



Building on yesterday's Wallonia to create the Wallonia of tomorrow

The brownfield rehabilitation process





SPAQUE is the expert in the Walloon Region in the area of landfill and brownfield rehabilitation and contaminated soil management.



SPAQUE sa

Stakeholder in the economic and sustainable development of Wallonia

SPAQUE was founded in 1991 at the initiative of the Walloon government, with as mission the rehabilitation of landfills in Wallonia. In 2001, it was also tasked by the government with the remediation of brownfields.

Areas of activity

SPAQUE is active in :

- inventory of potentially contaminated sites (Walsols database) ;
- compilation and updating of lists of priority sites for rehabilitation ;
- rehabilitation of contaminated brownfields and landfills ;
- management and maintenance of rehabilitated sites ;
- environmental (air-water-soil) quality and health management ;
- environmental monitoring ;
- water management ;
- property development on rehabilitated sites ;
- use of renewable energies and fight against global warming.

Expertise

SPAQUE is a consultancy firm that employs around 80 people. It brings together high-level experts in engineering, chemistry, geology, biology, architecture, town planning, law, industrial archaeology, geomatics, etc.

SPAQUE was the first public body to rehabilitate landfills and dumps and decontaminate brownfields in Wallonia.

The rehabilitation process

The key strength of SPAQUE is its ability to handle the entire site rehabilitation process. It undertakes its rehabilitation projects according to a **rigorous process : the value chain.**

The value chain is a sequential enumeration of the scientific and technical activities of SPAQUE's production chain, which also integrates cross-cutting activities. This process allows the costs of a rehabilitation project to be optimised through expertise and know-how.

For brownfields, the process is as follows :

- historical review ;
- soil investigations (exploration, characterisation, volumetric analysis) ;
- economic, technical and town planning feasibility studies ;
- analysis of existing risks ;
- rehabilitation and construction works ;
- analysis of residual risks ;
- water management, where applicable.



The soil investigation manager follows the dossier all the way through the soil investigations and the feasibility study



Historical review

Specialists in historical investigation and in the history of industrial processes retrace the history of an industrial site. The result of this activity is a *planum*, which is then passed on to the people who will perform the soil investigations (exploration, characterisation and volumetric analysis). This document localises all the successive activities that were carried out on the site, the potential pollution sources, and any remaining buildings and substructures.



Soil investigations

The site dossier is then entrusted to a single project manager, a soil investigation specialist, who will follow the dossier until it is, or is not as the case may be, handed over to the department in charge of the rehabilitation work.

Based on the *planum*, a soil and water sampling plan is drawn up that takes account of the town planning project developed for the site. The interpretation of the results of the sample analyses will confirm, or not, the existence of pollutants and identify their nature. Here, a distinction is made between exploration and characterisation investigations.

At the end of these studies, a provisional "conceptual model" of the site is available. This is a simplified 3D view of the site that integrates topographic and geological data, pollution sources, possible pollution migration scenarios, and potential targets.

At this stage, all data compiled for each investigated site are input into a prioritisation software tool developed by SPAQ_{UE}.

The aim here is to compile a list of priority sites to be rehabilitated, which is then sent to the Walloon government. Based on this list, the government commissions SPAQ_{UE} with the rehabilitation of certain sites.

The objective then is to develop the final "conceptual model" for the site to be rehabilitated. This involves the transition from "identified contaminations" to delimited three-dimensional "spots".

A "spot" is a volume of soil, water or liquid that has been subjected to contamination. This volume must be calculated as accurately as possible.

The site's conceptual model will allow the following four essential questions for the continuation of the process to be answered :

- what is the surface area to be worked ?
- what is the excavation depth ?
- what pollutants will be encountered ?
- how many m³ will have to be excavated or pumped out ?



Economic, technical and town planning feasibility study

At this stage, the project manager performs a simplified risk analysis that will enable him to weight the remediation standards, as authorised by the soil decree. This weighting is carried out in relation to the future allocation of the site, taking into account potential impacts on human health, groundwater and the ecosystem. It results in a significant reduction in contaminated volumes to be treated and, therefore, in the cost of the work.

The project manager now has the "conceptual model" of the site. The feasibility study is aimed at choosing the rehabilitation alternative that offers the best "quality/price" ratio.

This study will be based on the expertise and collaboration of several cross-cutting activities :

- risk assessment ;
- geomatics ;
- town planning ;
- architecture ;
- financial analysis.

The objective of this collaboration is :

- to define decontamination objectives optimised in relation to the reallocation project ;
- to identify appropriate remediation techniques.

At the end of the feasibility study, a series of rehabilitation alternatives, including the one selected by the authors of the study that takes account of the reallocation project, is presented to the in-house experts involved in the site rehabilitation.

Once an alternative has been chosen, the feasibility study is finalised with a detailed design. It is then forwarded to the Rehabilitation Works department. This is where the role of the soil investigation manager ends.

Besides simplified risk analyses, SPAQ/E has a department that specialises in risk assessment. Its first task is to perform a detailed analysis of the impact of the site redevelopment project on the remediation objectives and therefore on the costs of the work. Its second task is to review the soil analyses at the end of the work to verify the conformity of the results.

SPAQ/E has a department dedicated to the management of environmental and health quality. If, during the soil investigations, a possible transfer of pollutants from the site to a residential area is detected, this department is notified. Local residents are then contacted to inform them of the situation and the need to check whether the pollution has reached their home, lawn or garden.

Depending on the results of the analyses of the samples taken (soil, air, gas, water and vegetables), a panel of toxicological experts and physicians may recommend basic measures applicable to everyday life. If the acceptable external exposure limit is exceeded, the panel advises the local residents to have biological analyses carried out on a voluntary basis. The logistics of this biomonitoring will be managed by SPAQ/E. Based on the results, the panel of experts will judge whether or not a risk to human health is present.



Soil sampling



Rehabilitation and construction works

The dossier (feasibility study) is then forwarded to an engineer who will handle the rehabilitation of the site, assisted by a site supervisor. Based on this dossier and a detailed on-site examination, he drafts the specifications.

Once the contract is awarded, the work can begin. The work generally involves the following activities :

- site clearing and clean-up ;
- clean-up of remaining buildings ;
- selective deconstruction of these buildings ;
- sorting of deconstruction materials ;
- removal to recycling facility or on-site crushing ;
- excavation of polluted soil ;
- geotechnical security ;
- deconstruction of remaining foundations ;
- on-site treatment of contaminated soil and/or removal to an authorised treatment facility ;
- groundwater treatment ;
- backfill with healthy soil ;
- water management.

The work is organised so as to minimise nuisance to local residents. It is followed up on a daily basis by a site supervisor, and weekly site meetings are conducted.

The External Communication and Press Relations department keeps the local residents and the media informed throughout the rehabilitation work.



Construction of the Congress Centre in Mons on the "Ateliers SNCB" site rehabilitated by SPAQ∞E

The Risk Analysis department will again intervene at the end of the work to verify the rehabilitation for conformity with the decontamination objectives defined in the feasibility study. At the end of the works, an assessment of the residual risks is necessary to confirm the compatibility of the site with its future usage.

Upon completion of the site's rehabilitation, SPAQ∞E is able to carry out the construction work. The preparation of the project and its implementation require the collaboration of architects and town planners, together with engineers of the Works department, who will work in close collaboration with the intercommunal economic development agency, the City, the municipality, the autonomous port, and, where appropriate, the private partner involved in the project.

Prior to the work, SPAQ∞E draws up an inventory of the quality of the site allowing a project to be developed according to the level of rehabilitation.

Water management

Like soil, groundwater may have suffered under the impact of polluting activities and measures are often taken to restrict its use. However, the groundwater flow persists and may help the dispersal of the pollutants, in some cases even outside the site boundaries.

Water management involves a number of steps :

- **definition of a hydrogeological diagram of the project sit ;**
- **monitoring the reduction in pollutant concentrations due to natural attenuation following the management or elimination of pollution sources in the soil ;**
- **determination and design of water pollution treatment and recovery systems ;**
- **implementation of water management systems ;**
- **groundwater management: long-term follow-up of treatment systems and associated parameters.**



Conclusion

With the implementation of its value chain during the rehabilitation of a contaminated brownfield, SPAQ//E guarantees the end-to-end involvement of high-level expertise aimed, in accordance with the soil decree, at ensuring effective remediation of the site to allow its sustainable utilisation.

This process, which only SPAQ//E masters in its entirety, also allows the remediation cost to be kept under control through risk analyses and incorporation of the reallocation project for the site to be rehabilitated.



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