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Gasworks site renovation

Biological in-situ remediation of contaminated gasworks and coke oven sites.

Sustainable remediation through in-situ degradation of oil and cyanide-containing impurities on gasworks and coke oven sites – bacterial cleaning of soil pollution.

Abstract

The former gasworks or coking plant locations in Germany are consistently subject to all massive pollution, which – in many cases despite already implemented but inadequate remedial measures – still or again represents a danger to people and the environment today. Classic renovations, on the other hand, often pose a major problem, both technically and financially – and in most cases will not lead to ultimate success.

Together with partners, *ekolive* offers in-situ biological rehabilitation that reliably and sustainably achieves the specified rehabilitation goals – even under existing buildings – and without the creation of any critical intermediate or end products. The duration of the overall measure is thus manageable, and significant costs are saved compared to traditional measures.

In the remediation of groundwater and soil pollution, biological in-situ methods are gaining in importance. In this biological process, the pollutants in the soil, i.e., in the spring itself, are mineralized, i.e., they are completely degraded over time. The renovation goals are thus finally achieved.

Need for restoration and consequential damages

Previous renovations and ongoing renovation needs in the vicious circle between failure and cost pressure

The decades of use of the former 1,300 gasworks or coking plants in Germany inevitably led, for various operational reasons and former negligence, to massive pollution, which today represents a danger to people and the environment. Mainly through the targeted bombing during World War II, by-products of coal gasification such as phenols, polycyclic aromatic hydrocarbons (PAHs) and other hydrocarbons got into the ground, from where they elute into the groundwater.


Foto: Wiener Energie

Since the 1980s, many of these contaminated sites have already been either secured or remedied, with attempts to reduce the amounts of pollutants usually through soil replacement, while the groundwater plume was checked using pump-and-treat methods. Today, however, it is evident that many of these costly renovations were inadequate and the threats either remain or are returning. Soil replacement was only carried out in contamination centers and mostly not down to deeper layers, so that many pollutants remained in the soil, which in turn means that the remediation pumps must continue to run indefinitely for reasons of groundwater protection.

In the case of contaminated sites that have not yet been remediated, further problems often arise today: the soils are mostly embankments made up of various materials or sealed surfaces. Landfill capacities, on the other hand, are rare and make soil replacement expensive. If the locations are still being used, there are massive restrictions due to existing infrastructures, buildings, lines – in addition to the dangers for employees and visitors. Large-hole bores only reach part of the contaminated areas and endanger existing buildings.

In many of these cases, what remains is the hope of nature's “monitored natural attenuation”, but these are in turn associated with decades of surveillance and expensive security measures. On the other hand, for reasons of cost, efforts are now being made for a minimum of effort, while at the same time society's critical monitoring of such contaminated sites is increasing – a vicious circle.

Solution approach

Primary elimination of pollutants in the soil and in-situ

In the remediation of groundwater and soil pollution, biological in-situ methods are gaining in importance. These processes use the ability of natural microorganisms to break down organic pollutants. In contrast to the passive "controlled self-cleaning forces", the living conditions for the microorganisms are specifically improved and activated so that the natural process is accelerated by potencies and controlled in a targeted manner. In this way, the contaminated soil remains in its natural storage conditions, dredging or even replacement is avoided, costs and hazards are significantly reduced.

In this biological process, the pollutants in the soil, i.e., in the spring itself, are mineralized, i.e., complete degradation over time to the inorganic end products CO_2 and H_2O. This primarily eliminates the contamination, not a secondary purification of the contaminated groundwater. Remediation goals are finally achieved, the contaminated sites are removed from the cadastre, remediation and monitoring costs are brought to a conclusion, and environmental and health risks are permanently eliminated in the long term.

This also applies to cyanides, which are broken down in a combined application of chemical oxidation and our bacteria.

Advantages

Final achievement of the renovation goals

Direct benefits of in-situ bioremediation:

- Achievement of the specified remediation targets (soil remediation target = reduction of the pollutant inventory; groundwater remediation target = undercutting the maximum permissible emission values).
- Full-area and sustainable in-situ remediation of the entire contamination area (also beyond property boundaries) from the surface to the sealing layer – also under existing buildings.
- No minimum distances to buildings and lines – ergo no gaps in renovation and no renovation demolition; no effects on existing underground lines, neither on plastics, PE, steel.
- Preservation of the structure and structure of the existing soil structure.
- Ecological in-situ remediation method without the creation of any critical intermediate and end products (since in-situ also without highly toxic volatilization of the cyanides) without negative effects on the existing flora.
- Minimal disruption to ongoing operations – no restriction of public traffic, no evacuation of the workforce necessary.
- Minimal visibility of the renovation measures.
- Manageable duration of the overall measure.
- Significant cost savings compared to alternative soil replacement measures.

Minimally invasive and visible intervention – avoidance of all follow-up costs

Indirect benefits of in-situ bioremediation:

- No need for excavation; no excavation work; no excavated material; no disposal (dumping) of excavated material; no logistics for disposal; no costs for excavation and excavation consequences.
- No need to backfill large holes; no backfilling work; no costs for backfilling and backfilling consequences.
- No need to relocate supply lines; no costs for infrastructure work.
- Elimination of any risk of repeated exceeding of the measurement limit values; no risk of subsequent renovation requirements.
- Elimination of high negative secondary effects due to the volatilization of the highly hazardous or carcinogenic contaminants after their exposure.
- Elimination of high negative visibility due to long-term construction work with high protective measures (protective suits, gas masks) and company evacuation over the entire construction phase.
- No need to change soil conditions; no change in groundwater flows (through backfilling) with subsequent risks of further pollutants being washed out.
- No endangerment of foundations and building structures; no settlement risks; no vibrations (=> no consequential risks)
- Elimination of the need to evacuate the company premises for the duration of the renovation (=> no follow-up costs, no follow-up risks regarding the willingness of the workforce to return to the company premises)
- Positive portrayal of contaminated site operators as environmentally and health-conscious actors.

Imprint and contakt

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Our offer

ekolive is the first and leading provider of a new ecological bioleaching method for the ecological release of elements and the breakdown of organic contaminants.