

A COMPREHENSIVE EVALUATION OF GROUND MOTION ASSOCIATED WITH FRASCH SULPHUR MINING IN A GULF COAST SALT DOME

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ABSTRACT

Freeport Sulphur (now Freeport-McMoRan Energy) mined 12 million (long) tons of sulphur from the offshore Main Pass 299 salt dome caprock over a nearly 10-year period. Sulphur mining from this dome ceased in 2000 as a result of market conditions. The Frasch sulphur mining method involves heating the sulphur ore (contained in the voids in the salt dome caprock) in such a manner that the sulphur will flow from the ore zone as a liquid. This method of ore extraction typically produces caving in the caprock with associated ground movement in the caprock and the sediments overlying the caprock.

Freeport Sulphur (through their contractor, Fugro Geoservices, Inc.) measured the seafloor elevation overlying the Main Pass 299 salt dome before the initiation of sulphur mining, during sulphur mining, and 4 years after mining had ceased. The maximum measured vertical elevation change was about 20 feet. In 2005, Freeport-McMoRan Energy commissioned a comprehensive geomechanical study to determine if future caprock movements could be expected as a consequence of the terminated sulphur mining that might impact proposed gas storage cavern wellbores at Main Pass 299.

This paper presents a brief summary of the Frasch sulphur mining process; the historical seafloor elevations measured before, during, and after sulphur mining; and the results of a three-dimensional geomechanical model history match to the measured ground motion. This case history is believed to be the only complete case history of Gulf Coast sulphur mining-induced ground movements.