™ residue that has settled at the bottom of the IBC is thoroughly reconstituted before use.

3. Dilute the RemActiv™ 20:1 with water (non-chlorinated). This can be done by utlising a water truck, a dosing tank, or a backpack sprayer depending on the size of the application. More sophisticated systems can be used to dilute and dose the RemActiv™, for example a Venturi dosing unit and a series of irrigation hoses.

4. If using pumps, see the RemActiv™ Product Specification Sheet for details about the viscosity and density of the RemActiv™ product.

5. Once diluted, apply evenly to the soil using sprayers while mixing the soil thoroughly. An even application is important. Soil can be mixed using an excavator or loader, ensuring that the soil is thoroughly broken up and mixed. If using *in-situ* shallow surface mixing, a rotary hoe or similar can be used.

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6. Once the RemActiv™ is applied, the aeration and moisture conditions in the soil should be maintained to ensure the optimal performance of the product.
Aeration and moisture are the key parameters that require periodic monitoring to ensure that the bioremediation process is optimised.

A — **Aeration:** For *ex-situ* soil piles, aerate the soil by thoroughly and completely turning the soil inside out with an excavator/loader. For biofarm applications, a rotary hoe or similar can be used. If the biofarm is set up <300 mm deep, the soil does not require turning as adequate surface area is exposed to the air. As a guide, aerate after 2 weeks, 4 weeks and then monthly until the desired treatment outcome is achieved.

B — **Moisture:** This is critical. If the soil dries out completely, the bioremediation rate will slow dramatically or even stop. Moisture can be maintained by watering thoroughly during the initial mixing and during subsequent aeration events. For biofarm applications, a water truck can be used. For larger projects, a series of irrigation pipes, drippers or sprinklers can be employed. Aim for “evenly moist” conditions without excess water. This is equivalent to a total moisture content of ~10% for a sand and ~20% for a clay. If the soil is wet to start with, no extra water may need to be added apart from the diluted RemActiv™.

7. Monitor the treatment process by sampling the soil and analysing for TPH. Monitor the TPH levels over time and a typical decay curve should result. Extrapolating this curve can give some indication of treatment endpoint and timeframes to completion. Treatment times of <3 months are often adequate for lower TPH concentrations and easily biodegradable hydrocarbons. For more challenging projects, 12 months or more may be required. The monitoring of TPH levels is the best indicator of timeframes.

8. Store any residual RemActiv™ concentrate under dark, cool conditions. Any residual diluted solution should be discarded safely.

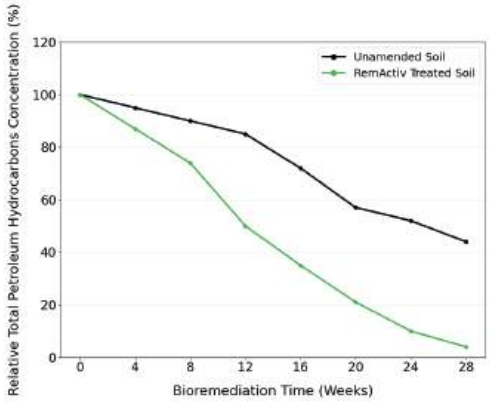

Figure 1: RMIT University study showing a 50% increase in degradation of TPH using RemActiv™ vs natural attenuation

Important Note

The above steps are to be used as a guide only. Actual bioremediation rates will be affected by a number of complex factors including the type of soil, moisture and aeration conditions, temperature, the levels and types of petroleum hydrocarbons present (including how weathered they are), and the presence of other contaminants. Also, the best practical setup will vary based on site access, available equipment, and type of application.

Health and Safety

RemActiv™ is not classified as a hazardous good. Appropriate PPE should be worn when handling and applying the product. It is the responsibility of the user to apply the RemActiv™ products in a safe manner according to the RemActiv™ SDS (available upon request).

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