Foraminifera from the trawls and the smaller Foraminifera from the cores. Maximum size of the larger Foraminifera usually is between 1–10 mm. The zonation is:

TRAWLS

Meters	
179	*Valvulineria inflata* Group
878	*Cibicides wuellerstorfi* and *Reophax scorpiurus* Groups
1,171	*Cyclammina canellata* Group
1,863	*Alveolophragmium subglobosum* and *Reophax nodulosus* Groups
2,489	*Hormosina ovicula* Group
3,149	*Planispirinoides bucculenta* Group
3,404	*Recurvoides turbinatus-Bathysiphon* Group

CORES

Meters	
796	*Epistominella pacifica smithi* Group
1,171	*Bulimina rostrata* Group
1,932	*Eponides tumidulus* Group
2,498	*Nonion pompilioides* Group
3,257	*Stilostomella antillea* Group

Estimates of the total volumes of material caught by each trawl range from 2 to about 43 kg., dry weight.

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ORIGIN OF NITROGEN-METHANE GAS AND ANOMALOUSLY HIGH FLUID PRESSURES, SACRAMENTO VALLEY, CALIFORNIA

Nitrogen gas is commonly found in natural gas accumulations within Cretaceous and younger rocks in selected areas of the Sacramento Valley. Considerations of a variety of data and concepts suggest that the nitrogen originates independently from and earlier than the methane with which the nitrogen is now commingled and that it does not originate within the sediments in which the natural gas accumulations are found today. The proposed answer is that the Sacramento Valley nitrogen originates from low-grade metamorphism of sedimentary rocks containing organic matter. By elimination, the enigmatic Franciscan rocks of the Coast Range province appear to be the most probable source of this nitrogen. Abnormally high fluid pressures also exist within the Cretaceous sediments of the Sacramento Valley and may play a critical role in the origin of the methane within this dry-gas province. The existing fluid-potential distribution strongly suggests that the abnormally high-fluid potentials are the result of tectonic compaction—stemming from continuous uplift of the Coast Ranges at least from late Tertiary into Recent time.

The general fluid-potential distribution within the Sacramento Valley is such that vertically upward flow is commonly present. Water flowing upward through shales serving as methane sources would contain in solution different quantities of methane per unit volume of water depending upon the fluid pressures. The high solubilities of simple paraffin hydrocarbons in water as opposed to those of more complicated hydrocarbons and the exponential variation of these solubilities with pressure provide a mechanism for selectively transporting in aqueous solution essentially only simple paraffins—particularly methane—from a shale source at high pressure and discharging them as free gas at lower pressures in a reservoir rock. The operation of such a mechanism would be dependent upon significant vertical fluid-potential differences and would be independent of the age and degree of compaction of the shale. The methane for the Sacramento Valley dry-gas province thus may have evolved and accumulated fairly recently—subsequent to the presumed initiation of the regional high fluid potentials in late Tertiary time.

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REFLECTION TECHNIQUES SUGGEST NATURE OF DEEP-OCEAN SEDIMENTS

Conventional reflection profiling reveals a deep-ocean sedimentary column up to 3,500 m. thick. Sedimentary layers are grouped into an upper acoustically transparent zone, 20–510 m. thick, and a lower acoustically responsive zone up to 3,000 m. thick. The former, exhibiting a minimum of internal structure, has an average $V_i = 1.70$ km./sec. determined from X^2, T^2 analyses, an average thickness of 200–250 m., and is interpreted as unconsolidated, water-saturated red clay or pelagic ooze. The responsive zone is strongly layered, has an average $V_i = 3.0$ km./sec., and is interpreted to be semi-consolidated to consolidated mixed red clay and ooze, turbidites, or volcanic products. Low-velocity sediments blanket ocean-bottom topography and exhibit relief (up to 100 m.) largely at the water-sediment interface suggesting bottom scour and transport. Higher-velocity, stratified sediments lie on an irregular basement with pronounced discordance; thickness is dependent on basement topography and suggests differing depositional processes and rates of diagenesis. The uniform, plane surface interface between the two sedimentary units and extraordinary smoothness of layers within the stratified zone may be explained by the leveling effect of turbidity currents in rapidly filling sediment basins.

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STRATIGRAPHY AND OIL POSSIBILITIES OF MESOZOIC ROCKS IN KANDIK BASIN, EAST-CENTRAL ALASKA

Mesozoic sedimentary rocks in the Kandik basin are subdivided provisionally into four units. The oldest, unit A, rests unconformably on the Tahkandit Limestone of Permian age. It consists mainly of carbonaceous argillite but includes some limestone, oil shale, and quartz arenite. This unit is about 5,000 ft. thick and ranges in age from Middle Triassic (Ladinian) at its base to Early Cretaceous (Valanginian) at its top. Conformably overlying unit A is unit B, a massive quartz arenite with minor interbeds of argillite and chert-pebble conglomerate. Unit B is less than 100 ft. thick south of the Yukon River but northward it thickens to about 1,000 ft. or more in the headwaters of the Black River. Pelecypods of Valanginian age have been found in the quartz arenite at several widely spaced localities. Unit B grades conformably upward into unit C, a rhythmically bedded quartz arenite and argillite, at least 5,000 ft. thick, that forms a substantial part of the Kandik Formation (Lower Cretaceous) at its type locality. Pelecypods of Valanginian age occur in the lower part of unit C. Unit D consists of chert-pebble conglomerate, sandstone, siltstone, and argillite, all of the graywacke type. It rests conformably on unit C in the vicinity of the Yukon