

**CASE STUDY: THE USE OF WELL CONTROL AND TWO DIFFERENT VSP  
PROCESSING METHODS TO CHARACTERIZE THE LOCATION OF THE EASTERN  
FLANK OF THE MARKHAM SALT DOME.**

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**Abstract**

Characterization of the salt sediment interface on the flank of a salt dome is important for the solution mining industry because it influences cavern placement and provides a basis for geologic risk management. The ability to locate the edge of salt is dependent upon the type, amount, distribution and quality of the available subsurface and geophysical data. This paper is a case study of the process that was used for the eastern flank of the Markham salt dome utilizing Vertical Seismic Profile (VSP) and well data.

A thorough review of available well control on and around the dome found insufficient data were available to define the edge of salt for the project requirements. To help delineate the flank of the dome, VSP data were collected in several brine wells drilled around the edge of the dome. In October, 2010 a checkshot survey and an offset VSP was collected in the Hudson #4 well and processed using traditional VSP processing techniques. The VSP results did not agree with the well control maps.

The mismatch between the VSP and the well data drove a second look at the Hudson #4 VSP data to determine if any options were available to reprocess the data for a more accurate determination of the salt flank position. A new technique called “Interferometric Salt Flank Estimation” was used and the results are presented here. Interferometry is used to construct virtual source gathers at the receiver positions within the salt body. This velocity-independent process effectively moves the sources from the surface to the borehole, removing the complications of the overlying geology, and provides an improved illumination of the suspected salt flank position.

**Key words:** Salt flank estimation, Vertical Seismic Profile, Interferometry, Seismic, Well control, Geophysics, Salt dome, Geology, Texas