

# RemActiv Concentrate: Bioremediation Enhancer



RemActiv is designed to accelerate the bioremediation of petroleum hydrocarbons in soil. The product contains a specially formulated nutrient mix that result in faster remediation times and cheaper processing costs.

RemActiv is supplied as a liquid concentrate (20:1) in 1,000L volumes and can be simply applied using a water truck or sprayer. The product has been used at a number of sites across Australia with outstanding results.



***“The results from our trial exceeded our expectations and highlighted the effectiveness of RemActiv”***

Kevin Lampard, Perth Petroleum Services

***“RemActiv significantly enhanced the extent of bioremediation compared to soil with nutrient amendment alone”***

Asquith et al, Journal of Environmental Science and Engineering, A 1 (2012) 637-650



## Benefits

- Faster bioremediation times
- Easy and quick to apply
- Cheaper than standard fertilizers
- Reduced freight costs

## Features

- Convenient liquid concentrate
- Available in 20L or 1000L containers
- Nutrients optimised for microbial growth
- Used to degrade aliphatic and aromatic hydrocarbons

## Applications

- Bioremediation
- Emergency spill response
- Bio farming
- Organic waste treatment

### Nutrient constituents in RemActiv

Element	%
Nitrogen	20
Phosphorus	2
Potassium	1
Sulphur	2.4
Zinc	0.5
Calcium	0.4
Manganese	0.4
Magnesium	0.2
Iron	0.1

## 1. Product Information

RemActiv, a Ziltek product, is a highly effective liquid nutrient product designed to accelerate the bioremediation of hydrocarbon contaminated sites and spills.

RemActiv is primarily a fast-acting liquid nutrient mix (macro and micro) designed specifically for stimulating and enhancing the growth of local/indigenous microorganisms in petroleum contaminated soil.

In terms of nutrients, RemActiv will provide (w/v) 20% nitrogen, 2 % phosphorous, 1% potassium (NPK = 20:2:1) and a range of other trace elements. The product has been specifically formulated to optimise the growth of microorganisms – most other fertilizer products contain the optimal nutrients to support plant growth.

(Worth noting: 20% nitrogen translates to 20 parts per 100. Some other commercial products for similar applications have nitrogen and other elements described as available in “parts per million”).

## 2. Application Benefits

Some of the application benefits of using RemActiv are:

- Cost-effective on a nitrogen basis with conventional fertilisers
- Shorter treatment times
- Minimal bulk out factor
- Easy to apply with conventional equipment

## 3. Shelf Life, Storage, Transport and Handling

- Shelf life: Unlimited
- Storage: Keep out of direct sunlight
- Temperature tolerance: 2 to 50°C (storage and use)
- Mix well before use
- Classified: Non Dangerous Good – Non Hazardous
- Precautions: S25 – use protective eye wear and gloves when handling

\* Refer to SDS for further details.

### Benefits

Because RemActiv is a NDG (non-dangerous good) it;

- Reduces storage costs due to its ability to withstand Australian temperature conditions for at least two years in storage;
- Reduces transport costs because as a NDG it does not require specialised transport certification;
- Minimises risk to personnel when handling, mixing and applying RemActiv Concentrate and/or solution.

The product is supplied in a concentrate form, thus minimising freight costs.

## 4. Application Rates

Suggested application rates described below are for the diluted form of RemActiv.

The recommended dilution rate for RemActiv is 1:20 with nonchlorinated water; however some users have reported success with dilution rates as low as 1:100.

In certain cases where low dose rates over a given area are required, it may be easier to achieve even and consistent application by using higher rates of dilution.

## Application Rate Guide

Application rates referred to below are suggested as a guide only. Many site variables will impact upon the application rate and on-going use should be adjusted according to analytical results obtained during the bioremediation process.

Application	Contamination	Rate Dilution 1:20
Land farms	Low	0.5 l/m <sup>2</sup>
	High	3.0 l/m <sup>2</sup>
Biopiles	Low	10 l/m <sup>3</sup>
	High	75 l/m <sup>3</sup>
Spill	Low	0.25 l/m <sup>2</sup>
	High	1 l/m <sup>2</sup>
Water	Low	5 l/kl
	High	25 l/kl

### Site Variables

Some of the site variables that may impact upon the rate of bioremediation include:

- Soil type, porosity, and moisture content
- Type and level of contaminants
- Regulatory targets
- Available oxygen
- Consistency and method of application.

## RemActiv Trials Successful for Pacific National

Pacific National engaged environmental engineering consultants RCA Australia to independently assess Ziltek's RemActiv product as a bioremediation agent for cleaning up diesel spills in the rail industry.

Soil collected from the Greta Train Support Facility in New South Wales was compacted into containers and spiked evenly with diesel to around 35,000 mg/kg Total Recoverable Hydrocarbons (TRH; C<sub>10</sub> to C<sub>40</sub>).

RemActiv was diluted and applied evenly to the soil as per the manufacturer's recommendations. Treated soil was covered with an absorbent to minimise water loss and to replicate the current spill response procedures of Pacific National.

Triplicate soil samples were collected at 0, 1, 3 and 6 months and sent to NATA-accredited Australian Laboratory Services for TRH analysis.

Results (Fig. 1) showed that >65% of TRH was degraded within 1 month of application. After 6 months, TRH was reduced by >80% to 6,613 mg/kg, which is well below the NEPM\* ESL trigger value of 9,270 mg/kg.

While significant natural degradation of TRH also occurred in the untreated control, the TRH concentration after 6 months was 11,720 mg/kg, which exceeds the NEPM ESL trigger value.



Photo 1: Pacific National staff setting up RemActiv trial

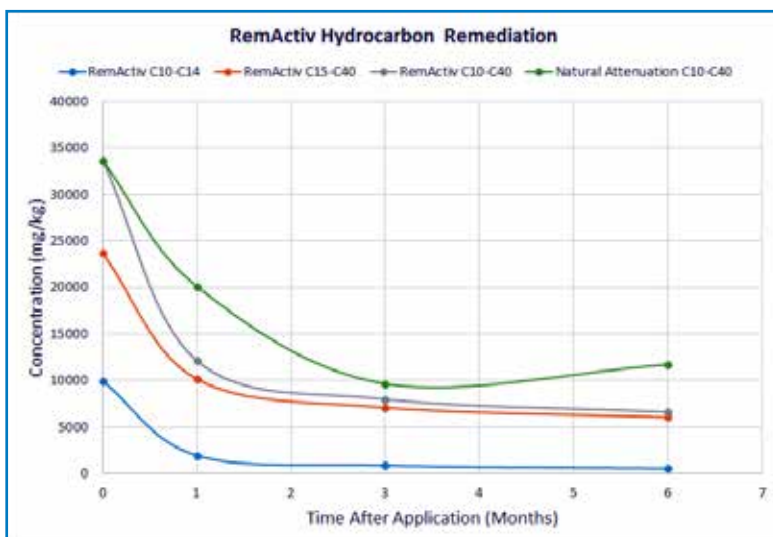


Figure 1: Degradation rates of total recoverable hydrocarbons in diesel contaminated soil following RemActiv treatment

In summary, RemActiv reduced diesel contamination in soil to below the regulatory trigger value within 6 months, with minimal soil management requirements.

The procedure involves simply spraying a single dose of RemActiv on the spill site at the recommended dose and then covering the spill with organic absorbent material to reduce evaporation.

This paves the way for the use of RemActiv as a simple, practical and cost effective bioremediation product for quickly reducing the impact of hydrocarbon spills in the rail industry.

\* NEPM = National Environment Protection (Assessment of Contaminated Site) Measure 2013



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