

by E. Gerald ("Jerry") Hensel  
and Greg Minnery  
ChevronTexaco

## Gravity Study of a Sinkhole in the Permian Basin

Microgal gravity surveys have been used in the past for cavity detection in archeological sites such as in the Great Pyramid in Egypt, in karst topography and in mining areas. In this study we are applying this technology to an area of immediate interest to the petroleum industry. Borehole collapse in several wells in a Permian Basin field has propagated upward resulting in sinkholes that can be tens of meters deep, including several that have developed at the surface. Our study well shows signs of borehole collapse, but not a surface sinkhole. Seismic data suggest that a subsurface anomaly around the well is associated with this collapse. Gravity models indicate that borehole collapse should produce measurable gravity anomalies with amplitudes up to 1.4 mGal. A high-resolution gravity survey, °Gal level, was conducted over the area of the seismic anomaly. Gravity data along two profiles over a surface sinkhole to the north of the study well shows the expected gravity low over the sinkhole. However, the gridded gravity data over the study well and seismic anomaly does not show the expected gravity low, but rather shows an anomaly that appears to be sourced by a near-surface density contrast. Subsurface collapse may have occurred followed by sedimentation filling the cavity. ■

*Seismic data suggest that a subsurface anomaly around the well is associated with this collapse.*

### Biographical Sketch

JERRY HENSEL earned his BSc in geophysics from the University of California, Riverside, and his MSc in geophysics from the University of Washington, Seattle. His career started at Chevron Overseas Petroleum in 1982 and he has been an interpreter of seismic and potential field data, as well as serving on several technical support



teams. Jerry has worked in many areas of the world including Southern California basins, Mojave Desert, Eastern Washington and Eastern Oregon, Northern Alaska, Nevada, Southern Utah and Northern Arizona, Gulf Coast, Rocky Mountains, Offshore Eastern Canada, Western, Southern and Eastern Africa coastal basins, Coastal India, South China Sea, Indonesia,

Brazil and Colombia. His interests include interpretation of gravity, magnetic, electrical fields data in the petroleum environment and software development, deployment and support, data base development, deployment and support for potential fields data. He is a member of the SEG and AGU.

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Contact: Bruce Houff  
(O) 713 658-8555 • (F) 713 658-0715  
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