

**SOLUTION MINING
RESEARCH INSTITUTE**

1745 Chris Court
Deerfield, Illinois 60015-2079
USA

Telephone: 847-374-0490 Fax: 847-374-0491
E-mail: bdiamond@mcs.com

Meeting Paper



**Interior Cavern Conditions
and Salt Fall Potential**

by

**Darrell E. Munson
Martin A. Molecke**

**Sandia National Laboratories
Albuquerque, New Mexico
USA**

**Robert E. Myers
Strategic Petroleum Reserve/DOE
New Orleans, Louisiana
USA**

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INTERIOR CAVERN CONDITIONS AND SALT FALL POTENTIAL

Darrell E. Munson, Martin A. Molecke
Sandia National Laboratories*, Albuquerque, NM

Robert E. Myers
Strategic Petroleum Reserve/DOE, New Orleans, LA

ABSTRACT

A relatively large number of salt caverns are used for fluid hydrocarbon storage, including an extensive set of facilities in the Gulf Coast salt domes for the Strategic Petroleum Reserve (SPR) Program. Attention is focused on the SPR caverns because of available histories that detail events involving loss and damage of the hanging string casing. The total number of events is limited, making the database statistically sparse. The occurrence of the events is not evenly distributed, with some facilities, and some caverns, more susceptible than others. While not all of these events could be attributed to impacts from salt falls, many did show the evidence of such impacts. As a result, a study has been completed to analyze the potential for salt falls in the SPR storage caverns. In this process, it was also possible to deduce some of the cavern interior conditions. Storage caverns are very large systems in which many factors could possibly play a part in casing damage. In this study, all of the potentially important factors such as salt dome geology, operational details, and material characteristics were considered, with all being logically evaluated and most being determined as secondary in nature. As a result of the study, it appears that a principal factor in determining a propensity for casing damage from salt falls is the creep and fracture characteristics of salt in individual caverns. In addition the fracture depends strongly upon the concentration of impurity particles in the salt. Although direct observation of cavern conditions is not possible, the average impurity concentration and the accumulation of salt fall material can be determined. When this is done, there is a reasonable correlation between the propensity for a cavern to show casing damage events and accumulation of salt fall material. Interestingly, the accumulation volumes of salt fall material can be extremely large, indicating that only a few of the salt falls are large enough to cause impact damage.

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