It is generally believed that growth faults act as primary conduit to the migration of hyrocarbon from the source to the reservoir rock. These faults and their associated structures often provide closures for hydrocarbon traps as exemplified in the Niger delta and Gulf Coast region. However, the relation of the growth-fault building mechanism to the migration and entrapment of hydrocarbon has not been fully understood.

A model of the influence of growth-fault building mechanism on the distribution and accumulation of hydrocarbon is presented. Fundamental to the model is a quantitative analysis of the criteria for failure. This failure is shown to occur in the so-called "plane of weakness" of the rock. When sliding accompanies the failure, the plane is commonly referred to as the slip plane. The criteria for failure in the presence of pore pressure and cracks have been studied and used to model the source rock. Hydrocarbon, which is "squeezed" out from the source rock as a result of the failure criteria, follows the plane of weakness in migrating to the reservoir region.

Therefore, an understanding of these directions and a knowledge of the geology of the reservoir region will be helpful in identifying new possible targets within a growth-fault zone and in reexamining areas within the zone that were thought to be barren.

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Petroleum Trap Associations: a Basis for Systematic Exploration

A strategy that considers "all possible" trap types in each volume of potentially petroliferous rocks becomes increasingly attractive as the remaining petroleum prospects become more elusive. This approach calls for cataloguing systematically the numerous lithologic configurations possessing trap-forming potential that may result from the basic processes of erosion, deposition, diagenesis, and deformation, as experienced by the particular strata.

These varied lithologic configurations are then considered in terms of their areal and time-stratigraphic associations. A wide variety of oil and gas entrapments is commonly related to one or more large-scale trap-forming features, such as a paleodrainage system or a salt dome. Traps associated with such features commonly develop during intervals of exceptionally rapid change, certain of which may be regarded as distinct trap-forming events. Some changes, like river avulsion, may be caused by internal processes, whereas others, like particular (series of) changes in sea level, originate outside the local systems and so may affect extensive regions. The objective is to predict "all" the potentially trap-forming lithologic configurations that might occur on each feature at the stratigraphic position of each event.

However, the accumulation-forming potential of these configurations and events must also be considered. This is revealed most directly by studies of existing production, which may then be used to guide exploration for related accumulations and to predict "new" types and locations of entrapment. Since the trap-forming features and events are frequently related to the other prerequisites for petroleum accumulation, consideration of accumulations provides some integration of all the prerequisites.

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Dolomitization of Brassfield Formation

The Brassfield Formation (Lower Silurian), which crops out in southwestern Ohio, through parts of Indiana and Kentucky, to western Tennessee, is a transgressive sequence consisting of interbedded shales, limestones, and dolostones. Shales dominate the eastern edge of the outcrop, whereas carbonate sediments are characteristic of the western and southern exposures. A detailed study of outcrops in southwestern Ohio shows that two separate dolomitizing processes have altered the rocks. Elsewhere, the Brassfield Formation appears to be dolomitized by a single process. In southwestern Ohio, initial dolomitization was restricted to the basal Belfast Member and probably occurred penecontemporaneously in a supratidal environment similar to a modern sabkha. Dolomite in the Belfast member occurs as small (10 to 40 μm), cloudy, anhedral crystals. Thinly laminated sediments with a few gypsym casts are characteristic of this unit.

Regional dolomitization was a later diagenetic event related to the formation of a freshwater and seawater mixing zone beneath a landmass created by upwarping of the Cincinnati arch and Nashville and Ozark domes. Intensity of dolomitization in the outcrop belt is controlled by the proximity of the original carbonate sediments to the source of dolomitizing fluids in the mixing zone. The Brassfield is undolomitized away from these structural highs. Dolomite from this portion of the formation is typically large ($>10\mu$m), limpid, euhedral rhombs replacing bioclasts and sparry calcite cement.

This "Dorag" type of dolomitization suggests the presence of landmasses in the areas of the Cincinnati arch and the Ozark and Nashville domes during the time of dolomitization of the Brassfield Formation.

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Zoning in Chesapeake Bay Dredge Piles

Chesapeake Bay economics requires channel dredging to maximize its potential in trade. Because of environmentalists' objections, aspects of dredge spoil disposal have received much attention and have held up dredging operations. The effects of heavy metals is an important factor in these environmental concerns.

The most recent and popular method of disposal involves the dumping of a sediment slurry, via conveyor, into a contained, nearshore or onshore dumpsite. This creates piles of sediment above water, incident to the bay. This method of dumping provides a model for some basic sedimentary and geochemical principles: sorting by grain size owing to differing settling rates, and resultant sorting of metals owing to affinities of these metals to a specific grain fraction. Vertical zoning of metals with depth is also possible, due to supergene enrichment. These three processes are investigated by this project with the intention of providing information to help in structuring the long term use and development of the bay.

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Facies-Controlled Diagenesis and Reservoir Character, Entrada Sandstone (Late Jurassic), Durango, Colorado

The Entrada was deposited as part of a Late Jurassic erg that covered much of the western United States. Depositional environments of the Entrada include: (1) small-scale, coarse-grained eolian dunes, (2) eolian sand sheet, (3) large-scale eolian dunes, and (4) water-laid sands. Quartz and potassium feldspar overgrowths are the most abundant cements, followed by dolomite, calcite, and kaolinite.

Current reservoir models for eolian depositional environments suggest that well-sorted dune sands should have higher permeability than the finer grained and poorly sorted sand sheets. However, in the Entrada, no difference in permeability was