

Solution Mining Research Institute Fall 2010 Technical Conference

Leipzig, Germany 3-6 October 2010

Improving Dual Well Horizontal Cavern Volume and Shape Predictions by Post-Processing Single Well Sonar Data.

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Abstract

Understanding the shape and volume of solution mining caverns is key to their control and proper operation. In many situations direct measurement of the dual well caverns is difficult, and the operator relies on three dimensional (3D) models obtained via sonar surveys of each single well.

For dual well horizontal caverns, due to the relatively wide cavern compared to the height, the current sonar tools provide the best estimation of the cavern shape by logging the cavern from each of the wells. This creates two separate sets of 3D data, and the current post-processing tools do not combine this data most accurately.

This paper details the improvement in accuracy that can be obtained by post-processing the sonar data using NURBS type software for a large horizontal cavern.

A commercial NURBS modeling tool (Rhinoceros) was used to create a 3D mesh is each set of sonar data. Through a Boolean union operation, a unified 3D mesh representing the single-whole cavern was developed, and based on it, the cavern area, volume and any cavern-section can be calculated.

Keywords: Cavern Mapping, Sonar, Cavern Development, Potash

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