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ASSOCIATION ROUND TABLE

ABNORMAL FLUID PRESSURES SYMPOSIUM
September 10-12, 1979
Keystone, Colorado

Descriptions of Papers

BREDEHOEFT, J., U.S. Geol. Survey, Reston, Va.

Permeability of Clay and Shale

Permeability is a critical factor in the maintenance of abnormal fluid pressures. The permeability of "tight" geologic materials is difficult to measure; it is particularly difficult to measure in situ. Both the laboratory and in-situ methods need special techniques when the permeabilities are less than 10^{-10} cm/sec (10^{-7} Darcys). Permeability can be measured (1) on rock samples in the laboratory; (2) in situ, utilizing well test procedures; and (3) on a regional scale, utilizing a hydrodynamic analysis of the entire system.

Generalizations from the results of a comparison of these techniques for Cretaceous shale in South Dakota can be used to summarize our knowledge of clay and shale permeability.

FOSTER, W. R., Mobil Research and Development Corp., Dallas, Tex.

Smectite-Illite Transformation—Its Role in Generating and Maintaining Geopressure

The effects of the smectite-illite transformation are incorporated into compaction and fluid mechanical models for shales by connecting the extent of this reaction to their elastic rigidity and permeability coefficents. In this way the reaction partly determines both the thermo-elastic response of a shale body and the equation of motion of its fluid phase. Computer simulation of these model equations reproduces the spectra of geopressure phenomena encountered in the northern Gulf of Mexico.

LOW, PHILIP F.

Properties of Water in Clay Mineral Systems

The properties of water in clay systems have a direct relation to the generation of abnormal pressures in buried sediments. From the principles of clay swelling a new theory of pressure generation has been developed.

MOMPER, JAMES A., Amoco Production Co., Tulsa, Okla.

Generation of Abnormal Pressures Through Organic Matter Transformations

Adequately heated hydrogen-rich organic matter will generate fluids in sufficient quantity to considerably exceed the volume-reduction of remaining kerogen. Resulting volume increases cause high fluid pressures in laminae of sealed, confined argillaceous rocks where organic matter is concentrated, forming or re-opening partings and fractures for oil migration and expulsion.

PURCELL, W. R., Shell Development Co., Houston, Tex.

Concepts of Effective Stress—a Review

Many modifications have been made in expressions for effective stress since the concept was first introduced by soil scientists almost 40 years ago. There is no single definition of effective stress applicable to all stress-dependent processes. Problems are encountered in estimating earth stresses. There is a need to develop effective stress laws for porous materials containing two fluids at different pressures.

SERIFF, A. J.

Effect of Unloading and Temperature Change on Fluid Pressure in a Sealed Compressible Rock

A computation of the fluid pressure change caused by uplift of a sealed porous rock suggests that a typical brine-filled clastic rock with a normal fluid-pressure gradient (FPG) at about 6,000 ft (1,830 m) would experience a reduction of FPG of about 0.1 per 1,000 ft (300 m) of uplift (and unloading) if the rock remained sealed and mechanically unchanged. The effects of temperature and external pressure are included and finite rock, grain, and fluid compressibilities are used. Under the same conditions increased burial would produce an increase of FPG of 0.1 per 1,000 ft (300 m).

SMITH, J. E., G. C. DYSINGER, and R. L. BORST, Phillips Petroleum Co., Bartlesville, Okla.

Gravitational Compaction and Abnormal Fluid Pressures

Pressures and fluid movements which occur over geologic time in compacting sand-shale sequences, both during and following deposition, are modeled. Improvements and accuracy limitations on such models will be discussed.

AAPG-SEPM ANNUAL MEETING
Houston, Texas

Additional Abstract

DOTT, R. H., JR., Univ. Wisconsin, Madison, Wisc.

Nugget-Navajo Sandstone Environmental War—Can Trace Fossils Help?

Practically all of the Navajo and much of the correlative Nugget Sandstone (Triassic-Jurassic) in Utah and Wyoming contain a distinctive lamination shown recently by R. E. Hunter to be diagnostic of eolian ripple translation. The Navajo has only rare tracks, bones, and