



Case 31 Germany: Closure of Halle-Lochau landfill

Problem to resolve: Landfills are being phased out in many countries but the leachate and landfill gas continue to pollute the environment. Techniques are being sought to stop both negative impacts

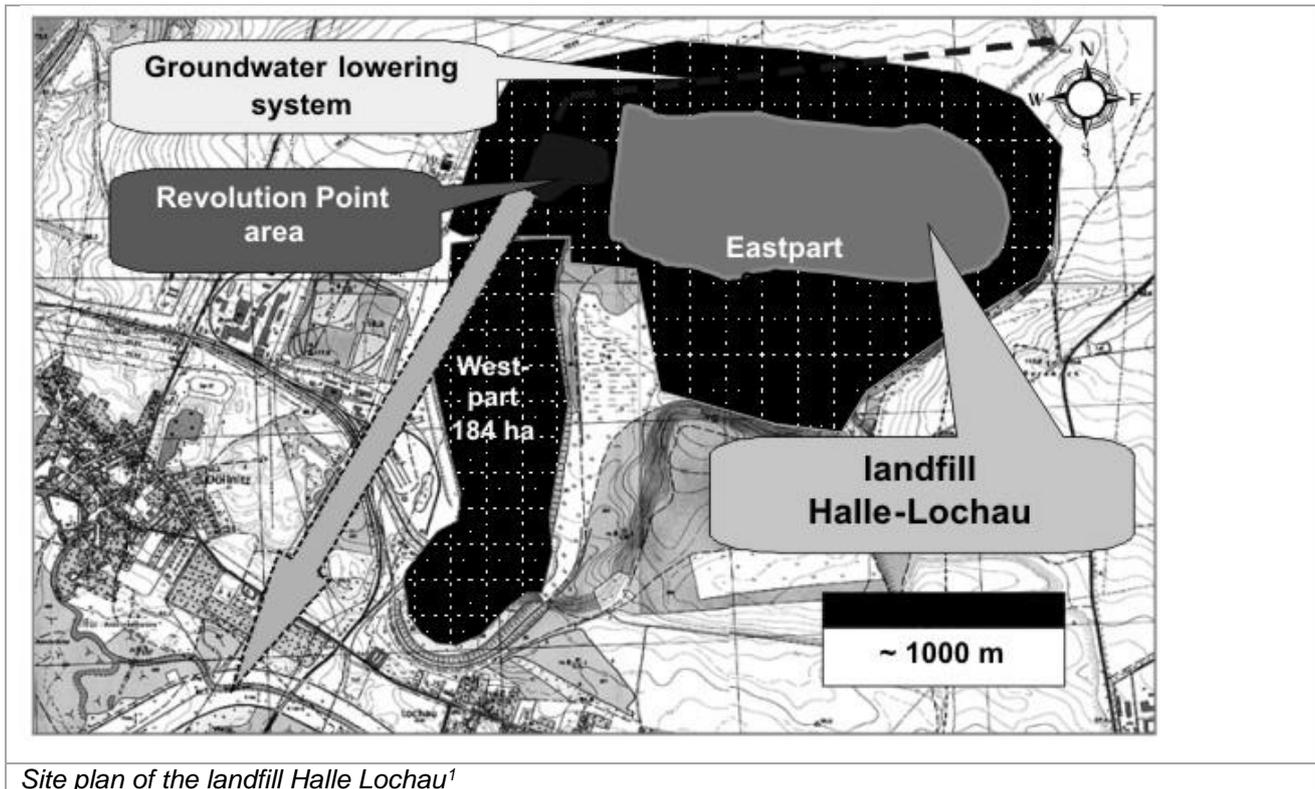
Response: Recycling of Leachate and burning the gas to avoid it be released into the atmosphere.

The German landfill “Halle-Lochau” is located approximately 5km southeast of Halle in a former open cast mining site. It first became operational in 1976 and had an approximate tipping area and filled volume of 81.5ha and 17 million m³ respectively by the end of 2004. The landfill’s height is believed to have exceeded 20m around this time.

The landfill was built in a worked-out open pit and had some interesting hydrogeological properties. The plan to permanently close the landfill led to the cessation of active dewatering to reduce the ground water table. As such, the ground water was anticipated to rise again and reach the landfill body. EU regulations at the time stated that landfills that lie below the groundwater level should not be operational after 2009, while in Germany this period was reduced to 2005.

No technical guidelines existed at the time in relation to sustainability and environmental protection considerations as regards (old) subaquatic landfills, therefore the government sought to find economic and ecological long-term solutions to this issue, authorizing a research project whose results would serve as the groundwork for such regulations. The company Abfallwirtschaft GmbH Halle-Lochau led the research project and was responsible for conducting an assessment and technical classification of local conditions and processes that are present during landfill closure and after-care.





Site plan of the landfill Halle Lochau¹

The feasibility study

Six options were developed for the final design of the closed landfill which consider the conditions and current situation of the landfill. A feature shared by all the options was the rise of the groundwater level caused by the discontinuation of the present groundwater lowering. Halting the groundwater control system would result in the generation of a lake for most of the options. The research project looked at what kind of pollution would occur during flooding and their effects on the environment, comparing all six options, and deciding on the optimal solution.

The research project's investigation proposed that landfill gas should be generated to help make the landfill body become partially inert. Once the landfill is closed, the landfill gas would be collected and incinerated, while leachate would be used to stimulate microbial biodegradation of pollutants in the landfill body. Non-permeable materials should be used to build special underwater sealing systems in the lake designed to limit contact with the landfill body. Once the landfill gas has been generated, the landfill area would be flooded and a lake generated.

Closure of landfill

In the preferred option, inert materials would be used to ensure the western section of the site was completely infilled as part of closure operations. This would help to ensure the landfill body was geotechnically secure, and allow for the commencement of landfill closure and restoration operations. A restoration layer would be raised on the landfill body and vegetation planted on it.



Example of an Engineered Landfill Gas Utilisation Plant²

In order to make the wastes inert, the construction of an additional facility during the landfill closure phase would be required. The leachate that is collected would be fed through a complex humidification system into the landfill body, enabling an optimal humidity content to be attained in the waste. The material arising from the decomposition of harmful substances is then collected with the landfill gas and incinerated in the gas utilisation station.

The research project expected that the completion of the landfill closure phase and aftercare would occur approximately 20-30 years after the completion of the landfilling stage. After-use of the site may entail construction of commercial premises or development of a local recreational area. The lake that is generated could serve as a scenic tourist spot with accompanying recreational activities, while the worked-out open cut would be surrounded by wooded and park areas.

Credentials

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References

¹ Source: Closure and aftercare regime for landfills below the water table (2005).
http://journals.bg.agh.edu.pl/GORNICTWO/2005-03/GG_2005_3_04.pdf

² Source: Hofstetter Hofstetter Umwelttechnik AG - Gas Conversion Technology
<http://www.hofstetter-uwat.com/> (Retrieved 7 July 2015)