

Remediation of Groundwater and Soil Vapour on a Former Tank Farm of the US Army, Wuerzburg (Germany)



BAUEREnvironmentGroup



The flexible design of the treatment plants allows for the removal of treatment stages depending on the evolution of the contaminants' concentrations. Thus, operational costs are reduced considerably.

On the site of a former tank farm of the US Army BAUER Environment Group installed two plants for the treatment of groundwater and soil vapour. The plants are characterised by a flexible design which allows for up and downgrading.

Thus, the treatment units are adjusted to decreasing contamination in soil vapour and groundwater. The plants have a treatment capacity of 3.5 m³/h of groundwater, and 1,000 m³/h of soil vapour.

Remediation site

On the former tank farm site, the main pollutants are petroleum hydrocarbons and BTEX, especially benzene. Before remediation start, the groundwater exhibited concentrations of up to 5.6 mg/l of TPH and 2.5 mg/l of BTEX. The soil vapour showed concentrations of 800 mg/m³ for aliphatic hydrocarbons (C5 to C10) and 800 mg/m³ for BTEX.

The objective of the remediation was to prepare the site for re-use. Two remediation areas were selected and a groundwater and soil vapour treatment plant installed in each.

Results

The remediation features the combination of on-site treatment (pump-and-treat) and in situ treatment.

The groundwater treatment includes the following stages:

- extraction of the contaminated water from a remediation well
- collection of the water in a tank



The cleaned groundwater is enriched with oxygen and nutrients and re-infiltrated upstream the remediation well. The infiltrated water flushes the ground and stimulates the in situ natural degradation of the hydrocarbons.

- stripping column for the removal of BTEX
- gravel filter to separate suspended particles
- activated carbon filter to remove TPH and remaining organic residues from the water
- oxygenation and enrichment with nutrients
- re-infiltration upstream of the remediation well

The upstream infiltration of the cleaned and oxygenated water stimulates the in situ biological degradation of hydrocarbons. The infiltrated water flushes the ground, is extracted from the remediation well and passes all treatment stages again. Thus, step by step the

activated carbon filter is activated biologically and becomes a bioreactor.

The soil vapour is extracted from 23 soil vapour wells and 6 wells for the combined extraction of groundwater and soil vapour. During the first remediation phase, the soil vapour was treated in a catalytic oxidation unit.

Through 24 wells fresh air is supplied to the ground for airsparging. During this process, volatile contaminants pass over from the aqueous to the gas phase allowing for their removal from groundwater. Besides, the supply of fresh air stimulates the in situ natural degradation of the pollutants.

The flexible design of the treatment plants allows for the removal of treatment stages depending on the evolution of the contaminants' concentrations. The adaptation of the plants to changing conditions reduces operational costs considerably.

Client:	Wuerzburger Hafen GmbH, Wuerzburg (Germany)
Supervision:	Geotechnisches Institut Prof. Dr. Magar + Partner GbR, Wuerzburg (Germany)
Scope of Works:	installation and operation of two groundwater and soil vapour treatment plants for the removal of TPH and BTEX
Contract Period:	March 2002 till 2007