

## Development of the Haaksbergen Brinefield, the Netherlands

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### Abstract

Salt mining in The Netherlands started with the company KNZ in 1919. KNZ developed a small brinefield for solution mining on the Buurse concession and erected a salt production plant in Boekelo, a small village located in the East of the Netherlands. About 15 years later, from 1934 onwards, a new and larger brinefield was developed between Hengelo and Enschede on the Twenthe-Rijn concession and its extensions. After eight decades of production from that concession the possibilities for continuation of salt mining have now become limited.

Since 2005, when it became clear that future salt mining possibilities on the Twenthe-Rijn concession were becoming increasingly sparse and that the mining would become too expensive, AkzoNobel, the successor of KNZ, has been looking to develop an alternative brinefield to supply the Hengelo salt plant with brine. Therefore the development of a new brinefield was started. The design principle for the new brinefield is to seek the optimum regarding environmental, social and economical sustainability. As such, it reflects the mission statement of AkzoNobel's mining technology department: "Mining for Current and Future generations", Sustainability is an important criterion in our brinefield area selection process, our brinefield design process and the brinefield development strategy.

The main criteria for the selection of the brinefield area were 1) salt reserves and 2) favorable surface situation for building infrastructure. For the reserves attention was paid to the regional geology, the depth and thickness of the salt body, the distance to the plant and the salt quality. For the surface situation attention was paid to the environment, nature, population density and land use. The Haaksbergen area is the best area regarding these two criteria.

After selection of the brinefield area, the new brinefield design was developed. The design aimed to find the optimum between maximizing salt production and minimizing the environmental impact. The first design was based on maximizing the production and exploring the potential impact on the environment. However the environmental impact could become significant. A new geological model, based on new exploration data provided an opportunity to redesign the field leading to a significant reduction in predicted subsidence, while maintaining an economically attractive reserve position.

The field development aimed to 1) reduce safety risks, 2) minimize environmental impact. A potential safety risk is caused by the possible presence of oil- or gasfilled pockets in potential Zechstein reservoirs above the salt; this is reduced by designing the well to account for bycatch of oil or gas, and by drilling the well in the crest of the pillow-shaped salt structure in the first phase of brinefield development. The environmental impact is minimized by building the pump station in an industrial estate area and to develop the brinefield from that location. Possible effects of subsidence are managed by developing the brinefield in three phases. The experience from each previous phase will be used to optimize the design of the next phase. This is how AkzoNobel puts its sustainable vision into practice.

**Key words:** Bedded Salt Deposits, Salt Cavern Development, Environmental Protection and Regulatory Affairs, Geology, Netherlands, Rock Mechanics, Solution Mining and Salt History, Subsidence, Surveying, Zechstein