GEOGRAPHY AND GEOLOGY

Chairman: Robert D. Miles, Department of Civil Engineering, Purdue University, West Lafayette, Indiana 47907

William D. Brooks, Department of Geography and Geology, Indiana State University, Terre Haute, Indiana 47809 was elected Chairman for 1975

ABSTRACTS

Lithofacies-Ratio Slice Maps as an Exploration Method to Delineate Aquifers in Glacieated Areas. Abdelrahman M. Maarouf and Wilton N. Melhorn, Department of Geosciences, Purdue University, Lafayette, Indiana, 47907.——Unconsolidated glacial deposits contain significant water-bearing zones which, if adequately defined, may be important aquifers. Within glaciated regions, there are commonly segments of bedrock drainage systems filled with Quaternary deposits, which attain a maximum thickness of 450 feet in the buried Teays Valley in Indiana.

This paper attempts to delineate the subsurface extension of unevenly distributed sand and gravel bodies in Tippecanoe County, Indiana by using three dimensional analysis. This county is an appropriate test area, as it includes an urban population of about 110,000 totally dependent on ground water supplies. A series of nine lithofacies-ratio maps were constructed, one for each 50-foot slice of glacial materials. The method is successful for mapping different lithologic units, but is constrained by the quality and quantity of available subsurface data.

Future development of ground water in Tippecanoe County is most favorable in unexploited areas of thick sand and gravel aquifers, which all lie along the Teays, Anderson, and other preglacial bedrock valleys.

Evolution of Quarternary Drainage in Tippecanoe County, Indiana. Abdelrahman M. Maarouf and Wilton N. Melhorn, Department of Geosciences, Purdue University, Lafayette, Indiana 47907.——The pre-Pleistocene drainage pattern in Tippecanoe County does not coinside with the present drainage pattern. The Kansan glacier did not alter the drainage significantly, whereas the Illinoian ice dammed and buried the major Yarmouthian valleys. Glacial Lake Lafayette was formed on the Teays upstream from an Illinoian ice dam, and lacustrine deposition occurred over an area of about 4 square miles. The outlet channel developed to drain Glacial Lake Lafayette was perpetuated as the present Wabash River drainage southwest of Lafayette. Other ice-marginal streams formed new drainage channels that replaced some of the older channels and buried under Illinoian drift. The Wisconsinan glaciation brought other changes and established the present position of the streams.

Intramolecular Carbon Isotopic Distribution in Acetic Acid from Unpasturized Apple Cider Vinegar. Gianfranco Rinaldi, W. G. Mein-

SCHEIN, and J. M. HAYES*, Dept. of Geology, Indiana University, Bloomington (*also Dept. of Chemistry) Indiana 47809.——$\sigma^{13}C$ measurements have been made on the methyl carbon and the total combustion products of acetic acid isolated from unpasturized apple cider vinegar. From these measurements, the difference in the ^{13}C contents of the methyl and carboxyl carbon atoms of this biosynthetic acid was calculated. It was found that the $\triangle\sigma\ ^{13}C$ for the carboxyl group minus the methyl group was 12 o/oo. Previous $\triangle\sigma\ ^{13}C$ analyses of an acetic acid sample isolated from pasturized apple cider vinegar have shown that the carboxyl carbon was enriched by 18 o/oo or 1.8 o/o. The general agreement between the findings on the acetic acids from these two cider samples indicate that biological acetates, such as acetyl-CoA, which is enzamatically formed from acetic acid will also contain a carboxyl carbon that is enriched in ^{13}C relative to its methyl carbon. Because acetyl-CoA is a fundamental intermediate in the biosynthesis of fatty acids, isoprenoids, steroids, and other biological lipids, it is reasonable to expect that any "isotopic order" in acetyl-CoA will be partially retained in lipids which are geologically as well as biologically important compounds. The geological potential of these findings relate to paleoenvironmental and origin of life investigations.

Comparative Studies of Methods for Continuation and Derivatives of Potential Fields. B. D. KWON and ALBERT J. RUDMAN, Indiana University, Bloomington, Indiana 47401.——Studies of model potential fields continued upward and downward show differences depending on the method of continuation. Beginning with a magnetic field computed over a buried vertical cylinder, the field was continued to various levels by a method introduced by Henderson (Lagrangian interpolation) and by a spectral method (frequency domain analysis). Resultant fields show (1) no significant differences in upward continued values, (2) in downward continuation, accurate values are obtained with the spectral method over the central part of the anomaly, and (3) accurate values are obtained with Henderson's method on the flanks of the anomaly, while oscillations usually characterize the spectral method in this region. Essentially the same observations are made for derivative calculations.

Field oscillations are empirically predicted at levels continued to approximately two-thirds of the depth of the source. Our spectral computer program output yields marked oscillations at one-half of the depth of the source. Henderson's method shows no oscillations at this depth and only minor oscillations at the top of the body (some negative values appear on the flanks of the anomaly). The Henderson output is a smooth field even if continued below the top of the body. These results suggest that the presence of oscillations cannot be used to identify the top of a buried source without careful consideration of the method used to continue the field. Use of the derivative to outline and isolate anomalies must similarly include consideration of the method of calculation.

Continuation of Potential Fields: Model Studies. VINCENT MIKULSKI and ALBERT J. RUDMAN, Department of Geology, Indiana University, Bloomington, Indiana 47401.——Downward continuation of potential

fields of models are used to isolate and study gravity and magnetic anomalies. Two computer programs are utilized in the analyses of simple geometric forms. The first generates two-dimensional gravity and magnetic fields in the form of a map output. This map data serves as input to the second program to continue the field downward.

Model fields simulating various geologic bodies are studied to see if the continuation process permits interpretation of the depth, shape and resolution of the sources. Presence of oscillations (deviations from symmetrical, regular contours and accentuation of negative values) indicate that the level of continuation is near the top of the body. The zero contour of the second derivative approximates the shape as the field is continued below the top of the body. Resolution of several bodies is enhanced as the field due to each source is isolated.

Recent Trends in Malt Beverage Production and Consumption: The Case of the Indiana Brewers. THOMAS J. STEVENS, Department of Geography, SUNY, Brockport, New York, 14420.——In 1940, Indiana's 16 breweries produced 1.8 million barrels of malt beverage. In the same year, Hoosiers consumed 1.1 million barrels of brew. By 1970 only four breweries were in operation but were producing 2.8 million barrels a year. At the same time, Hoosiers had increased their consumption of beverages to 2.7 million barrels of 31 gallons each. These changes were occurring at a time when Indiana's population increased to 5.2 million from 3.4 million, and per capita consumption went from 10.1 gallons to 16.2 gallons per year. In order to provide some perspective for this analysis, it should be noted that in 1940, 603 breweries in the United States were authorized to produce and sell malt beverages. In that year they brewed and sold 55.2 million barrels resulting in a national per capita consumption rate of 12.1 gallons. The 1970 production of 134.6 million barrels by 155 breweries yielded a per capita consumption rate of 18.6 gallons. In any case, Hoosiers consumed less than the national average, both in gallons and in percent of increase but were consuming a larger percent, on an equivalent basis, of the local product. A situation that could be good or bad depending on one's point of view.