

# GEOMECHANICAL ASSESSMENT OF THE LOOP LLC CRUDE OIL STORAGE FACILITY IN THE CLOVELLY SALT DOME, LOUISIANA

*By:*

Joe L. Ratigan  
PB Energy Storage Services  
Houston, Texas

Joel D. Nieland  
RESPEC  
Rapid City, South Dakota

Thomas V. McCauley  
LOOP LLC  
Larose, Louisiana

## ABSTRACT

The Louisiana Offshore Oil Port (LOOP) operates a nine-cavern crude oil storage terminal in south Louisiana. The LOOP facility experiences daily receipts averaging over 1.4 million barrels of oil per day from offloaded ships and Gulf of Mexico production (via pipeline) with corresponding deliveries through connecting pipelines to refineries. The LOOP solution-mined caverns were developed in the early 1980s. In 2004 and 2005, LOOP executed a comprehensive geomechanical assessment of their underground storage facility in the Clovelly salt dome.

The purpose of the assessment was to evaluate the stability of the cavern field under current conditions and as projected future cavern growth occurs. The assessment included: (1) a contemporary geomechanical stress analysis of the caverns in their current geometrical configurations and in the geometrical configurations projected for the future; (2) a review of the measured ground subsidence at the facility, estimation of the cavern closure rates implied by the ground subsidence, projection of the future ground subsidence, and assessment of the subsidence-induced well casing loading; and (3) comparison of the LOOP underground storage facility to other underground storage facilities, industrial guidelines, and state regulations. The projected facility lifetime was estimated using the results.

The study noted that significant advancements have been made in geomechanical modeling since the LOOP caverns were designed. The study confirmed that the caverns in the Clovelly salt dome are geomechanically stable and the LOOP facility can be operated safely for decades into the future. This paper describes each of the study components and discusses the results and conclusions from the study.

**Keywords:** Salt Domes, Oil Storage, Geomechanics