Solution Mining Research Institute Spring 2015 Technical Conference

Rochester, New York, USA, 27 – 28 April 2015

Mapping the Geologic Structure Surrounding a Gulf Coast Salt Dome Using Three-Dimensional Seismic Data

Christopher A. Rautman
C Tech Development Corporation, Albuquerque, New Mexico 87122

Abstract

As part of a broader study focused on identifying additional brine disposal capacity for the Bayou Choctaw Strategic Petroleum Reserve facilities in southern Louisiana, Sandia National Laboratories has used three-dimensional seismic data to map the sediments flanking the Bayou Choctaw salt dome. The seismic data previously were used to map the salt stock, itself. Most of the recent effort focused on the sandy Miocene interval overlying the Anahuac Shale, which forms an easily identifiable stratigraphic marker in the region. Several sand intervals within the Miocene section currently are used for brine disposal for the SPR facilities.

Some two dozen, mostly radial faults have been mapped, affecting a total of twelve mapped seismic marker horizons The radial faults generally dip and drop down the stratigraphic section in a helical fashion, rotating around the central salt mass. Two faults located on the northeastern and northern flanks of the salt dome, however, dip in the opposite direction, thus forming a well defined graben structure to the northeast. A less well defined graben is present on the north. Fault offsets typically are not large.

We present selected structure contour maps showing the radial faulting and the geometric configuration of five selected seismic marker horizons. Marker horizons were chosen, in part, to delineate thick sand-rich sequences, in contrast to other sequences dominated by thinner sand units interbedded with shales. These same data are then used to generate 3-D visualizations of the Bayou Choctaw salt dome and the surrounding sediments and faulting.

Key Words: Computer modeling, geology, faulting, Gulf Coast, salt domes, 3-D seismic.