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BULLETIN 2025

- Benzene under control
- Rooftop Constructed Wetland
- We actively help Ukraine

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Looking Back at 2025

Dear friends and business partners,

The year 2025 was marked for most of us by efforts to mitigate the consequences of the freight train accident involving benzene near the Hustopeče nad Bečvou railway station. I would therefore like to offer a brief reflection on the activities of our company's emergency response service during this incident and over the course of the year.

The emergency service began its operations in 1996 with an intervention at the Kmetiněves site, where 1.3 million liters of gasoline leaked in a hydrogeologically sensitive area of the Czech Cretaceous Basin. This incident demonstrated our ability to respond quickly to emerging situations, including working safely in environments with elevated fire and explosion risks.

Nearly 30 years have passed, during which the emergency service has become a respected unit responsible for managing chemical accident aftermaths, including highly toxic substances. It has been integrated into the Czech Republic's safety infrastructure. The professionalism of our experts is further evidenced by successful interventions abroad, even in areas near armed conflicts.

The accident in the Hustopeče nad Bečvou area at the end of February this year (the largest benzene accident in the world to date, with high risk levels) placed significant demands on our staff's expertise, rapid risk assessment capabilities, and the application of new remediation technologies. The handling of this incident showed that the emergency response system we have developed over nearly 30 years has demonstrated a high level of effectiveness, especially this year.

The strength of our company was also evident in our ability to collaborate efficiently across departments. During the critical phase of addressing this incident, I was repeatedly reminded of the proverb: "One stick breaks easily, but a bundle does not". This great wisdom applies to our company as well, where the ability to cooperate and the extraordinary commitment to resolving the accident across the entire organization demonstrated Dekonta's strength. I extend my sincere thanks to everyone who made this possible.

Looking ahead (given the deteriorating security situation not only in Europe), I clearly feel that the importance of our company will grow. As part of strengthening the resilience of the Czech Republic's critical infrastructure, the role of the emergency service will increase. I would therefore like to thank all our employees for the work we accomplished in 2025. The often- mentioned "strength of Dekonta" fills me with pride as we move into the coming year.

Ing. Petr Mothejl
Member of the Board of Directors DEKONTA Holding, a.s.

1.

FREIGHT TRAIN ACCIDENT INVOLVING BENZENE TRANSPORT IN THE CZECH TOWN OF HUSTOPEČE NAD BEČVOU

Petr Mothejl, Ondřej Lhotský

ACCIDENT OVERVIEW

On February 28, 2025, at 11:40 a.m., a serious railway accident occurred at Hustopeče nad Bečvou railway station involving freight train Pn 52690, which was transporting pure benzene produced by DEZA, a.s. in Valašské Meziříčí. Out of 17 tank cars carrying a total of 1,020 tonnes of benzene, 14 derailed and subsequently caught fire.

The blaze affected 15 cars in total, most of which failed under the combined effects of mechanical impact and intense heat. The loss of structural integrity led to benzene leakage, followed by combustion accompanied by heavy soot generation. A portion of the benzene burned off, some infiltrated the subsurface and groundwater, while another fraction remained trapped within the wreckage of the tank cars.

INITIAL RESPONSE AND INVOLVEMENT OF DEKONTA

From the very beginning, it was clear that the accident represented an exceptionally large-scale environmental incident with a high risk of impacting all components of the environment. The emergency response was complicated by the presence of high concentrations of benzene vapours, as benzene is a highly toxic, carcinogenic, mutagenic, explosive, and extremely flammable substance. Its wide explosion range (1.2–8.6 vol%), combined with its toxicity, posed a major hazard to all rescue and remediation operations.

„EMERGENCY PHASE"OF THE INCIDENT

On March 4, 2025, DEKONTA, a.s. – as a recognized component of the Integrated Rescue System of the Czech Republic (IRS) with nationwide competence – was officially called upon to assist in rescue and remediation efforts. From March 5 onward, DEKONTA's teams were fully deployed on site, with the primary objective of minimizing environmental damage and preventing further spread of contamination.

EXTREME SITE HAZARD

The situation was complicated by several critical factors:

- **A large amount of benzene released** – according to initial estimates, up to 300 m^3 infiltrated into the subsurface over an area of approximately 45 000 m^2.
- **Highly permeable subsoil,** consisting of gravel and sand deposits of the Pleistocene terrace of the Bečva River, with the groundwater table only 2.5 metres below the surface.
- **Groundwater flow directed** south and southwest toward the Bečva River and a nearby gravel pit used for fish farming, located merely 100 metres from the accident site.

A bird's eye view of the affected area

SITE INVESTIGATION AND EMERGENCY BENZENE PUMPING

Given these conditions, it was crucial to rapidly delineate the extent and migration pathways of the contamination. Instead of conventional drilling, hand-dug test pits were established between the railway tracks to save time. Later, the investigation was supplemented by the Membrane Interface Probe (MIP) method provided by Geoprobe, a modern technology enabling in-situ detection of volatile organic compounds and their horizontal distribution in the subsurface.

The results confirmed a rapid migration of free-phase benzene through preferential flow zones toward the peninsula extending into the nearest gravel pit.

Simultaneously, benzene was being pumped from the groundwater surface, with work often continuing through the night under strict safety protocols and the use of full chemical protective equipment. The required respiratory and body protection standards were initially determined by the Fire Rescue Service of the Czech Republic and later refined by the Regional Public Health Authority in Olomouc, based on real-time measurements of airborne benzene vapour concentrations.

THE BENZENE SPILL, COMBINED WITH THE RISKY LOCATION, PERMEABLE SUBSOIL, AND NEARBY WATER BODY, CLEARLY INDICATED AN EXCEPTIONALLY EXTENSIVE ECOLOGICAL EVENT WITH A HIGH RISK OF ENDANGERING ALL COMPONENTS OF THE ENVIRONMENT.

Establishment of dug probes and simultaneous measurement of benzene levels in the air

In cooperation with the Fire Rescue Service, DEKONTA, a.s. also installed sorption barriers on the surface of the gravel pit, effectively preventing further spread of contamination across the water surface.

FINDINGS AND KEY DECISIONS

On March 18, 2025, based on the results of the site investigation, an initial mass balance of the released benzene and its distribution was carried out. The assessment confirmed that:

- 200–300 m^3 of benzene had leaked into the subsurface environment,
- benzene was rapidly spreading as a free phase floating on the groundwater table, while simultaneously dissolving and migrating with the groundwater flow,
- the existing emergency measures were insufficient to prevent contamination of surface waters,
- there was an urgent need to increase financial resources and reinforce the response operations and
- the contaminated area had to be isolated using sheet pile walls to prevent further migration of free-phase benzene and highly contaminated groundwater.

These findings were presented on March 26, 2025, at the second meeting of the Crisis Committee of the Ministry of the Environment of the Czech Republic, leading to a decision to accelerate remedial measures and secure funding for the cleanup operations. A crucial step was also the declaration of a state of danger by the Governor of the Olomouc Region, Ladislav Okleštěk, which allowed for more flexible coordination of the emergency response.

Work management was divided into two main components: the technical section, led by Ing. Petr Mothejl, and the economic and organizational section, headed by Mgr. Karel Petrželka. Field activities continued around the clock, focusing on free-phase benzene extraction, construction of the sheet pile barrier, installation of remediation wells, and continuous environmental monitoring.

Following a series of discussions with state authorities, DEKONTA's strategy for the next phase was approved: to retain the contamination source in the unsaturated zone, concentrate efforts on preventing the migration of benzene (both in dissolved and free-phase forms), and subsequently remove free-phase benzene from the groundwater surface.

EMERGENCY AND REMEDIATION OPERATIONS AFTER APRIL 23, 2025

On April 23, 2025, the third meeting of the Crisis Committee was held at the Ministry of the Environment, attended by the Ministers of Transport and Environment along with representatives of other key institutions.

The main agenda focused on proposed emergency and remediation measures and the setting of priorities based on the requirements of the respective ministries. At the same time, updated information on the site situation was presented – according to the available data, approximately 98% of the released benzene had been successfully contained within the area enclosed by the sheet pile walls.

RAPID RESTORATION OF RAILWAY TRAFFIC

A clear priority was the swift restoration of railway operations. Investigations revealed that beneath the track bed lay a continuous layer of impermeable clay, which had prevented benzene from infiltrating directly under the railway. Instead, the contaminant had migrated laterally along the clay barrier, seeping into adjacent zones.

This geological configuration made it possible to rapidly decontaminate the railway area. The operation involved removing heavily contaminated slag from the railway subgrade and relocating it to a so-called infiltration lagoon located further

Prevention of benzene spreading on the water surface using sorption snakes

Firefighters from the State Fire Service also assisted in creating the probes, ready to intervene in the event of an explosion

Pumping pure benzene into a specialized hazardous waste tank of the Firefighters Decontamination Unit

Site remediation technology in the presence of benzene in the air

CONCEPT OF THE EMERGENCY REMEDIATION PROJECT

Based on consensus among all participating institutions, an Emergency Remediation Project was developed with the aim of achieving a gradual and safe removal of contamination. The project was structured around five main pillars:

- **Focus on the removal of free-phase benzene** – priority was given to extracting the free-phase benzene first, followed by remediation of its dissolved form.
- **Hydraulic isolation** – maintaining the groundwater level inside the sheet pile-enclosed area lower than in the surrounding environment to prevent the migration of contaminated water.
- **Use of large-capacity activated carbon (AC) filters** – for the treatment of contaminated water containing dissolved benzene and its subsequent discharge into the adjacent gravel pit.
- **Intensive pumping of water with dissolved contamination after the removal of the free phase** – ensuring that the maximum possible amount of benzene is extracted in its free-phase form, which is economically most efficient.
- **Laboratory and pilot testing of supplementary methods** and their gradual implementation into practice.

south. After the accident, this lagoon had accumulated a large volume of liquid benzene, which subsequently burned and seeped into the groundwater.

Following the relocation of the contaminated slag, the area with the newly placed material was sealed with a bentonite liner and additional protective layers, enabling the immediate reconstruction of the railway line. Thanks to this coordinated effort, railway traffic was successfully restored as early as June 15, 2025.

OPERATION OF THE REMEDIATION SYSTEM

Since May 13, 2025, the site has been operated by an **automated remediation system equipped** with three activated carbon (AC) filters, each with a capacity of 20 m^3 / 10 tonnes of AC. Two filters are continuously operated in series, ensuring uninterrupted treatment performance.

The system treats water containing up to 1.8 g/L of benzene at the inlet with 100% efficiency, enabling the discharge of purified water into the surface waters of the adjacent gravel pit. Once saturated, the used activated carbon is transported in tank trucks to Austria for reactivation, while the same truck simultaneously delivers a fresh AC charge back to the site.

As part of the evaluation of potential pre-treatment technologies, the **Macroporous Membrane Polymer Extraction (MPPE) system,** supplied by Veolia, was identified as a suitable extraction technology. Testing confirmed its high efficiency and operational safety; however, due to transportation

Measuring the amount of benzene in the air

Pumping benzene from an excavation site

Benzene removal by a specialized team of firefighters Dekonta

Large-capacity activated carbon filters

costs and an uncertain deployment schedule, the method was not implemented in practice. Alternative technologies were assessed but found to be unsuitable for site conditions.

INNOVATIVE IN SITU METHODS

Pilot testing of **colloidal activated carbon (CAC)** application confirmed a sorption capacity comparable to that of the granular activated carbon used in filtration systems. Direct injection into the subsurface environment resulted in a significant reduction of benzene concentrations. Laboratory analyses further demonstrated that benzene adsorbed onto the colloidal carbon can subsequently be effectively biodegraded.

Based on these results, a full-scale application project of the reagent was prepared. In total, more than **32 tonnes** of colloidal activated carbon were applied at the site, supplied by the U.S. remediation technology manufacturer Regenesis (products PetroFix and PlumeStop).

SONIC DRILLING – A MODERN INVESTIGATION TECHNOLOGY

One of the technical highlights of the project was the **deployment of sonic (resonant) drilling technology.** This method uses high-frequency vibrations to penetrate geological formations, allowing for very rapid collection of **undisturbed core samples**. In the Czech Republic, this was only the second-ever use of this technique, provided by the Belgian company **Geosonda**. Within just 4.5 days, 25 boreholes were drilled to an average depth of 7 metres. The use of sonic drilling significantly accelerated the site investigation and yielded detailed, high-resolution data on the geological structure of the subsurface.

NEXT STEPS

Laboratory and pilot tests of in-situ chemical oxidation (ISCO) and biodegradation technologies have confirmed their **high efficiency in benzene removal.** Application projects for these agents have already been developed, and their implementation is expected in the coming months.

THE ACCIDENT BROUGHT MANY NEW EXPERIENCES WITH THE USE OF INNOVATIVE TECHNOLOGIES AND THE SEARCH FOR UNIQUE REMEDIATION PROCEDURES.

ACKNOWLEDGEMENTS

Although the site has not yet been fully remediated, the most severe environmental risks in the immediate vicinity of the accident – particularly the threat to surface waters and the Bečva River – have already been eliminated.

Today, modern remediation technologies are installed and successfully tested on-site, several of which have been used in the Czech Republic for the first time. With some hindsight, it is now possible to look back on the so-called "hot phase" of the emergency response, which took place from March 4 to approximately April 21, 2025.

Given that the benzene tanker train accident in Hustopeče nad Bečvou represents the largest incident of its kind worldwide, and that the risks associated with the on-site operations were exceptionally high, I would like to express my sincere gratitude to all employees of DEKONTA who participated in the emergency and remediation response.

Thanks to their courage, professionalism, and technical expertise, the situation was successfully brought under control and gradually stabilized.

The work carried out during the "hot phase" took place under extremely demanding conditions and required both personal commitment and extraordinary bravery.

In addition to the members of DEKONTA's Emergency Response Division, staff from other divisions and subsidiaries – including **AQD-envitest, s.r.o.** – also took part in the intervention with full dedication.

Special thanks are extended to **Ondřej Lhotský, Vladislav Knytl, Milan Mrázek,** and other colleagues who performed exceptionally challenging work on site. **Hydrogeological support** during this initial phase was provided by **RNDr. Zdeněk Koch (Vodní zdroje Chrudim, s.r.o.),** continuing a more than twenty-year collaboration with DEKONTA's Emergency Response Division in managing environmental emergencies.

Significant credit for the successful outcome of the operation also goes to the **Fire Rescue Service of the Czech Republic, the Czech Environmental Inspectorate** and **the Ministry of the Environment of the Czech Republic,** to whom sincere thanks are likewise extended.

Ing. Petr Mothejl, DEKONTA, a.s.

2.

REMEDIATION OF HISTORICAL ENVIRONMENTAL CONTAMINATION

AT THE TANEX-KORTAN SITE

Radek Červinka, Ondřej Urban

Industrial activity at the site dates back to the late 19th century, when the first facilities for sulfuric acid production were established. From around 1900, the focus shifted toward manufacturing products for the leather and textile industries. Tanning agents were produced here starting in 1945.

After 1970, the plant began producing powdered chromium and aluminium salts, reaching its peak output between 1980 and 1994. In 1990, the state-owned enterprise ZAZ Jaroměř, Plant No. 4 – Hrádek nad Nisou was transformed into the joint-stock company TANEX a.s.

During decades of industrial activity, the site became heavily contaminated – primarily with trivalent and hexavalent chromium. Today, these pollutants pose a serious threat to groundwater resources in the nearby residential area and are spreading toward the Lusatian Neisse River. The necessity for remediation arose from earlier environmental investigations and was confirmed by the Risk Analysis Report (2022). The main objective of the clean-up work is to remove chromium hotspots present in building structures, soil, and groundwater within the company's premises, thereby preventing further migration of toxic hexavalent chromium into the aquifer system. Remediation target limits were set at 1,000 mg/kg dry weight of total chromium for the unsaturated zone and building materials, and 0.5 mg/L Cr6+ for groundwater within the site.

At the beginning of the project, hazardous historical chemicals were removed from all above-ground and underground tanks and sumps. These contained mainly industrial wastewater with high concentrations of chromium and phenols. Subsequently, selected buildings on the site were gradually demolished. One particularly interesting discovery was a set of historical reduction pits designed to convert hexavalent chromium (Cr6+) to its less toxic trivalent form (Cr3+) – a process once used in the leather industry. Technologically, the reduction involved sodium dichromate, which, in an acidic sulfuric environ-

1 *Historical tank with sodium dichromate*
2 *Detail of chrome water*

1

2

ment and with the addition of sugars, was reduced to chromium sulphate, a compound suitable for tanning leather. These circular reduction pits were hidden beneath a double concrete floor in the foundation of a sheet-metal warehouse and were filled with bright yellow chromium-containing water and construction debris. The total chromium concentration in the pits was around 5 g/L (predominantly as Cr6+), amounting to an estimated 19 kilograms of chromium in total. By removing these structures, a significant and clearly defined source of groundwater contamination within the site was successfully eliminated.

Before the excavation of contaminated soils, a reactive geochemical barrier was constructed along the downgradient boundary of the site. The barrier consisted of a line of wells drilled into the Quaternary aquifer. These wells were subsequently injected with a suspension of a composite micro- and nano-scale zero-valent iron (nZVI) material, and equipped with a unique electroreduction system featuring automated monitoring of electrochemical parameters. The principle of direct current (DC) support for nZVI involves supplying electrons into the geological medium via a DC current of suitable current density—high enough to exceed the so-called practical decomposition voltage, at which the electrolysis of water occurs. The synergistic interaction between the applied current, nZVI particles, and naturally occurring iron phases in the rock matrix significantly enhances the efficiency of reductive processes. In the vicinity of the cathode, pH levels can rise to as high as 14, while the redox potential (Eh) decreases toward the stability limit of water. The main advantage of this method lies in the "preservation" of the iron particle surfaces, preventing premature oxidation and thereby substantially extending the reagent's lifetime. This allows strongly reducing conditions to be maintained for a longer period. The DC-supported nZVI method is protected under Patent No. 304152 – "In-situ remediation method for rock environments contaminated by harmful chemical compounds", owned by MEGA a.s. and the Technical University of Liberec.

At present, excavation of soils in the unsaturated zone is underway at selected hotspots identified during the detailed site investigation conducted at the beginning of the project. In the most heavily contaminated areas, chromium concentrations in soils reach several tens of thousands of mg/kg dry weight, sometimes accompanied by mixed contamination with phenols, recognizable by their characteristic "hospital-like" odor. For on-site, real-time monitoring of chromium concentrations in excavated soils, a handheld X-ray fluorescence (XRF) spectrometer Delta is being used. The subsequent remediation of the saturated zone will be carried out through direct-push injection of an nZVI (nano zero-valent iron) suspension into the affected Quaternary aquifer, targeting the areas with the highest levels of contamination.

Baseline and annual groundwater monitoring confirmed significant contamination of the Quaternary aquifer by chromium and its gradual migration toward the nearby residential area and the Lusatian Neisse River. Within the industrial site, the highest Cr6+ concentrations in groundwater reach several milligrams per liter, while the most affected domestic wells contain up to 1 mg/L Cr6+. For comparison, the drinking water limit for total chromium is 0.025 mg/L. The monitoring network has also been expanded with five new hydrogeological wells.

The four-year remediation project (May 2024 – May 2028) is being implemented under a contract between KORTAN s.r.o. and the remediation company DEKONTA, a.s. A major contribution to the technical implementation is provided by MEGA a.s. The project is co-funded by the European Union through the Operational Programme Environment and supported by the budget of the Liberec Region.

Demolition of tanks using hydraulic shears

Injection of nZVI composite

3.

ROOFTOP CONSTRUCTED WETLAND FOR WASTEWATER TREATMENT IN BAŠŤ

COMBINING WATER PURIFICATION AND GREEN ROOF TECHNOLOGY

Ondřej Perlinger, Petr Dočekal

INTRODUCTION

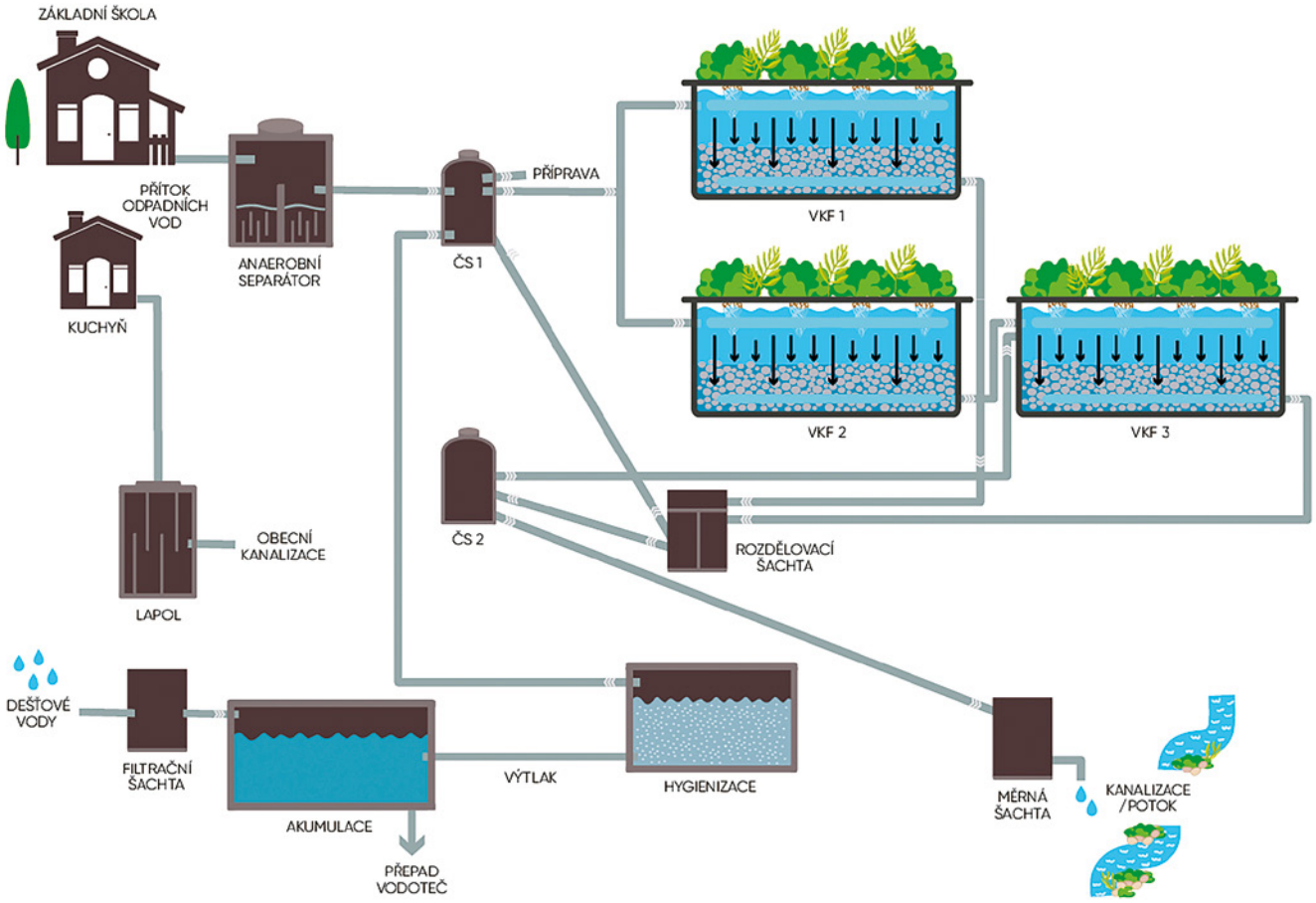
Constructed wetlands have been used for more than 50 years as a proven and reliable technology for wastewater treatment, ensuring compliance with regulatory discharge limits. This system is suitable for treating wastewater from a wide range of sources – from individual buildings and recreational facilities to small towns and municipalities.

Green roofs, on the other hand, are becoming increasingly common not only on newly constructed office buildings, apartment complexes, and family homes, but also as part of the renovation of existing structures. Their purpose is to revitalize urban and suburban environments, providing benefits not only for residents and employees but also for plants and wildlife, by creating a more hospitable and ecologically balanced living space.

The combination of these two elements – a rooftop constructed wetland and a green roof – is still relatively uncommon. That is why we are pleased to present the recently completed rooftop constructed wetland system, which forms part of the project "New Elementary School Building in Bašť", designed by the architectural consortium BARAAK architekti s.r.o., Dvořák & Partneři s.r.o., and Banality Studio.

The project investor is the Union of Municipalities "Pod Beckovem", which includes the villages Líbeznice, Bašť, Měšice, Zlonín, Předboj, and Bořanovice.

DEKONTA, a.s. had the opportunity to participate in this project from the preparation phase through to implementation. The rooftop constructed wetland, designed for a capacity of up to 240 population equivalents (PE), is highlighted in the following visualization of the entire project.



Schematic diagram of wastewater management

STRUCTURAL DESIGN

The entire wastewater management concept was developed based on the investor's requirements and local site conditions—specifically, the need to save space and the impossibility of discharging wastewater into the municipal sewer system. The constructed wetland itself occupies one-third of the roof area of the new two-story school building for upper-grade students, located in the center of the entire complex. As shown in the visualization above, the remaining two-thirds of the roof surfaces of the new school buildings were designed as extensive green roofs, visually blending with the rooftop constructed wetland into a unified landscape element.

The purpose of the rooftop constructed wetland in Bašť is to treat wastewater generated by the school's daily operation. Rainwater and wastewater from the school kitchen are managed separately. Effluent from the school kitchen passes through a grease trap (lapol) before being discharged into the sewer system, while a portion of the rainwater is intended for diluting and supplementing sanitary wastewater during periods when the school is closed (holidays and breaks). After hygienic treat-

View of the former farmyard area in the center of Bašť before the start of construction works.

Visualization of the final appearance of the elementary school complex and its surroundings after completion of all planned construction phases. (Source: https://baraak.cz/project/zakladni-skola-bast, accessed July 26, 2025)

ment, rainwater will also be reused for toilet flushing, further enhancing the sustainability of the system.

Wastewater is first directed into an anaerobic separator located in the southeastern corner of the site. The separator consists of prefabricated reinforced-concrete multi-chamber septic tanks divided by polypropylene (PP) wall panels, providing a hydraulic retention time of three days and a total volume of 61.9 m^3. From the anaerobic separator, the pretreated water flows into a pumping station, where it is pulsed to the rooftop by a pair of pumps to irrigate the rooftop constructed wetland filter.

One of the pumping stations also receives inflow from the technical room, where rainwater undergoes hygienic treatment. This treated rainwater is used to supplement the water supply to the rooftop wetland in case of insufficient inflow from school operation or during periods of inactivity, such as holidays or summer breaks, preventing the drying of the root filter. The second pumping station, designed for recirculation, receives water by gravity from the distribution chamber (or storage tank) and then pulses it back to the rooftop wetland filter.

Collection piping made of PVC DN 110 before the placement of the filter layers (left), and distribution piping made of PP DN 110 together with perforated PP pipes (d40) on the filter surface, covered with halved PVC pipe profiles before being overlaid with a load-bearing layer of washed gravel (right).

The rooftop constructed wetland before planting.

The rooftop root-zone filter covers an area of 640 m^2, with a filter bed approximately one meter thick. It is divided into three sections: the main filters VKF 1 (265 m^2) and VKF 2 (269 m^2), which treat pre-settled water from the anaerobic separator, and a smaller recirculation filter VKF 3 (106 m^2). The entire roof structure is designed as a watertight containment basin equipped with several safety overflow systems. The filter layers are composed of lightweight aggregate of various fractions, providing drainage, filtration, and resistance to wind uplift.

At the bottom, a collection pipe system fitted with inspection risers drains the treated water, while the top layer contains perforated distribution pipes that deliver water evenly across the filter surface. System safety is ensured by three overflow channels that direct excess water to adjacent green roofs and one emergency drain connected to the outlet pipe. Thanks to these measures, the roof cannot be flooded in case of a pipeline failure, and the structural load always remains within safe limits.

AFTER COMPLETION OF THE ENTIRE FILTER LAYER STRUCTURE, THE SURFACE WAS PLANTED WITH WETLAND VEGETATION.

The treated wastewater will be discharged through a measuring chamber into a pressurized sewer system, and subsequently into a surface watercourse.

Inside the chamber, a Parshall flume equipped with an ultrasonic sensor continuously monitors the flow rate of the discharged water and automatically transmits the recorded data. The measuring chamber also allows for the collection of water samples for accredited laboratory analysis of the treated effluent quality.

CONCLUSION

Although the constructed wetland represents only a small part of the overall project, it plays a significant role as a practical example of on-site wastewater management. The school's operation not only creates an environment where children can naturally learn about the water cycle and the importance of responsible water use, but also serves as a tangible demonstration of an innovative connection between a constructed wetland and green roof technology.

DEKONTA SUPPORTS UKRAINE:
FROM HUMANITARIAN AID TO ENVIRONMENTAL PROJECTS

Martin Polák, Pavel Mothejl

Since the beginning of the war in Ukraine in February 2022, the Czech company DEKONTA has been actively involved in assisting the country affected by the conflict. As early as May 2022, the company began providing humanitarian aid, which included accommodation for refugees, vehicle deliveries for the Ukrainian army (in particular for Czech volunteers), and ten mobile drinking water treatment units. The support also included financial donations.

DEKONTA has become a member of the Ukrainian–Czech Chamber of Commerce, the Czech– Ukrainian Joint Chamber of Commerce, and the Business Club Ukraine at the Ministry of Industry and Trade of the Czech Republic. These steps have enabled the company to establish closer cooperation with Ukrainian partners and state institutions.

DEVELOPMENT AND ENVIRONMENTAL PROJECTS

From the second year of the conflict, DEKONTA began focusing on project acquisitions in Ukraine and gradually secured several important projects within the framework of state-funded assistance:

1.

KALYNIVKA Proposal for Remedial Measures

Programme: Aid for Trade Ukraine
Year: 2024
Description: Design of remedial measures for a contaminated site. The project has been initiated and completed; the announcement of the implementation tender is currently pending.

2.

DNIPROPETROVSK REGION Environmental Liabilities I

Programme: Czech Development Agency
Year: 2024
Description: Identification and assessment of 40 environmental hotspots. Preliminary investigations were conducted at ten sites, and two locations were selected for detailed surveys.

3.

DNIPROPETROVSK REGION Environmental Liabilities II

Programme: Czech Development Agency
Year: 2025
Description: Continuation of the project aimed at identifying an additional 40 environmental hotspots, collecting samples at ten sites, and carrying out detailed investigations at two locations.

4.

KYIV REGION Environmental Survey

Programme: UNEP (United Nations Environment Programme)
Year: 2025
Description: Desk review of industrial and agricultural sites, on-site inspections, and sampling at 4–6 selected locations.

For our activities, we received an award from the Business Club Ukraine for our long-term support and professional assistance in the restoration and protection of the environment – an appreciation we value deeply and a motivation for us to continue our efforts.

5.

REMOVAL OF PCB-CONTAMINATED WASTE FROM THE CHEMKO STRÁŽSKE AREA

Vojtěch Musil, Adam Titěra

INTRODUCTION

Over the course of several decades of full operation at the CHEMKO chemical plant in Strážske, eastern Slovakia, various types of waste with high concentrations of PCB compounds (polychlorinated biphenyls) were generated. Following an emergency response intervention, some of these wastes, together with other PCB-contaminated materials such as soil and concrete, were temporarily stored in 17 ADR-certified containers that remained on site. Four of these containers held drums filled with liquid, semi-liquid, and solid chemical substances containing high levels of PCBs and other chlorinated compounds. Some of the drums also contained gasoline and diesel mixed with PCB oils, while the majority consisted of construction debris combined with PCB resins, corroded metal drums, and other PCB-contaminated waste materials.

In view of the unsatisfactory condition of temporary waste storage in ADR containers at the CHEMKO Strážské site, it was decided that this waste must be removed from the site as a matter of priority. The Slovak Ministry of the Environment announced a tender for work related to the sorting, repackaging, and subsequent removal and disposal of waste, which was won by DEKONTA in cooperation with the Slovak company DETOX

PREPARATORY WORKS

Before the commencement of on-site activities, careful preparation and planning were carried out, including the development of a technological procedure and the approval of the work plan by the competent authorities and the site owner. A technical base was subsequently established at the site, consisting primarily of a covered mobile hall for waste handling and secured temporary storage areas.

Prior to initiating waste manipulation and repackaging, surface soil samples were collected from the designated work area in order to determine baseline contamination levels. These reference values will allow for a future assessment of whether any unintended releases of PCB compounds into the environment occurred during the remediation works.

Repackaging and removal of waste from the site

REPACKAGING AND DISPOSAL OF WASTE

The work took place, with only short interruptions, over several months from the end of April to the beginning of September 2025. It was carried out by employees of DEKONTA IC in cooperation with DETOX, which mainly coordinated waste transport. On average, a team of 8 to 10 workers participated in the operation.

Waste handling for loose materials was performed directly inside the original containers, which were moved as needed into the covered mobile hall. The material was carefully sorted, and all unwanted components such as metal drums, wood, used personal protective equipment, and plastic debris were removed. The remaining rubble was crushed to a maximum fragment size of ten centimetres.

When handling drums, particular attention was paid to safety during opening. All manipulation was performed manually using non-sparking tools. Liquid and semi-liquid wastes were transferred from old drums into new UN-certified drums, while highly viscous materials were removed by hand using simple tools. Each drum was filled so that the total weight did not exceed 60 kilograms. Empty and emptied drums were then cut into pieces with a maximum edge length of 10 centimetres and repacked into UN drums.

All activities were conducted under strict safety measures with the use of appropriate protective equipment. Workers were equipped with disposable coveralls, full-face masks fitted with combination filters, and special chemical-resistant gloves. The work was physically demanding not only because of the manipulation of toxic PCB-containing materials but also due to the long hours spent in the enclosed space of the mobile hall, which required constant ventilation and regular rotation of work shifts. Every operation from opening drums to transferring viscous materials, repackaging and cutting demanded maximum concentration and precision to prevent any accident or release of hazardous substances into the environment.

After all the wastes stored in the original ADR containers had been sorted and repackaged, the emptied containers were decontaminated using chemical and sorptive agents to allow their environmentally safe disposal. In total, 162 tonnes of waste were transported for final destruction to an industrial waste incineration plant in Vienna, as there is currently no facility in Slovakia capable of safely treating PCB-containing waste of this type.

WHAT COMES NEXT?

The completion of this project did not bring the work at the CHEMKO Strážske site to an end. On the contrary, further stages of remediation are already being prepared. A public tender is expected to be announced for the next stage of remediation, which will involve the repackaging of approximately 5,000 to 9,000 drums currently stored loosely in an underground bunker at the site. These works are planned to take place in 2026.

6.

WE DESIGN SYSTEMIC ENVIRONMENTAL SOLUTIONS IN BOSNIA AND HERZEGOVINA

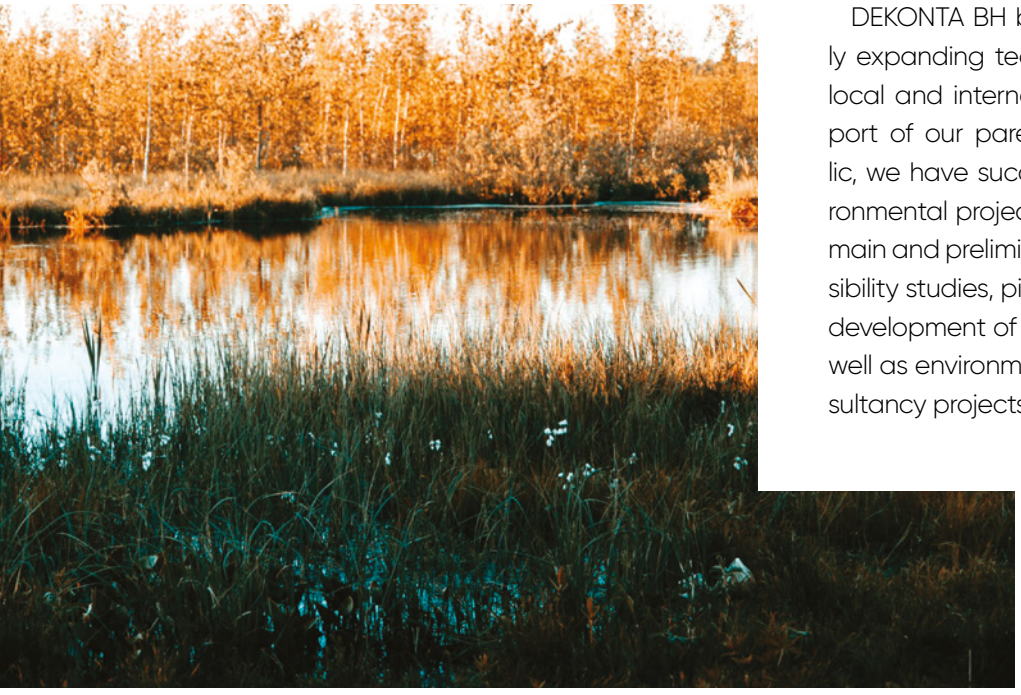
Mgr. Maja Čolović Daul
managing director
Dekonta BH d.o.o.

Our sister company, DEKONTA BH d.o.o., has been operating in Bosnia and Herzegovina since 2019 and has quickly become a respected partner in the field of environmental protection. In an interview with its Managing Director, Maja Čolović Daul, we talked about successful projects that help develop the country's infrastructure, the challenges the region faces, and the company's plans for 2026.

Could you briefly introduce your company and team for our readers?

DEKONTA BH d.o.o. (DEKONTA BH), was established in 2019, based in Sarajevo. An achieving excellence and employing innovative approaches and technologies for sustainable environmental protection are at the heart of our mission. We prioritize providing the best working conditions and treating our employees with dignity and respect, a commitment recognized by our three consecutive wins of the SDG Business Pioneers Award in the People category from 2021 to 2023.

DEKONTA BH boasts a permanent and continually expanding team of experts. In collaboration with local and international partners, and with the support of our parent company in the Czech Republic, we have successfully completed over thirty environmental projects since our founding. These include main and preliminary designs, site investigations, feasibility studies, pilot tests, research and development, development of strategic documentation, planes, as well as environmental and waste management consultancy projects.



Our Clients include United Nations Development Programme (UNDP), Deutsche Gesellschaft für Internationale Zusammenarbeit (GiZ), Stockholm Environment Institute (SEI), European Bank for Reconstruction and Development (EBRD), Environmental Fund of the Federation of Bosnia and Herzegovina, World Bank (WB), Governmental institutions, Private Sectors companies, Public sector companies, etc. Core business include Contaminated site investigation & remediation, Waste management, Environmental emergency response, Environmental consulting, Environmental research & development, Wastewater treatment and sludge management, Air emission & odour treatment, Industrial cleaning, etc.

What were the most important projects you worked on in 2025?

In 2025 we delivered two flagship assignments that showcase our ability to pair transaction structuring with national-scale environmental systems. As Technical, Environmental & Social Consultant for the Butile WWTP PPP (Sarajevo) the first PPP planned for a public utility under the new PPP law we prepared the full bankability package: due diligence and risk allocation, PPP option analysis and financial modelling, ESG safeguards (incl. sludge-management solution), stakeholder engagement, and draft tender/contract documentation to set a repeatable template for future municipal PPPs. In parallel, we led the Bosnia and Herzegovina Environmental Hotspots Mapping project, building a country-wide database and GIS-enabled inventory that applies standardized scoring to identify and prioritize contaminated sites, links sites to targeted remediation options and an investment pipeline, and includes governance protocols, dashboards, and training so national and local institutions can manage, update, and use the data for permitting and land-use decisions aligned with EU standards.

Which project are you most proud of and why?

Efficient Waste Management System in Sarajevo Canton (Oct 2021–Dec 2023) financed by the Czech Government and delivered by Dekonta with People in Need BiH and KJKP RAD is the project we're most proud of. Our team provided technical consulting to upgrade the GIS/tracking system, develop RAD's business strategic plan, improve legal–economic–technical workflows, and plan source-separated collection, sorting, and placement of recyclables. Alongside equipment procurement, hands-on technical assistance, capacity building and a citizen awareness campaign, the project helped reduce disposal volumes and increase separately collected waste across the Canton. What makes this work stand out is the orchestration of a complex stakeholder ekosystém aligning the public utility's departments, multiple municipalities, cantonal/federal ministries, producer responsibility organisations, the private sector and the public. We charted a clear, efficient planning path, introduced a practical roadmap of improvements and changes, and defined obligations for each system actor, laying a strong foundation for sustained, system-wide progress.What are the biggest environmental challenges in your country right now?

What are the biggest environmental challenges in your country right now?

Bosnia and Herzegovina continues to grapple with core environmental issues: municipal waste is still largely landfilled, separate collection is limited and illegal dumping persists; many towns lack fully compliant wastewater treatment and safe, long-term sludge management routes; hazardous waste relies on export due to the absence of national treatment capacity; and legacy industrial hotspots continue to pressure rivers, soils and communities. Closing the gaps will require stronger EPR enforcement and source separation, rehabilitation and regionalisation of landfills, WWTP upgrades coupled with sustainable sludge solutions, creation of hazardous-waste pretreatment and secure storage, and a GIS-based inventory to prioritise remediation and investments aligned with EU standards.

Do you have any exciting news from your company (new contracts, partnerships, awards, or expansions)?

Dekonta BH has been winner for three years in a row 2021, 2022 and 2023 of the prestigious SDG (Sustainable Development Goals) Business Pioneers Award for leaders of sustainable development in the "People" category.

What are your main goals or priorities for 2026?

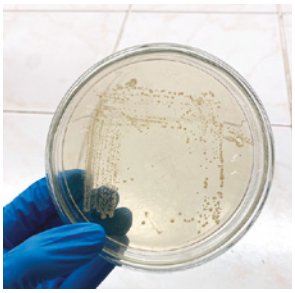
In our previous work, Dekonta has delivered solutions in waste management, contaminated-soil remediation, and sludge treatment and handling. In 2026, we plan to further develop this business line, expand our client base, and offer comprehensive end-to-end solutions for the final management of WWTP sludge from dewatering and drying to recovery or compliant use as recultivation material at degraded areas.

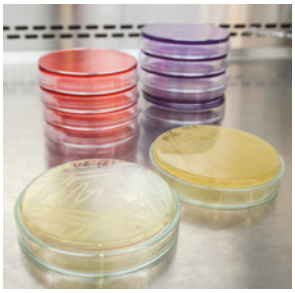
7.

BIODEGRADATION OF MICROPOLLUTANTS

A NATURAL RESPONSE TO A MODERN PROBLEM

Jana Šipanová, Petra Innemanová





Micropollutants are a group of substances that occur in the environment only at trace concentrations, yet they can have a significant ecological impact. With the advancement of high-sensitivity analytical methods, it is now possible to reliably detect them at nanogram-per-millilitre levels. Among the most important are PPCPs (pharmaceuticals and personal care products) – pharmaceuticals and cosmetic or hygiene compounds. These substances can act as endocrine disruptors, interfering with the hormonal balance of organisms and affecting their development and behaviour. Particularly problematic are antibiotic residues, which tend to accumulate around wastewater treatment plants. Their presence has also been confirmed in sewage sludge, which can then be applied to agricultural soils. In such environments, bacteria capable of surviving in the presence of antibiotics may accumulate and transfer resistance genes to other microorganisms. As a result, the spread of antibiotic resistance is accelerated, potentially reducing the effectiveness of standard treatments for common infections in both humans and animals.

The research team of DEKONTA, a.s., in collaboration with the Institute of Microbiology of the Czech Academy of Sciences and other partners, has joined the project "Microorganisms in Ecological Restoration – Bacteria as Cellular Factories for Controlled Bioremediation of Ecosystems", co-funded by the Ministry of Education, Youth and Sports of the Czech Republic (OP JAK programme). The project aims to identify and evaluate microorganisms capable of degrading selected pharmaceutical compounds directly at wastewater treatment plants, thus acting as biological catalysts in situ. DEKONTA's contribution focuses on the isolation of lactic acid bacteria (LAB) from both sewage sludge and food-related sources. Lactic fermentation is a natural anaerobic process in which bacteria convert simple sugars into lactic acid, thereby lowering the pH of the medium and inhibiting the growth of undesirable microorganisms. The main advantage of LAB lies in their natural occurrence in biowaste and food residues, which makes them readily available, cost-effective, and suitable for direct application in wastewater treatment technologies.

The research also involves work with SCOBY – a symbiotic culture of bacteria and yeast, commonly known from kombucha fermentation. The microorganisms within this culture produce a cellulose-based matrix that provides a suitable microenvironment for metabolic activity, thereby enhancing the degradation of target compounds. The SCOBY culture serves as a model ecosystem for studying the influence of fermentation processes on the fate of selected micropollutants. The tested compounds include hormonal substances (e.g., 17β-estradiol), antibiotics (e.g., azithromycin, erythromycin), common analgesics (e.g., ibuprofen, diclofenac), as well as persistent pharmaceuticals such as carbamazepine. These compounds belong to the most frequently detected residues in wastewater and sewage sludge, and their complete degradation by conventional treatment technologies remains challenging.

The aim of the project is to develop a whole-cell biocatalyst based on lactic acid bacteria (LAB) that can be integrated into wastewater treatment processes. The intended outcome is sludge free of hazardous residues, safe for agricultural reuse. This approach is not only environmentally friendly and sustainable, but also economically viable. By combining natural biological processes, modern science, and innovative technologies, we seek new ways to reduce environmental burdens and protect human health and ecosystems. Further details about our research are available at https://micro-biotech.cz/.

DEKONTA OFFERS CLIENTS A FULL RANGE

OF CONSULTING SERVICES IN ENVIRONMENTAL MANAGEMENT AND OCCUPATIONAL HEALTH AND SAFETY

Aleš Kulhánek, Pavel Veselý

We have been providing comprehensive consulting services in the fields of environmental protection and occupational health and safety (OHS) since 2005. Our services include environmental audits, environmental impact assessments (EIA), consultancy in integrated pollution prevention and control (IPPC) and the Integrated Pollution Register (IRZ), as well as the preparation of various documents required by current legislation—such as emergency response plans, operating procedures, and others. We also offer customized consulting and outsourcing services tailored to clients' specific needs.

From the very beginning, most of these services have been provided not only to domestic clients, but also to international companies operating either within the Czech Republic or across Central and Eastern Europe, including the Balkans and post-Soviet countries. This international scope is achieved through cooperation with our sister companies and a network of local partner consultants.

ENVIRONMENTAL AND OCCUPATIONAL HEALTH AND SAFETY AUDITS

We carry out environmental and occupational health and safety audits for both domestic and international clients. These include acquisition audits (Phase I Environmental Due Diligence) and periodic compliance audits assessing conformity with local environmental and safety legislation. Audits can be performed independently for each area or as a combined assessment covering both environmental protection and occupational health and safety.

When acquiring a company, it is essential for investors to identify potential risks in advance and verify whether the audited entity complies with permit conditions and applicable national and EU legal requirements. One of the major potential liabilities may be existing environmental contamination, whose remediation costs would fall on the purchaser. Therefore, each audit also includes an evaluation of waste management practices and the handling of hazardous substances.

If contamination of the site is suspected, we recommend a follow-up Phase II Environmental Audit, which focuses on verifying the presence and extent of contamination in the subsurface environment and estimating the financial implications of remediation.

ENVIRONMENTAL IMPACT ASSESSMENT (EIA)

For clients planning to expand an existing production facility, build a new plant, or install new technology within the Czech Republic, we prepare Environmental Impact Assessment (EIA) studies in accordance with Act No. 100/2001 Coll. Our assessments evaluate both the current environmental conditions and the potential impacts of the proposed project on individual environmental components as well as on human health.

As part of the EIA process (or as independent studies) we provide specialized background assessments, including noise impact analyses, air dispersion modelling, public health impact assessments, biodiversity evaluations, tree-felling assessments, climate impact reviews, and landscape character studies.

INTEGRATED POLLUTION PREVENTION AND CONTROL (IPPC) AND POLLUTANT RELEASE AND TRANSFER REGISTER (PRTR)

We have been active in the fields of Integrated Pollution Prevention and Control (IPPC) and the Pollut-

ant Release and Transfer Register (PRTR) since the respective legislation came into force in 2002 and 2008.

Over the years, we have prepared dozens of applications for integrated permits for facilities in the chemical industry, waste management, automotive sector, and agricultural operations. We provide comprehensive services, including the assessment of pollutant releases and transfers.

We maintain long-term partnerships with many of our clients, assisting them repeatedly throughout the permit cycle. As part of our services, we also prepare the Baseline Report (a mandatory document for selected IPPC installations) including soil and groundwater surveys in accordance with the applicable regulatory requirements.

OUTSOURCING OF ENVIRONMENTAL AND OHS SERVICES

If the client wants to make an investment in the expansion of a production plant or new technology, we offer consultation on the requirements of the applicable legislation on environmental protection and occupational health and safety and advise on the permits that must be obtained for the introduction of the relevant technology. We strive to help speed up the permitting process as much as possible, which is certainly not easy in the Czech Republic.

WE HELP COMPANIES IMPLEMENT AND MAINTAIN MANAGEMENT SYSTEMS

- We assist companies in implementing and maintaining management systems for:
- Quality in accordance with ISO 9001,
- Environmental management in accordance with ISO 14001,
- Occupational health and safety in accordance with ISO 45001
- We provide comprehensive services of a Dangerous Goods Safety Advisor (ADR) for the road transport of hazardous materials, as well as the preparation of emergency plans aimed at protecting water bodies from contamination by hazardous substances. Our work also includes the preparation of operating rules for air pollution sources, waste management facilities, and water structures.

We also offer comprehensive long-term environmental management services, tailored to the client's operations. This includes monitoring and updating operating permits, tracking changes in Czech and EU legislation, and developing strategies to ensure compliance with new regulatory requirements. In addition, we manage the preparation and submission of annual environmental reports covering air, water, waste, the PRTR system, and other mandatory topics.

ESG AND SUSTAINABILITY

We are committed to the positive impact of our activities on the environment and society. We respond to new European legislation and the requirements of our business partners. We address sustainability issues, climate change adaptation and non-financial "ESG" reporting under the European Sustainability Reporting Directive/CSRD and the European Regulation on the Taxonomy of Environmentally Sustainable Economic Activities.

For DEKONTA, Inc. we have developed sustainability and social responsibility policies, assessed the carbon footprint for the years 2022-2024 and prepared a voluntary non-financial sustainability report (VSME) for 2024. These outputs are publicly available on DEKONTA's website.

Sampling of contaminated soil

We provide comprehensive environmental consulting services for Czech and foreign clients in the industrial sector

DEKONTA BREAKING NEWS

PRESENTATION AT THE INTERNATIONAL CONFERENCE AQUACONSOIL 2025

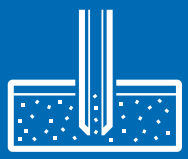
At the prestigious international conference AquaConSoil 2025, held this year in Liège, Belgium, we presented a case study on the remediation of groundwater contaminated with chlorinated ethylenes in low-permeability environments. In cooperation with the Technical University of Liberec, we tested a unique combination of FRAC-IN injections and electrokinetically enhanced distribution of remediation agents. The results of the pilot project demonstrated a significant decrease in contaminant concentrations as well as confirmation of both chemical and biological degradation. The study shows that even complex sites can be remediated effectively.

Practical Demonstration of the FRAC-IN Injection System

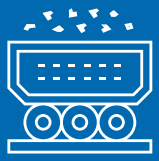
E.ON ENERGY GLOBE – A PRESTIGIOUS COMPETITION

Our photovoltaic panel recycling technology ranked among the top six projects out of 216 participants in the prestigious E.ON Energy Globe competition. Although we did not win this time, we consider it a major success to have presented our project in the finals and demonstrated a practical solution to a pressing question – what to do with solar panels after the end of their service life. The competition also provided an excellent opportunity to raise public awareness of this issue and to gather valuable feedback from both professionals and the general public.

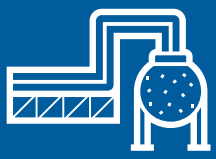
Photo of the finalists Photo - Jan Šmach, NOXmedia



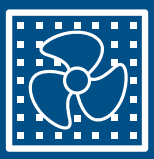
Contaminated Site Investigation & Remediation



Waste Management



Industrial Cleaning



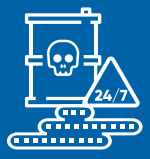
Air Emission & Odour Treatment

Environmental Consulting

Demolition & Earthworks

Accredited Laboratory Services

Research & Development



Emergency Response Services

Waste Water Treatment

Geological survey

Water management

DEKONTA, a.s.
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