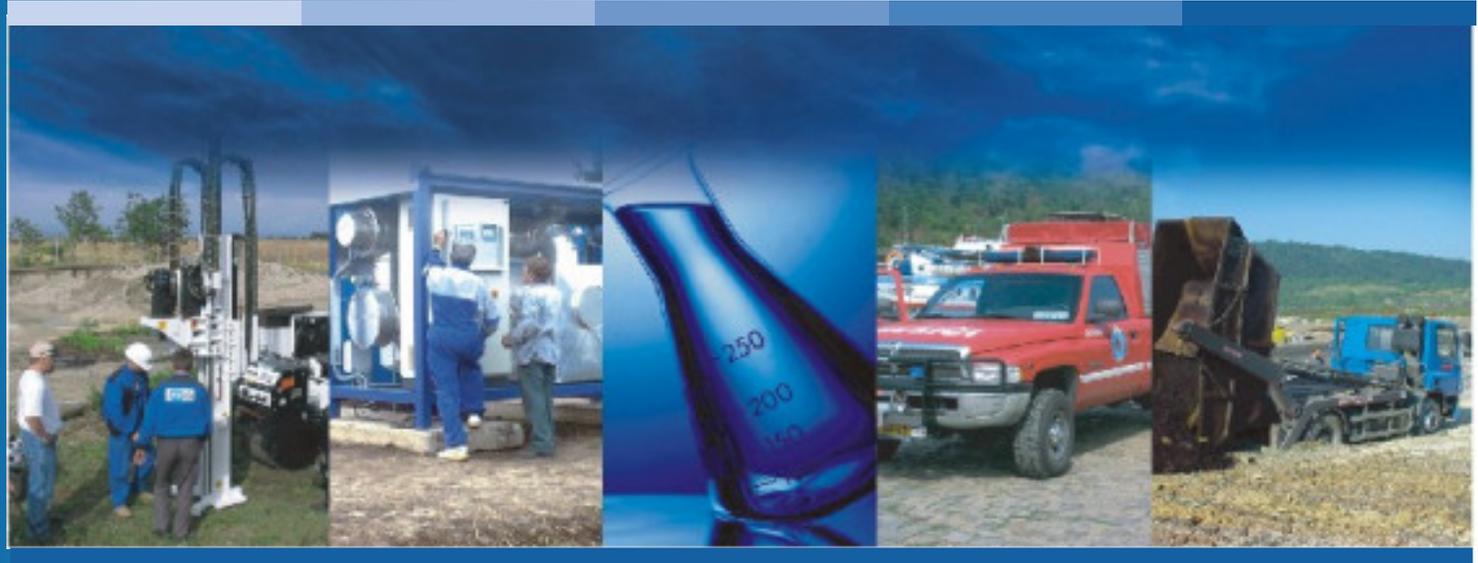


services and technologies

for a better environment

dekonta



**Delivering Excellence
in Remediation of Contaminated Sites**

September, 2008

Company Introduction

dekonta

- Leading provider of site remediation services in Central and Eastern Europe
- Established in 1992
- 150 employees
- Annual turnover approx. 20 million EURO
- ISO 9001, ISO 14001 and OHSAS 18001 certified company
- 400 environmental projects / year
- Offices in Romania (Ploiesti), Czech Republic (headquarters in Prague), Hungary, Poland, Russia, Serbia, Slovakia and Turkey



Environmental Services Delivered by DEKONTA



- Remediation of contaminated sites
- Hazardous waste treatment and disposal
- Emergency response services
- Environmental consulting
- Environmental laboratory



Main Clients

- Industrial companies (oil refining, chemistry, metallurgy, machinery etc.)
- International organizations (EBRD, WB, UNEP, UNDP etc.)
- Ministries, state organizations and municipalities
- Construction companies



Remediation of Contaminated Sites

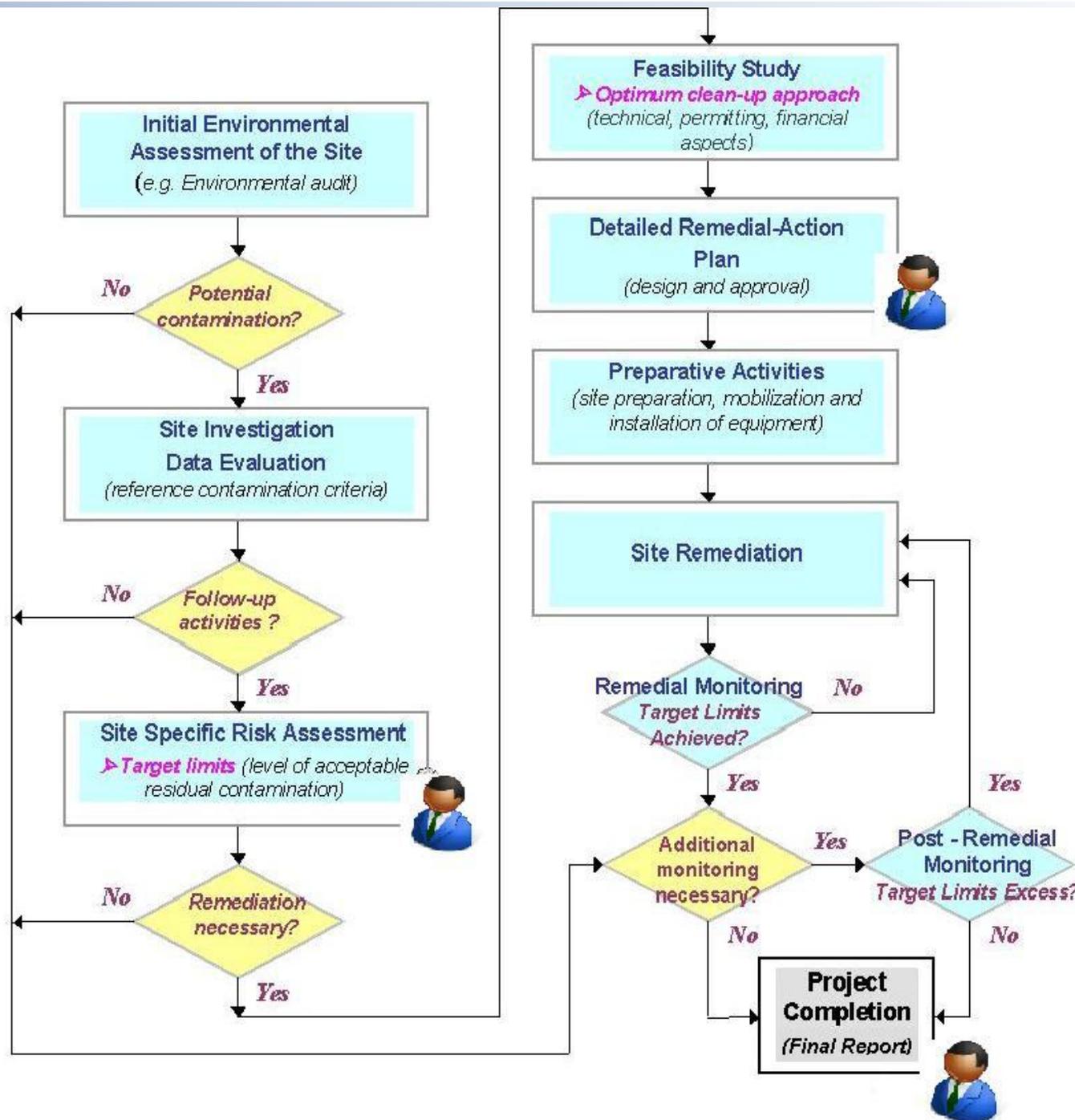
Complex and complicated process comprising of:

- **Preparatory activities (investigation, designing etc.)**
- **Application of suitable remediation measures**
- **Post-remedial activities (monitoring etc.)**



Typical Course of Site Remediation Process

 - Active participation of environmental authorities in the site remediation process



Remediation Methods Applied by DEKONTA

A. Remediation of contaminated soil

A.1 „Ex situ“ methods:

Contaminated soil (or waste) is removed from the site and transported for subsequent treatment or disposal to a permitted facility (landfill, bioremediation plant etc.)



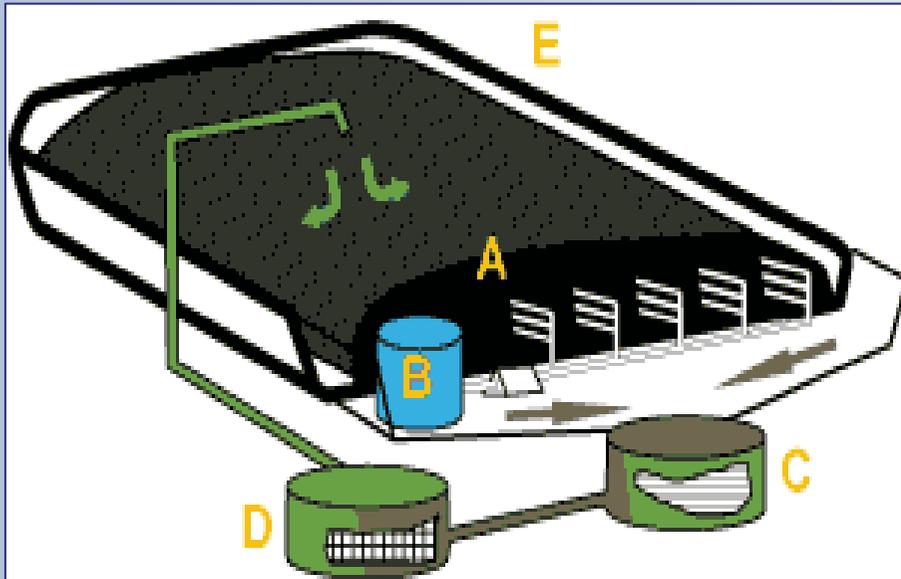
Remediation Methods Applied by DEKONTA

A. Remediation of contaminated soil

A.1 „Ex situ“ methods



A.1.1 Ex situ bioremediation



Legend:

- A - Treated soil
- B - Water tank
- C - Laakages collection tank
- D - Bioreactor for preparation of solution (biopreparation + fertilizers) applied on contaminated soil
- E - Leak-proof soil treatment area

Potential for application:

- Soil contaminated with organic pollutants.

Principle of the method:

- Support of natural processes in consequence of which organic matters present in treated soil are destructed by microbiological strains utilizing the contamination as energy source for their growth and multiplication.

Main plant-operation activities:

- Soil aeration (cultivation) and humidification, application of biopreparation, addition of fertilizers necessary for bacteria growth.



DEKONTA: Biotreatment plant, Slaný

Remediation Methods Applied by DEKONTA

A. Remediation of contaminated soil

A.1 „Ex situ“ methods



A.1.2 Stabilization / solidification of contaminated soil

Potential for application:

- Soil contaminated with organic and inorganic pollutants.

Principle of the method:

- Contamination is not removed from treated soil, nevertheless it is transformed to less mobile (leachable) or less toxic form by mixing soil with suitable additives (e.g. cement, lime etc.).

Main plant operation activities:

- Mixing soil with additives, maturation of stabilized soil (to achieve the required parameters), final disposal / utilization of stabilized soil (as backfilling material, at a non-hazardous waste landfill etc.).



DEKONTA: Containerized Stabilization plant, Ústí nad Labem

Remediation Methods Applied by DEKONTA

A. Remediation of contaminated soil

A.1 „Ex situ“ methods



A.1.3 Production of alternative fuel from waste / contaminated soil

Potential for application:

- Waste or soil heavily contaminated with organic matters.

Principle of the method:

- Re-processing of waste or contaminated soil to an alternative energy sources with sufficient calorific value (usually higher than 12 MJ/kg).

Typical plant operation activities:

- Separation of organic phase from waste (e.g. using centrifuge).
- Mixing of contaminated material with suitable additives (saw dust, coal dust etc.) to achieve the required physical properties (calorific value, consistency etc.).



Remediation Methods Applied by DEKONTA

A. Remediation of contaminated soil

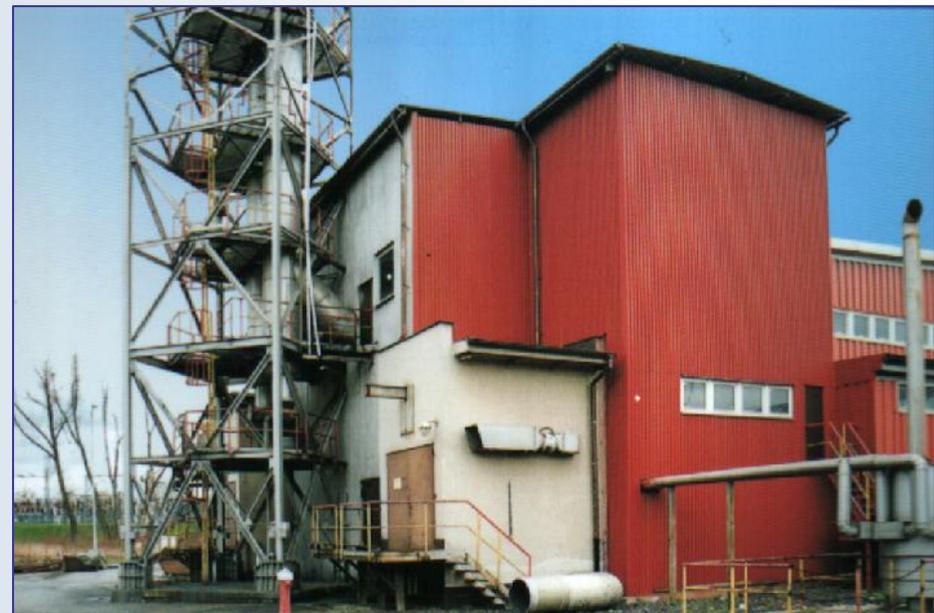
A.1 „Ex situ“ methods

A.1.4 Other „ex situ“ methods for soil remediation

- Thermal desorption
- Soil washing
- „Ex situ“ soil vapour extraction
- Incineration
- Landfilling



AVA Vacuum Indirect Thermal Desorption Plant – 10 t / hour



DEKONTA: Hazardous waste incinerator, 2006

A.2 „In situ“ methods:

The level of soil pollution is reduced down to the acceptable concentration limits by application of a suitable process (physical, chemical or biological) without excavation of the contaminated soil.



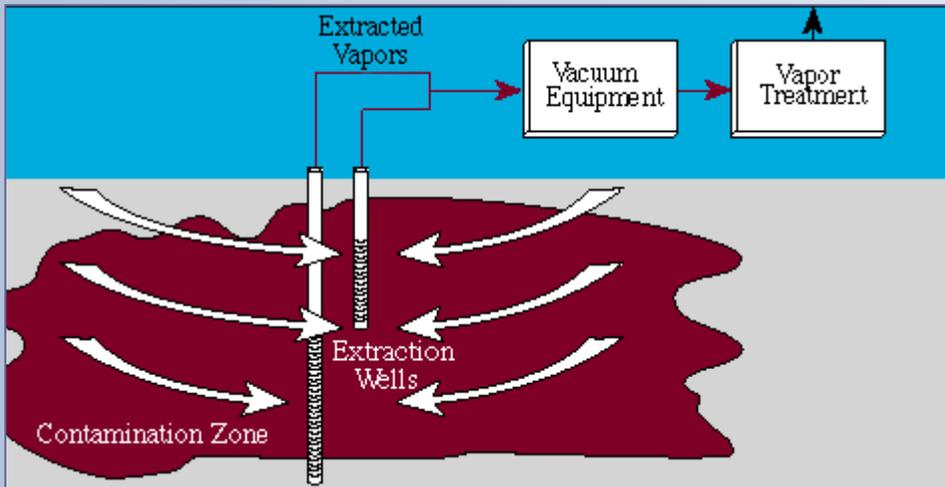
Remediation Methods Applied by DEKONTA

A. Remediation of contaminated soil

A.2 „In situ“ methods



A.2.1 Soil vapour extraction



Main technological activities:

- Installation of extraction wells, extraction of soil gas, treatment of extracted gas containing contaminants in filters with activated carbon or catalytic incineration units.

Potential for application:

- Soil contaminated with volatile organic pollutants – such as light hydrocarbon fractions, chlorinated solvents, aromatic hydrocarbons etc

Principle of the method:

- Extraction of gas from contaminated soil. Volatile organic compounds are extracted together with the gas.



DEKONTA: Containerized station for soil vapour extraction

Remediation Methods Applied by DEKONTA

A. Remediation of contaminated soil

A.2 „In situ“ methods

A.2.2 In situ bioremediation

Potential for application:

- Soil contaminated with organic pollutants.

Principle of the method:

- Support of natural processes in consequence of which organic matters present in soil are destructed by microbiological strains utilizing the contamination as energy source for their growth and multiplication.

Main plant-operation activities:

- Injection of biopreparation and fertilizers necessary for bacteria growth, aeration of unsaturated zone, extraction of groundwater

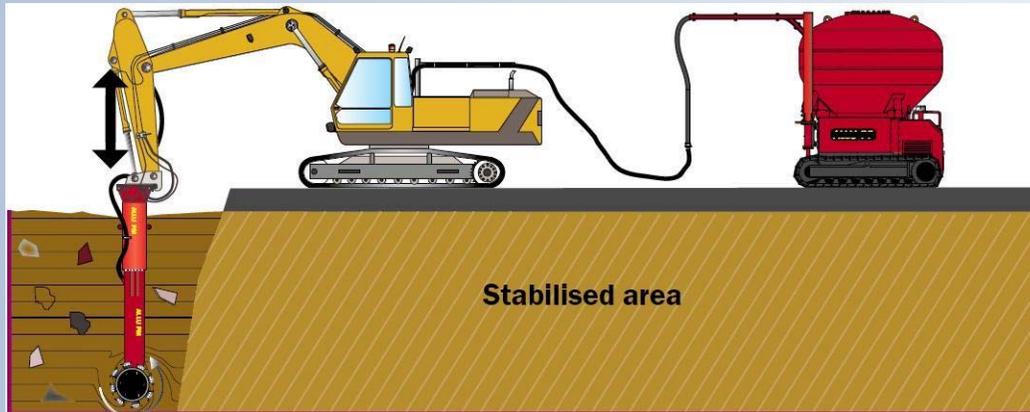


Remediation Methods Applied by DEKONTA

A. Remediation of contaminated soil

A.2 „In situ“ methods

A.2.3 „In situ“ stabilization



Potential for application:

- Soil contaminated with organic and inorganic pollutants.

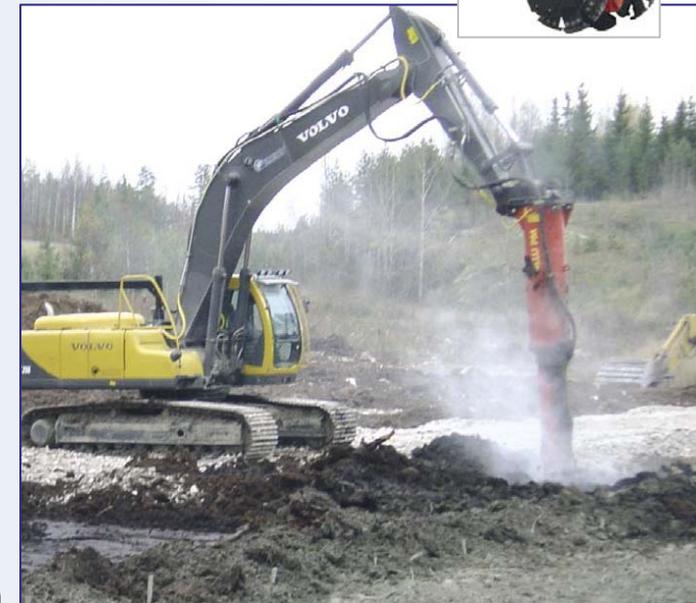
Principle of the method:

- Contamination is not removed from treated soil, nevertheless it is transformed to less mobile (leachable) or less toxic form by mixing soil with suitable additives (e.g. cement, lime etc.).

Main plant operation activities:

- Suitable additives are injected directly to the polluted place where they are mixed with contaminated soil without excavation of the soil.

ALLU equipment for In situ stabilization



Remediation Methods Applied by DEKONTA

A. Remediation of contaminated soil

A2. „In situ“ methods



A.2.4 Other „in situ“ methods for soil remediation

- Bioventing
- Soil flushing with water or suitable surfactant solution
- Steam enhanced soil flushing
- Phytoremediation



DEKONTA: Research of phytoremediation method, Mydlovary, 2003

B. Remediation of contaminated groundwater

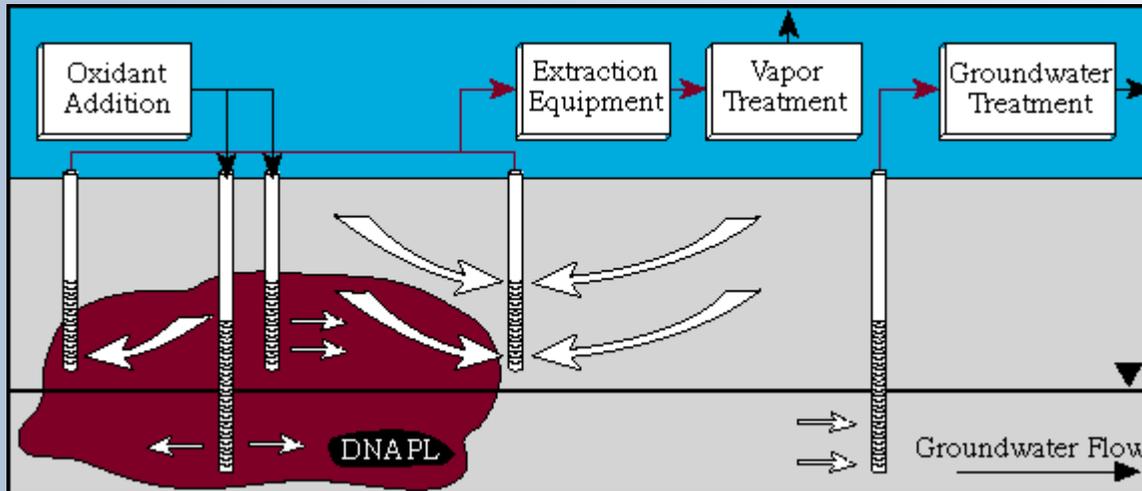
B.1 „Pump-and-treat“ methods:

Contaminated groundwater is extracted from suitably situated wells, treated and subsequently discharged or infiltrated. The following methods are applied by DEKONTA for treatment of extracted groundwater:

- Gravity separation
- Air (or steam) stripping
- Sorption
- Coagulation
- Flocculation
- Neutralization
- Chemical oxidation
- Chemical reduction
- Biological treatment
- Reverse osmosis



B.2 Chemical oxidation



Potential for application:

- Soil contaminated with organic pollutants which can be destroyed by reaction with oxidizing agents – such as hydrogen peroxide, potassium permanganate, ozone etc.

Principle of the method:

- Oxidizing agents injected to contaminated soil are chemically destructing present organic pollution.

Main technological activities:

- Installation of wells, injection of solution of oxidizing agent to contaminated soil, extraction of groundwater to support spreading of oxidizing agent through contaminated area but to prevent migration of applied solution outside remediated area



B.3 Other methods for groundwater remediation

- „In situ“ bioremediation (see above)
- Air sparging
- Bio-slurping
- Biological reductive dechlorination
- Application of nanoparticles
- Enhanced natural attenuation



DEKONTA: Application of biological reductive dechlorination method, Touzim, 2007

C. Methods eliminating migration of contaminants

Methods are based on installation of barriers eliminating migration of contaminants from polluted area to surrounding environment. Contaminants are not actively removed from the place of their occurrence. The following methods are applied by DEKONTA

- Installation of insulation capping systems over old landfill sites etc.
- Installation of underground sealing wells around contaminated areas
- Operation of hydraulic barriers
- Installation of reactive barriers



DEKONTA: Remediation of Hexion site, Sokolov, 2007
- Installation of underground sealing wells around contaminated area

Thank you for your kind attention!



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