

# BIOREMEDIATION OF CONTAMINATED SOIL



## PRINCIPLE OF BIOREMEDIATION

Bioremediation is a technique that uses microorganisms for the degradation of hazardous chemicals in:

- soil,
- sediments,
- water,
- waste,
- other contaminated materials (like construction debris and stones, sludge),

into harmless forms.

Since 1992, Dekonta has got the know-how and a state-of-the-art equipment to treat successfully high concentration of petroleum hydrocarbons in contaminated soils.

Generally, the bioremediation process length depends on several factors:

- Content of aromatic hydrocarbons;
- Heavy fraction magnitude and toxicity;
- Presence and mobility of other contaminants;
- Site dimensions/final use,
- Bioremediation process can be performed in two ways: ex-situ or in-situ (treatment of non-saturated zone).

## WHY DEKONTA'S TECHNOLOGY?

The advantages of our technique include:

- Lower cost than chemical/physical techniques;
- Contaminants usually converted to harmless products (like carbon dioxide and water) and not transferred to a different environmental media;
- Relative easy to implement, often allowing continued site use;
- Able to clean-up sites up to a Total Petroleum Hydrocarbons (TPH) concentration of 100 000 mg/kg in dry matter!



## EX-SITU BIOREMEDIATION

“Ex-situ” remediation method requires the transport of the contaminated soil to a bioremediation facility/platform.

The platform has a drainage system for the collection of rainwater and the water filtrated from the contaminated soil.

The length of the process depends on several parameters like contaminants type and concentration, target limits and soil/sediment composition.

Since the material is frequently mixed and aerated, and nutrients are added, contaminants are decomposed faster than in situ, furthermore they cannot keep spreading across the site.

The process can be described as follows:

- **Site investigation**
- **Treatability studies**
- **Soil excavation and transfer to the decontamination platform**
- **Biopiling remediation process (where Dekonta's bio-preparations, additives and fertilizers are added; soil is mixed and aerated to increase the biological activity)**
- **Monitoring and evaluation**

The contaminant target limits are determined by the responsible authorities and may vary based on the final site use or the disposal destination. The following table is an example of target concentrations limits achieved in time by Dekonta, according to different initial and final TPH and PAH (polycyclic aromatic hydrocarbons) concentrations:

max. input concentration TPH (mg/kg)	expected time of remediation process (number of seasons)	max. output concentration TPH (mg/kg)
5,000	2	500
20,000	2	1,000
50,000	2	5,000
max. input concentration ΣPAH (mg/kg)	expected time of remediation process (number of seasons)	max. output concentration ΣPAH (mg/kg)
1,000	1-2	200
10,000	1-2	2,000

## IN-SITU BIOREMEDIATION

After a site investigation and treatability preliminary studies, the non-saturated zone treatment is designed. Dekonta's biopreparation or different organic substrates are injected into the bedrock (injection wells or direct push). The overall process of bioremediation is monitored. The in-situ treatment takes usually longer time but is less expensive.



**Biopiles aeration**



**A site after biotreatment**

Do not hesitate to contact us for further enquires, case studies and references of our several worldwide projects.

Dekonta's offices are situated in Slovakia, Poland, Czech Republic, Russia, Hungary, Serbia and we have many partnerships in other EU countries, Asia and Africa. There are no language barriers at Dekonta: we speak 23 languages!

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