

A New Simulation Method for Seasonally Operated Salt Cavities

by

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ABSTRACT

During an extended shutdown period, brine in a salt cavity will become fully saturated. At resumption of operation with casing injection and tubing production, during the first retention time, produced brine will be fully saturated. It is only afterward that it may become undersaturated.

For all SALT series models, the brine volume produced from the bottom computational cell during a time increment is replaced from the cell above, which in turn is replenished from the next cell. Using mass balance equations, new average concentration and density are evaluated for brine in each cell. This averaging process forms a numerical front which moves fast and far ahead of the physical front.

One way to resolve this, is to place a numerical membrane between the resident brine and mixed brine. The implementation of this barrier was achieved by introduction of two dummy cavities. During the course of simulation, as dummy cavity 1 drains out of resident brine, dummy cavity 2, initially empty, fills with mixed brine. When this process is completed, simulation is reverted back to real cavity calculations. Details of the above scheme are the subject of this paper.