tle open folds in shallow Neogene bed rock, likely to be crustally pervasive, are draped over the indicated fault zone. Lengths of major fold axes range from 25 to 45 km, with dips on fold limbs ranging from 2 to 11°. Wavelength of folds averages 3 km with indicated shortening at the pre-Pleistocene unconformity of 1.5 to 2.5%. The curvilinear trend of fold axes and associated minor faults is oblique to the Sandspit trend. Lack of a through-going fault in Neogene sediment cover demonstrates that the zone is in an early or incipient stage of wrench-related structural development. Deep coupling movements along the buried fault zone are interpreted as the drive which has produced the observed shallow structural pattern.

Temporal and spatial relations of the major northwest shears suggest part of the North American–Pacific plate motion has been taken up by the Sandspit and Rennel-Louscoone faults. Earlier lateral movements along major faults in Queen Charlotte Sound, that may form part of a further Sandspit extension, might explain geophysical anomalies and tectonic events recorded in Insular Belt rocks.

Exploratory drilling in the late 1960s tested a number of wrench anticlines along a broad zone parallel to the offshore Sandspit fault trend.

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Lower Cretaceous (Neocomian) Sedimentation of Sable Island Area, Scotian Shelf, Eastern Canada

Neocomian sedimentation in the Sable Island area, Scotian Shelf, eastern Canada, has been studied by analysis, of 13 offshore wells, using log analysis binocular and petrographic microscope examination of cutting-samples and cores, and stratigraphic map analysis.

The Neocomian is represented in the study area by the Missisauga Formation, a dominantly sandstone sequence containing thick sand units with minor limestone and shale interbeds in the central part of the Scotian basin. The Neocomian sandstones are texturally immature to supermature, and range from subarkose to volcanic sublitharenite with rare quartzarenite. Limestones include both sparry and micritic types. Shales are mostly carbonaceous, pyritic, and silty.

During the early Berriasian, coarse clastics were introduced to the study area from the north and northwest, and gradually built up a high-constructive, lobate-type delta. The source area included granite, acidic to intermediate volcanic rocks, and sedimentary and possibly some metasedimentary rocks. A regional transgression at the end of Neocomian terminated the delta.

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Importance of Resolution for Helium Detectors Used in Uranium Exploration

One aspect of the Department of Energy's National Uranium Resource Evaluation (NURE) program sponsored through Bendix Field Engineering Corp. involves evaluation of instrumentation used for uranium exploration. In recent years ^4He has been useful in exploring for both uranium ore and petroleum deposits. As a consequence, mass spectrometers (leak detector type) have been used to seek small (a few percent) variations of ^4He in soil gases and aquifers. We modified one of these instruments to ascertain its reliability regarding resolution (the ability to separate adjacent mass peaks). We used the Veeco MS 17 AB because it provides twice the resolution of comparable instruments. An electromagnet was substituted for one of the permanent magnets to enable scanning the 0 to 5 amu mass range.

Acquired spectra allowed the determination of the contribution to mass three ($HD + H_3 + {}^3He$) from mass two (H_2). Interference is significant at the 1% level (the size of helium anomalies usually sought) when the abundance ratio $(M = 2)/(M = 3) \geq 75$. This value is valid for the $H_2/{}^4He$ ratio for an equivalent system with 50% lower resolution.

Additional experiments identified dissociated water or hydrocarbons as the principal source of H_2. Correlations of ^4He with soil gas moisture found in prior studies may not be due to true variation in ^4He but are ascribable to artifacts resulting from H_2 contributions to ^4He. Corrections for such artifacts can be made by converting field instruments to a scanning mode.

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Mesozoic and Cenozoic Paleogeography

A series of reconstructions showing land-sea relations, sedimentary facies, and volcanic types has been drawn. Continental orientations were determined using paleomagnetic, climatic, biogeographic, and sea-floor anomaly data. The main differences between these and existing maps are seen in south Asia. Here, Late Triassic sutures, involving Indochina, South China, and North China, indicate that Pangea did not form until this time. Paleoclimatic indicators associated with these south Asian blocks would place them in the tropics in the Triassic rather than the temperate zone as suggested by most published maps. Another innovation in the maps is the palinspastic restoration of the zone between India and the Tarim basin. Published paleogeographic maps show a 1,500 km-wide ocean between Indian and Asia in the late Eocene, the time that lithofacies and biogeographic data indicate that they were in contact. Present crustal thicknesses across the Himalayas and the Tibetan Plateau are double the norm, and so by "unthrusting" the Himalayas, and "unfolding" Tibet, we have constructed a series of maps that show the Asian blocks in contact at the appropriate times. All of the above changes result in an areally restricted Tethyan seaway. The effect of crustal foreshortening in the Tertiary may help to explain the extreme lowering of sea level during this time. The telescoping of continental crust would result in wider ocean basins at the present than at any time since the end of the Permian. This would have the effect of draining the epeiric seas.

1981 AAPG Student Chapter Program Abstracts

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Estimate of Volcanic Production Rate for Galapagos Islands, Ecuador

The Galapagos Islands, located midway between the East Pacific Rise and the South American continent, constitute one of the most volcanically active regions of the world. Satellite imagery, aerial photographs, and previous land surveys were used to estimate the volume of material produced from the

islands' six active volcanoes over the past 36 years. This Galapagos volcanic production rate estimate is used to calculate the contribution of Galapagos volcanism to global volcanic activity and allows comparison to the production rates of other active volcanic fields. In addition, a detailed account of the location and extent of 15 incompletely documented volcanic events has been established.

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Petrology and Stratigraphy of Triassic(?) "Nazas Formation," Sierra de San Julian, Zacatecas, Mexico

The Triassic(?) "Nazas Formation" of north-central Mexico is a sequence of volcanic flows, pyroclastic rocks, and volcaniclastic sediments. Outcrops occur in the Sierra del Rosario del Teyra, Guadalupe, and San Julian of northern Zacatecas. The Nazas is overlain unconformably by the Zuloaga Formation of Oxfordian age (Late Jurassic). A radiometric date of 230 ± 20 m.y. has been obtained for the Nazas volcanic rocks in the Villa Juarez uplift. Thus the Nazas Formation is tentatively correlated with the Huizachal Group of northeastern Mexico, the Eagle Mills Formation of the U.S. Gulf coastal province, and the Newark Supergroup of the Appalachian and Atlantic coastal provinces.

In the Sierra de San Julian, the sedimentary units of the Nazas include: (1) non-stratified, clayey matrix-supported pebble conglomerates; (2) planar-bedded and low-angle planar cross-stratified sandstones with interbedded siltstones; and (3) varved siltstones. A sequence of graded, sandy matrix-supported cobble-boulder conglomerates forms the uppermost unit in the Nazas.

Petrographic studies in progress suggest the following: (1) silicic-intermediate ashflow and airfall tuffs are volumetrically predominant; (2) sediments were derived mainly from the penecontemporaneous volcanic rocks, with a minor metamorphic source indicated by the presence of sand-size, finely polycrystalline quartz grains; and (3) the entire formation has had a complex diagenetic history. Hematite, calcite, and sericite are abundant alteration products.

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Gravity Investigation of Suspected Silurian Reef in North-Central Ohio

In his 1873 report on Wyandot County, Winchell discusses two unusual exposures of the Niagaran limestone near Carey, Ohio. These were designated as the "North Ridge" and the "West Ridge." Further work by Cumings and Shrock, published in 1928, led to the identification of these ridges as klintar of Silurian age. An active quarrying operation on the North Ridge supplies ample evidence of its origin. The Wyandot Dolomite quarry has uncovered a Silurian reef, exposing parts of the core mass, flank beds, and cap rock. In looking at the West Ridge, any conclusive evidence which once existed has been lost with the filling of abandoned quarries. The purpose of this report is to delineate the suspected reef in the West Ridge by its gravity anomaly.

Density determinations performed on samples taken from the North Ridge indicate a small density variation among the facies. Considering this factor, the station spacing was set at 200 ft (61 m) to insure detection of the anomaly. The gravity residual was calculated by least squares analysis on an IMB 370 computer. In this method a mathematical surface is calculated using the Bouguer value. This mathematical surface is fitted to the Bouguer surface and subtracted leaving the residual anomaly as the remainder. Since this system uses a point-to-point analysis, small variations in the residual anomaly should be readily detected. Two lines of these data have been selected for additional analysis by modeling using Talwani's two dimensional approach.

The shape of the residual anomaly and the fit between the theoretical profiles and the field profiles, together with the abrupt thickening of the Niagaran section as seen on electric logs, indicate that the West Ridge is a topographic expression of a Silurian reef.

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Subsurface Geology of Bayou Jean La Croix Field, Terrebonne Parish, Louisiana

Bayou Jean La Croix is on an east-west oriented domal feature located approximately 45 mi (73 km) south-southwest of New Orleans. Through June 1980, it has produced 6,490,630 bbl of oil, 1,368,000 bbl of condensate, and 49.6 Bcf of gas. The producing interval extends from the *Cibicides carstensi* to the *Robulus* 5 zones (upper middle Miocene).

The origin of the structure is probably related to deep-seated salt movement. Simple closure is interrupted by numerous east-west down-to-the-south faults crossing the structure. Dip on the major faults averages 48° and throw increases slightly through the productive section. All known oil and gas reserves are found upthrown to these faults.

The productive section is a deltaic-marine sand and shale sequence typical of the south Louisiana Tertiary. By obtaining expansion indices for correlative units in the stratigraphic section enveloping the structure it is possible to graphically plot structural movement. This analysis indicates that the maximum movement occurred between *Cibicides carstensi* and *Uvigerina* 3 times. This correlates closely with the time of accumulation of the majority of the hydrocarbons in the field. Further stratigraphic study will be undertaken to determine why the field's moderate reserves are only trapped upthrown to the faulting.

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Depositional Environment and Reservoir Characteristics of Lower Cretaceous Paluxy Sandstones, Bolton Field, Hinds County, Mississippi

Bolton field produces oil from numerous lenticular, Lower Cretaceous sandstones at depths ranging from 8,350 to 11,800 ft (2,545 to 3,596 m). The field is on an elongated, faulted anticline in the northwest part of the Mississippi salt basin. It was discovered in 1954 as a result of seismic mapping. Two years after its discovery it had produced 1,475,179 bbl of oil. A core of the Lower Cretaceous Paluxy sandstone, and electric logs from the field area, were studied to determine the environment of deposition and reservoir morphology.

The Paluxy sandstones were deposited within a fluvial system. Primary rock properties observed in the core indicate a braided stream deposit. Bedsets are thin, ranging from 0.5 to 9 ft (.15 to 2.74 m) in thickness. Sedimentary structures within bedsets consist of inclined laminae in the lower part to parallel laminae and ripples in the upper part, indicating deposition