Solution Mining Research Institute Fall 2012 Technical Conference

Bremen, Germany, 1-2 October 2012

THE GEOLOGICAL PATHWAY TOWARDS THE DEVELOPMENT OF A NEW SALT MINING AREA IN THE EASTERN NETHERLANDS

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Abstract

A long term strategic study in 2005 revealed that the remaining salt reserves in the current AkzoNobel brine field in the eastern Netherlands would become increasingly sparse and expensive to extract during the coming decades. Therefore, AkzoNobel has been investigating new salt mining possibilities since 2006, also looking at the deeper Permian Zechstein salt formations. Initial studies in 2006 and 2007 indicated that the best prospects for future salt mining were located in an area with relatively thick salt deposits at relatively shallow depths near the village of Haaksbergen, 10 kilometers southwest of AkzoNobel's current brine field and salt plant.

In 2008 AkzoNobel initiated a more detailed study of the geological situation in the Haaksbergen area to support the decision-making process for further exploratory research. This study by MWH was based on all available and usable seismic and borehole data in and around the area. Results indicated the presence of Zechstein salt resources with an elongated, pillow-like geometry at relatively shallow depths with a maximum thickness of the Zechstein Z1 Halite salt layers of almost 400 meters.

In early 2011 an exploration well was drilled near Haaksbergen. The top of the Zechstein Z1 Halite was found at a depth of approximately 600 meters and the thickness of the Zechstein Z1 Halite deposits measured over 300 meters. These results closely matched the depth and thickness previously modeled by MWH. Several well logs, cuttings and cores from the borehole were made, offering a lot of additional insight into the composition and characteristics of the salt pillow.

In anticipation of receiving a mining permit for this new area, AkzoNobel decided to conduct a seismic survey along two seismic lines of approximately 3 and 6 kilometers length to acquire higher resolution information, especially in areas with low data coverage. The objective of this additional study was to obtain more detailed knowledge on the location, geometry and thickness of the salt resources and on the presence of faults. The newly acquired seismic data were interpreted and integrated into the framework of previously interpreted seismic lines. Using seismic velocity and other information from the available wells, the seismic velocity model was updated and depth data were generated. Also, clearly visible faults were identified in the seismic profiles as they present a potential risk for salt mining and may create hydrocarbon traps. The interpreted depth data were integrated into the existing geological model.

The final geological model shows a narrow, elongated, slightly carved salt structure. Along its crest the modeled thickness of the Zechstein salt exceeds 400 meters and the top of the crest is located at a depth of less than 550 meters below sea level (approximately 580 meters below surface). This new geological model strongly reduces the level of uncertainty in estimates of salt resources and reserves which facilitates the decision-making process with respect to salt mining and planning. Estimated salt reserves in this area suffice for several decades of salt production. Finally, additional insight was gained with respect to the risk at encountering hydrocarbons when drilling wells to develop new caverns.

Key words: The Netherlands, Geology, Computer Modeling, Seismic, Permian Basin, Zechstein