seismic stratigraphic methods and therefore are not covered in this paper.

Turbidite fans are sequences of sands and shales deposited in conjunction with, and basinward of, deltas or submarine canyons. Turbidite sands can be generally classified into channel and suprafan sands. Certain seismic events and reflection patterns suggest the presence of turbidites. The interpreted events and reflection patterns include troughs, submarine canyons, mounds, a prograded fluvial-dominated delta reflection pattern and variations in its thickness, and onlap-offlap patterns on a depositional slope. Regional studies provide the best means of identifying and mapping depositional sequences. Examples from the North Sea, Gulf Coast, and Sacramento Valley illustrate the geologic and geophysical expression of delta and turbidite sequences, and their interrelation.

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Calculation of Seal Capacity from Porosity and Permeability Data

Porosity and permeability measurements can be used to calculate oil columns trapped by grain-size changes. Calculations can be useful when capillary pressure measurements are not available. Calculations are based on two major assumptions: (1) the rocks are water wet; and (2) mean effective grain size and pore size may be determined from average porosity and permeability. The first assumption is widely applicable; the second assumption has been tested and found to be reliable over a wide range of porosities and permeabilities for sandstones. Important in the calculations is that interfacial tension does not decrease to low values under subsurface conditions of higher temperatures and pressures but remains at a relatively large value of 30 dynes/cm for both gas and oil.

Calculations of oil column based on porosity and permeability data are particularly useful in evaluation of hydrodynamic flow as a trapping mechanism. Once hydrostatic or capillary-pressure oil column has been estimated, the effects of hydrodynamic flow can be evaluated as in independent variable. In many simple stratigraphic traps, the amount of oil trapped by hydrodynamic flow greatly exceeds that which can be trapped by capillary-pressure differences alone.

Studies of Recluse Muddy and Kitty Muddy fields in the Powder River basin of Wyoming indicate that hydrodynamic flow makes up a major part of the trapping element for the hydrocarbon column. Such examples show that downdip hydrodynamic flow can be an effective trapping mechanism in basins where reservoir systems are subject to recharge by meteoric waters.

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Origin of Thin, Siliceous Beds in Monterey Shale, Elk Hills Field, California

The Miocene Monterey Shale consists of thinly interbedded black shale and siliceous beds in a section 1,800 ft (550 m) thick on the western anticline, Elk Hills field. Selected full-diameter cores were examined through the upper section west of, and partly equivalent to, the Stevens Oil Zone sandstones. The siliceous beds are commonly 1 to 5 cm, and rarely 8 to 10 cm, thick. The beds are generally structureless or contain a few indistinct laminae. Bases are in sharp contact with underlying shale, and some tops are gradational to overlying shale. In a few beds, the uppermost parts show curved laminae that represent low-amplitude ripples. Therefore, the beds seem to be distal turbidites composed of common, massive A divisions and rare, rippled C divisions.

Many beds have a fine granular, graded texture with a thin basal zone of coarser detritus. The beds are composed of finely-crystalline, siliceous material, in some places partly replaced by dolomite(?). Petrographic study shows a significant content of fine sand to silt-size detritus. In a typical graded sequence, grains of quartz, plagioclase, and rock fragments form a thin lag at the base where they comprise more than 50% of the rock and have an average size of 0.13 mm. Detrital grains decrease upward to less than 3% at the top, and average size decreases to 0.05 mm.

The thin, regularly bedded nature of the section, significant detrital content, and graded texture suggest that the siliceous beds are turbidity-current deposits. The siliceous component was probably pelagic, diatomaceous sediment from the basin floor that was incorporated in turbidity flows, transported a short distance, and redeposited with terrigenous detritus in massive A divisions of the turbidite sequence. Alternatively, subsequent recrystallization destroyed original lamination and produced the structureless beds.

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Use of Sediment Gas Anomalies in Surface Prospecting

Measurements of methane and other hydrocarbon gases in near-surface marine sediments have been made with increasing frequency over the last 10 years as part of various geochemical prospecting efforts. Presumably, the presence of light hydrocarbon anomalies in sediments is indicative of seepage of hydrocarbons from nearby reservoirs. However, gas concentrations and compositions can be altered by filtering effects during gas migration through sediments as well as by microbially induced interferences and alterations. Methane is apparently consumed and oxidized by aerobic and anaerobic bacteria in near-surface sediments. The bacteria can alter isotopic compositions of microbially produced methane to yield thermal-like compositions which can be misinterpreted as oil-related gas. Ethane and higher (C_2+) hydrocarbon anomalies are considered more positive indicators of commercially prospective oil and gas accumulations but these gases can be selectively filtered by sediment chromatographic effects yielding bacteria-like compositions which might be passed over as non-anomalous.

These concerns, coupled with methodologic problems such as (1) the difficulty of measuring isotope ratios on small amounts of sediment gas, (2) the fact that the hydrocarbons which initially outgas from a sediment sample are different in composition than subsequent outgassing, and (3) disputes over the optimum depth for sediment gas measurement and anomaly detection, demand that surface gas anomalies used for prospect evaluation should be interpreted with care.

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Seismic Stratigraphy of Veracruz Tongue, Southwestern Gulf of Mexico

The Veracruz tongue is an area of continental slope and rise sediments bounded topographically by the Mexican Ridges foldbelt and the Campeche-Sigsbee salt province. Study of two multichannel lines and single fold sparker data enables five