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Meeting Paper

Case Study: 3-D Computer Visualization, an Effective Aid to Brine Field Management

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Introduction

The solution mining of salt domes requires a great deal of control of the development of the cavity over time. This is especially true in domes with a long history of mining and multiple active cavities. The acoustic logging data acquired in the cavities can accurately depict the growth of the individual cavities but visualizing the cavity in three dimensions has been problematic. Further, the relationships between the individual cavities and other subsurface features, such as the walls of the dome, are difficult to track but important in the development of a brine field. There is also a need for operators to communicate the details of the development of a brine field to management to justify the expenses incurred in acquiring new data or further development work. Any tool that aids in presenting the visual analysis of the current conditions within the field to people unfamiliar with the details of the brine field is of tremendous value to both parties. Three-dimensional visual analysis provides a means of presenting subsurface data in a way that allows operators and management to see the spatial relationships of the brine cavities and salt dome.

The evolution of a cavity over time must be monitored to provide feedback on operating procedures. Changes in production rate or injection/withdrawal pipe configuration will manifest themselves, albeit slowly, in changes in the morphology of the cavern. Monitoring of these changes and correlating them with operating practices provide a valuable tool in the long-term management of the development of the brine field. This information can be readily transmitted to new operators, hastening the learning process in the effects of changes in operating parameters on the development of the field.

An accurate model of the brine field can also be a useful tool in the further development of the salt dome as a brine field. Models of existing brine cavities, developed under known operating parameters, can be placed at arbitrary positions within the larger scale model of the salt dome to visually test for interferences with other cavities and the exterior walls of the dome.