Terramend® Reagent

Evonik Soil & Groundwater Remediation

PRODUCT APPLICATION GUIDE

Terramend® Reagent for Surface Treatment of Petroleum Hydrocarbons

INTRODUCTION:

Terramend Reagent is used to treat soils impacted with aerobically biodegradable organic compounds. Terramend enhances and promotes natural bioremediation rates by adjusting conditions in the soil matrix to stimulate target compound biodegradation. No microbial inoculation is conducted. The key to the Terramend aerobic bioremediation approach is the application of proprietary organic soil amendments designed with site-specific nutrient release kinetics. Combined with strict control of soil moisture and aeration protocols these amendments are designed to optimize contaminant removal rates.

Terramend bioremediation is generally applied as a land treatment process. Soil and amendment are blended using a rotary tiller, driven by an agricultural tractor, with an effective penetration of 2 feet (0.6 m). Tilling serves to homogenize and aerate the amended soil. Water content is one critical process parameter and is adjusted using agricultural irrigation equipment. A cover (i.e., tarpaulin and/or a greenhouse) may be used to prevent the addition of water from precipitation events and to minimize evaporation at other times.

TREATMENT PROTOCOL OVERVIEW:

Treatment is generally conducted as follows, using either a tilling or bio-pile/windrow approach. PeroxyChem will assist our customers in developing a site-specific treatment process work plan when Terramend will be used on the project.

<u>For tilling or windrows:</u>

1. Apply Terramend to the soil.
    a. Tilling approach – Incorporate using a deep rotary tiller at least twice, preferably at perpendicular angles to facilitate complete incorporation.
    b. Windrow approach – Incorporate using a heavy-duty windrow turner.
2. Apply water to achieve the target moisture content (50% to 60% of the soil's water holding capacity, WHC).
3. Conduct maintenance tilling/mixing, preferably twice per week, to incorporate oxygen into the soil for the microbial treatment process.
4. Assess soil pH and moisture when maintenance tilling, to verify and potentially adjust to 50-60% WHC and pH 6-8.
5. Conduct analytical testing to verify treatment progress every 30 days.
6. Continue treatment for the estimated project treatment duration or until desired results are achieved.

<u>For aerated bio-piles (eliminates or greatly reduces maintenance soil mixing):</u>

1. Apply Terramend to the soil.
2. Incorporate using an Allu bucket or by mixing very thoroughly with an excavator.
3. Establish constructed bio-piles in accordance with project design requirements. Depending on soil texture, this may include vent piping, blowers, an irrigation system, and a variety of process monitors (i.e., moisture, pH, oxygen, carbon dioxide).

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4. Apply water to achieve the target moisture content (50% to 60% of the soil's water holding capacity, WHC).
5. Assess soil pH and moisture when maintenance tilling to verify and potentially adjust to 50-60% WHC and pH 6-8.
6. Conduct analytical testing to verify treatment progress every 30 days.
7. Continue treatment for the estimated project treatment duration or until desired results are achieved.

Note: For site soils with higher petroleum hydrocarbon concentrations (>10,000 mg/kg. treatment protocol may include a second Terramend addition).

HEALTH AND SAFETY:

Terramend is safe when handled properly in accordance with instructions for use and the safety data sheet (SDS). The SDS is posted on our web site at: http://www.evonik.com/remediation. When working with Terramend, the use of standard personal protective equipment, including safety glasses, protective clothing and gloves are recommended.

Additional safety equipment may be required for mechanical and site operations.

Please contact Evonik for additional guidance.

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