panel were observed in data obtained from instruments installed for subsidence monitoring purposes on the surface, in the overburden, and underground. Instrumentation included strain measurement at the surface and both absolute and relative stress measurement at mine level. Data from tape extensometer readings, overcoring, and borehole pressure cells support a rotated fault-block hypothesis. In the mine area, frequent nearly vertical faults are present and can be located on satellite imagery. Two major faults are present and can be located on satellite imagery. Two major faults striking obliquely across the panel appear to have isolated a block of rock that rotated toward the gob at the north end of the panel as mining progressed, creating adverse loading conditions at mine level. The combination of satellite imagery, ground mapping during mining, and selected instrumentation may hold some potential for improved mine development in areas experiencing similar ground control problems due to the interception of geologic discontinuities.

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Tuscarora Sandstone (Silurian), Central Pennsylvania: Preliminary Quantitative Grain Shape Analyses of Cotter's (1982) Facies—Fluvial, Estuarine, Beach, and Marine(?) Shelf

Cotter (1982) demonstrated a logical sequence of depositional facies in the Tuscarora Sandstone, both vertically and laterally, from braided river fluvial deposits to the southeast, progressing through local "estuarine" and regional beach facies, to marine(?) shelf sand waves to the northwest. Several examples of each facies were sampled and subjected to quantitative grain-shape analysis. Although the outcropping Tuscarora has suffered intense diagenesis (pressure solution and quartz overgrowth), these effects are less obvious in thin sections cut parallel to bedding, where the gross two-dimensional grain shapes are relatively unmodified. Preliminary results comparing the Fourier Analysis (FA) methods of Ehrlich and colleagues (1970 to 1982) and Boon (1982) with the Rotated Radials-Factor Score (RR-FS) method of Parks (1981) are presented.

In the RR-FS method, the two-dimensional silhouettes of several hundred grains from each sample are electronically digitized and the raw data (100+ points per grain) are stored on floppy disks. From this point on, the analysis is performed under operator control by a series of FORTRAN programs implemented on a microcomputer. For each grain, the digitized outline is rotated about a calculated "center of gravity" to a least squares best fit with an empirical "reference shape"; and 36 equal-angle spaced radials are calculated. The data set for each sample (400+ grains) is reduced by R-mode Factor Analysis. Computed factor scores are used to classify the gross grain shapes into a limited number of distinguishable categories. Associations of shape types are compared to specific facies.

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Computer-Generation of a Devonian Shale Production and Potential Atlas for West Virginia

In the final phase of an Eastern Gas Shales Project (EGSP) contract with the U.S. Department of Energy, the West Virginia Geological and Economic Survey compiled an atlas of Devonian shale production and potential. By using both the survey's existing oil and gas data base and a more detailed, computerized data file created during the project, 22 maps were computer-generated for areas of western and southern West Virginia. These multicolored maps show all wells with known gas production from Devonian shales, all wells drilled to the shales that were dry holes, and all other unsuccessful shale wells that produce either from shallower Mississippian or Pennsylvanian units, or from deeper units below the shales (e.g., the Middle and Lower Devonian Huntersville and Oriskany Formations or the Upper Silurian Newburg sand).

In addition, a gray screen pattern on the maps indicates wells from which shows of gas were reported from the shales, and isopotential lines contour initial open flows from the shale gas wells. Thus, the atlas can be used to locate further shale wells in areas with known high productivity, as well as areas with potential for dual completions in one or more zones in addition to the shale. This atlas is one of many products that can be generated from high quality, detailed computer files.

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Paleoecology and Structure of a Late Silurian-Early Devonian(?) Patch Reef, Northwestern New Jersey

Quantitative and qualitative field examination of an Upper Silurian-Lower Devonian(?) "patch reef" bioherm in northwestern New Jersey resulted in the identification of at least five distinct lithologic and biotic facies: (1) a basinal lithofacies of medium to thick-bedded pelagic limestones containing few discernable fossils; (2) a peloidal grainstone facies, which is dominated by pelmatozoan fragments and peloidal carbonate grains; (3) a reef-talus facies characterized by a high biotic diversity; (4) a coral-boundstone facies dominated by massive tabulate corals; and (5) a stromatoporoid reef facies composed of large juxtaposed hemispherical stromatoporoids (65%), tabulate corals (30%), and rugose corals (5%).

Facies evidence demonstrates that the stromatoporoids and corals organically cemented this buildup into a rigid, wave-resistant structure that controlled its surrounding environment. According to Heckel's 1974 classification of reefs, this type of boundstone lithofacies would indicate an "organic framework reef."

The patch reef grew in a moderate-to-high energy regime and was developed on a carbonate platform which was situated on the margin of an epeiric sea. Reef growth was progradational and upward in response to a relative rise in sea level. Investigation of the patch reef facies revealed compound growth and accretion zones, in addition to demonstrating distributional patterns similar to those of modern patch reef analogs.

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Geologic Interpretation of Gravity and Magnetic Anomalies in Western New York and Lake Ontario

The Bouguer gravity anomaly map of western New York State and Lake Ontario indicates a series of gravity anomalies extending north-northeast across New York State and Lake Ontario. These gravity anomalies are due to the extension of the Precambrian rocks of the Bancroft-Madoc area of southern Ontario, Canada. Mafic plutons intruded into a mafic-metavolcanic sequence produce gravity positives, while granitic batholiths cause negative gravity anomalies. The intermediate gravity values are due to a marble-rich metasedimentary group. In most places the gravity positives are located between a magnetic high and low, suggesting the center of the magnetized source is fairly identical with the center of mass surplus.

The Clarendon-Linden fault is the most prominent structural feature in the Paleozoic rocks of western New York. Some control of this Paleozoic structure by the Precambrian basement is suggested