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Technical Paper

Temperature and Pressure Effects in Salt Cavities During Peak Shaving Withdrawals

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TEMPERATURE AND PRESSURE EFFECTS IN SALT CAVITIES DURING PEAK SHAVING WITHDRAWALS

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ABSTRACT

Recent developments in underground storage reflect both the need for and advantage of superior deliverability from caverns in withdrawals during peak demand periods. Recent recognition of market based rates in tariffs during periods of demand, along with the concept of multiseasonal peaking, have provided the incentive for development of salt storage facilities near gas gathering hubs and power generating sites.

Performance of a salt cavity during a high rate of withdrawal is manifested in terms of its temperature and pressure. These effects are important as they relate to well completions, surface equipment, dehy requirements, safety valves, surface separation, metering, and compression facilities.

The paper presents procedures developed for calculation of temperature and pressures for both the idealized case of adiabatic boundaries and the actual case of cavity walls subject to heat transfer.

Thermodynamic considerations related to PVT behavior of resident inventory, irreversible effects, and data from actual cavern operations are presented. The results show that it is possible to predict both pressure and temperature during unsteady state withdrawal with reasonable engineering reliability.