

## What is Remediator?

Remediator is a dual purpose oil/fuel absorbent and bioremediation agent for use on direct spills or on hydrocarbon contaminated soil. It is made by Enretech using locally sourced cotton-waste and is 100% biodegradable.

The Remediator solution contains naturally occurring bacteria commonly found in oil bearing plants and common soils. When given a hydrocarbon food source and kept moist, the bacteria propagate rapidly within the cotton-based fibres and break down the soil contaminant into its non-harmful constituents.

Remediator is reinforced by NOVO-AUSHC culture composed of well-known, non-pathogenic, hydrocarbon biodegrading microorganisms. NOVO-AUSHC is a scientifically produced microbial culture blend for the biodegradation of total petroleum hydrocarbons (TPHs). This culture can effectively biodegrade all different types of hydrocarbons such as BTEXN, gasoline, kerosene, polycyclic aromatic hydrocarbons with chain lengths ranging from C<sub>4</sub>-C<sub>40</sub>. NOVO-AUSHC is composed of 11 distinct microbial strains grown individually under sterile conditions to maintain even microbial cell numbers and then mixed with Enretech's 100% biodegradable cotton waste-based absorbent to form the Remediator product.

Remediator is also effective in degrading polycyclic aromatic hydrocarbons (PAHs). The activities of individually assessed microbial strains, found in the standard Remediator product, on the biodegradation of selected polycyclic aromatic hydrocarbons are listed in Table 1.

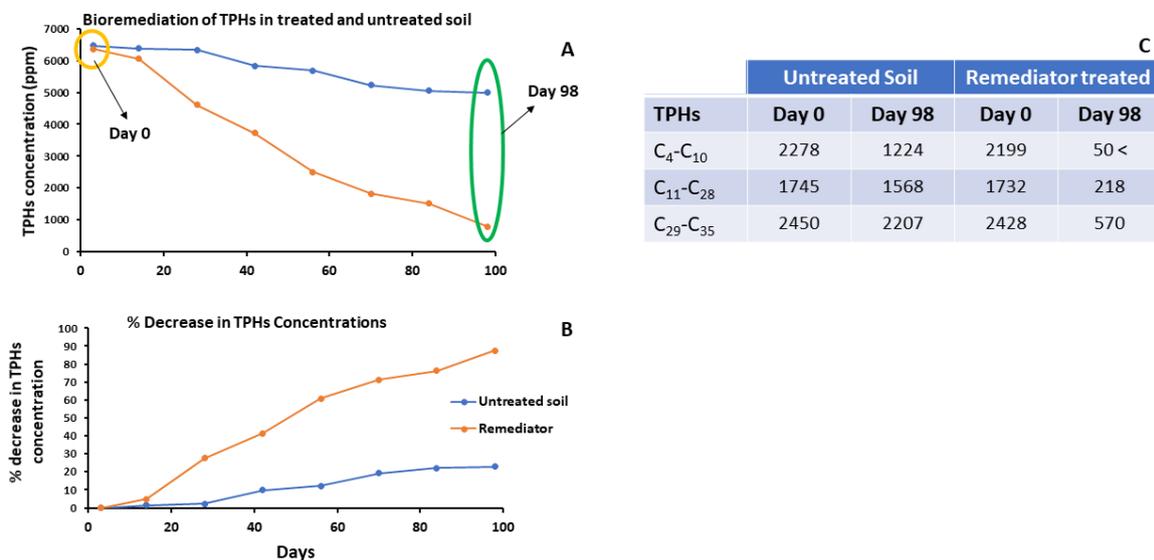
**Table 1.** Polycyclic aromatic hydrocarbon biodegradation activities of microbial strains coated on Remediator product:

Strain Identification	PAHs Biodegraded	Biodegradation rate in liquid (per day)
Novo-AH1	naphthalene, phenanthrene, and anthracene	5-15 ppm
Novo-AH2	oxy-PAHs, anthraquinone	5-10 ppm
Novo-AH3	benzo[a]pyrene, pyrene, phenanthrene	5-15 ppm
Novo-AH4	anthracene	10 ppm
Novo-AH5	phenanthrene, fluoranthene, pyrene	5-20 ppm
Novo-AH6	fluoranthene, naphthalene, phenanthrene, anthracene and	2-20 ppm

Novo-AH7	pyrene, benzo[a]pyrene	2-5 ppm
Novo-AH8	fluoranthene, phenanthrene, pyrene	2-10 ppm
Novo-AH9	anthracene, phenanthrene, naphthalene, fluorene, pyrene,	2-10 ppm
Novo-AH10	pyrene, anthracene, benzo[a]pyrene	2-15 ppm
Novo-AH11	naphthalene, pyrene	2-15 ppm

For soil contamination up to 40,000 ppm of petroleum hydrocarbons, thorough mixing of the absorbent-microbial blend maintaining appropriate moisture levels is sufficient for bioremediation to meet compliance levels within 3-4 months. Higher contamination levels can take up to 6 months and this depends on the type and age of the hydrocarbons and soil structure. We also offer a nutrient mix (<https://novorem.com.au/nutrient-formula/>) to enhance hydrocarbon bioremediation based on the soil samples, initial testing and analysis conducted by Novorem.

Figure 1 represents the results of bench-scale tests of bioremediation of TPHs contaminated soil with and without Remediator. TPH concentrations **decreased by over 87%** in soil samples treated with the Remediator product, while TPH concentrations decreased by 22% in untreated soil samples during 98 days of incubation.

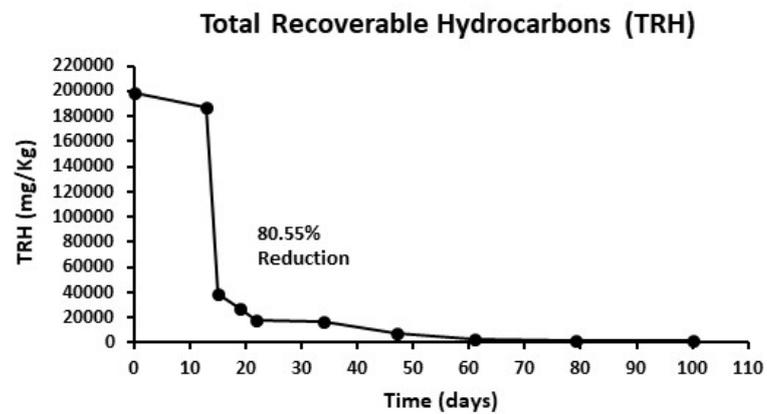


**Figure 1.** Bench-scale tests for bioremediation of crude oil contaminated soil over 98 days incubation. Biodegradation of TPHs (A) and % decrease (B) in TPHs concentrations in untreated and Remediator treated soil. TPHs present in the contaminated soil at the beginning and end of the period (C).

Enretech's Remediator product was used for an in-situ bioremediation project conducted in New Caledonia in a site heavily contaminated with hydrocarbons (190,000 ppm). As a result the content of total recoverable hydrocarbons **decreased by 99.39% in less than 100 days** (see below and Figure 2)



Images demonstrate the application of Remediator-1 in contaminated sites.



**Figure 2.** GC/MS analysis of total recoverable hydrocarbons in Enretech's Remediator-treated sites over 100 days.