LEACHING SIMULATION OF CAVITIY DEVELOPMENT WITH A MOVEABLE PAD

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INTRODUCTION

Theoretically, a storage cavity with a hemispherical or conical roof is more stable than a flat roof cavity. However, there is not significant field evidence, particularly for cavities in salt domes, to support the theory overwhelmingly. For one thing, there are very few existing conical roof cavities to provide data for comparative studies. For another, flat roof cavities in salt dome formations have been very stable.

The most common method of conical roof development is the gradual lowering of padding level during the course of cavity development. This is generally done in the later stage of leaching after sump/chimney development. With casing injection of water and tubing production of brine, diesel oil or other padding material is injected in the cemented casing, lowering the padding level in the cavity. The oil/brine interface is monitored by interface detectors or by other means for adherence to the pre-determined, designed roof dimensions.

Development of a conical roof would require a significant volume of padding material and surface storage facilities which often tends to make it cost prohibitive. The general exception to that is the case where the product to be stored is initially used as padding material, such as the use of crude oil for padding material in strategic petroleum reserve cavities.

Still, for storage cavities such as compressed air storage cavities or power plant auxiliary natural gas storage cavities, where the frequency of turn-overs could be as often as once a day, despite the cost, it may be prudent to go with conical roof, theoretically a more stable configuration.

A user-friendly, numerical model for personal computer that is capable of simulating leach/fill process has been developed and is briefly described in this paper.