



## THE SINKHOLE THAT WASN'T

### Abstract

This is the story of a failed solution-mined cavity beneath a developed portion of the City of Carlsbad, New Mexico. But it has a happy ending. In July 2008, a brine well collapsed on rural land about 32 km north of the Carlsbad, reaching a depth of about 40 m and a diameter of 100 m. In November of that year, another brine well collapse occurred 17 km to the northeast, swallowing part of an oil field operation next to the town of Loco Hills. A review of New Mexico state records found three brine wells with similar depths and production histories. Two were the ones that collapsed in 2008. The third was operated by I&W in Carlsbad and located at the junction of two highways, the railroad tracks, and an irrigation canal. The New Mexico Oil Conservation Division installed an array of highly sensitive borehole tiltmeters and other equipment to monitor the stability of the site for public safety. Next was a series of geophysical studies to characterize the cavity. During a sonar survey, the vulnerability to collapse was dramatically shown as brine flowed up the well to the surface and the borehole tiltmeter alarms went off because with the well unsealed, the roof of the cavity sagged and pushed brine out of the well. Despite this dramatic event, there was a pause as legal issues were sorted out and the state authorized funds, first for a detailed remediation plan and then for the remediation itself. But the brine well had more surprises. The cavity filling went well initially, and then different fill methods were needed where it was found substantial collapse has occurred at the cavity's north end but hadn't yet reached the surface. Additional funds were authorized by the state and the filling was completed in February 2022 at a total cost of over \$80 million. If it had collapsed, the estimated cost and economic impact would have exceeded \$1 billion.

## Biography

Jim Griswold was born in Tucson, Arizona but has spent most of his life in New Mexico, the son of a mining engineer and grandson of an independent oil producer. Jim is a graduate of New Mexico Tech where he was involved in thunderstorm research but began his professional career doing borehole geophysics and well completions in the Permian Basin of southeast New Mexico and west Texas. After one of the inevitable collapses in the oil and gas industry during 1982, he became a partner for about 7 years in a small R&D firm working on commercial applications of pulsed power. He then made another career shift into numeric modeling and environmental consulting focused on the remediation of vadose zone and groundwater contamination. In 2008, he joined the Oil Conservation Division of the New Mexico Energy, Minerals & Natural Resources Department as a senior hydrologist and eventually became its Environmental Bureau Chief. At present, Jim serves as an assistant to the Division Director coordinating special projects. He has been married for 32 years to the love of his life Lisa, has two daughters and an absolutely perfect 2-year-old granddaughter.