

SOLUTION MINING RESEARCH INSTITUTE

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Paper



Status Report on the Prediction of Solid Production During Solution Mining

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Introduction

Solution mining caverns in bedded salt formations with insoluble contents up to 30 % by volume can be accomplished provided sufficient salt thickness is available. When developing caverns for storage it is generally desirable to leach at relatively high rates so storage capacity is available as soon as possible. As leaching rates increase a greater fraction of the insoluble material liberated during the dissolution process will come to the surface with the produced brine. An accurate prediction of the volume of insoluble particles which will sediment at the bottom of the cavern as well as the volume and particle size distribution produced out of the cavern are critical for both the optimization of the leaching program and for determining the size and type of the surface facilities required to handle the insoluble particles.

Insoluble particles which sediment will cover the walls at the bottom of the cavern and stop the leaching process in this area. The accumulated insoluble particles will reduce the total cavern space available for storage. The leaching program takes this phenomenon into account by creating supplemental space called a sump to accommodate this insoluble material.

Insoluble particles produced with the discharged brine have to be separated from the fluid before it is disposed of, as it may plug or damage surface equipment, or damage the disposal zone. The settling ponds/tanks and filters needed to perform this separation have to be sized according to the volume of particles to be produced and their size distribution.

The original SANSMIC algorithm for insoluble production uses a curve fit of the integrated fraction of the falling particles which would fall out as a function of the upward fluid velocity for a specific particle size distribution assuming constant fluid properties. The particle size distribution is based on salt from a dome near Bryan Mound, Texas. Most of the particles were anhydrite particles. In any given cell, the fraction of the particles that are able to rise are assumed to be instantaneously produced, the other fraction goes to the sump. This curve fit only works for direct leach and predicts only the volume of insoluble material produced.

A new module was added to modified version of SANSMIC in order to allow the user to specify the insoluble particle size distribution. The new algorithm calculates the volume of insoluble particles which sediment and produced. Each particle size fraction is considered individually, and its velocity evaluated. This general algorithm can be adapted to both direct and reverse leach.