The study area has several hundred domestic and livestock water wells, most of which are less than 500 ft deep. Water levels in these wells generally are less than 300 ft below the surface. Delineation of the potentially strippable coal zone and determination of its relation to the shallow aquifers permit an estimate of the probable effects of surface mining on ground water.

Acquisition and interpretation of similar types of geologic, hydrologic, and related data in other areas that have potential for resource development will provide decision makers with tools necessary for proper assessment of environmental impacts.

MAARS, RONALD W., Univ. Wyoming, Laramie, Wyo.

INTERPRETIVE TECHNIQUES IN REMOTE SENSING

With increasing availability of aircraft and satellite remote-sensor data the working geoscientist now has a new tool at his fingertips. He can gain much from some of these data simply by applying traditional photointerpretive techniques, but still more can be gained if he selectively employs some specialized interpretive techniques. Proper use of the new interpretive techniques requires that the user have a basic understanding of the data he is using—how it is obtained and what it represents. He also must keep in mind the limitations of the data, such as its spectral, spatial, and brightness resolution.

With these considerations in mind, the geoscientist can select the type of remote sensor data that will apply best to his problem and then tailor the processing and analysis of the data to obtain the maximum amount of information with the least expense.

The geoscientist may employ various forms of optical or digital image enhancement or he may choose to use the computer in helping him make his discriminations and classifications. Some enhancement techniques are employed with visual-image analysis, such as color-additive and color-subtractive viewing, stereoscopic and pseudostereoscopic photo interpretation. A few procedures can be accomplished only through computer analysis (brightness ratioing, atmospheric correction), but most are effective with either imagery or digital data. This latter group includes contrast stretching, density slicing, cluster analysis, pattern recognition, frequency analysis, and edge enhancement. Most of these procedures can be done in several ways, with the accuracy of the results and the efficiency of the operation largely dependent on the equipment used. Thus, the economics of the situation are the final consideration in the implementation of most of the more complex interpretive techniques.

MANCINI, A. J., Wyoming Water Planning Program, State of Wyoming, Cheyenne, Wyo.

WATER AND COAL DEVELOPMENT IN POWDER RIVER BASIN

A large part of future energy demands may have to be satisfied by coal, uranium, and oil shale, with coal assuming most of this burden. By the year 2020 the value of products from coal may exceed the combined value of all products of Wyoming's other minerals. Coal can either be shipped out or used in state. In-state use has been projected to require mining 360 million tons each year by 2020. Sufficient mineable coal is available to meet the demand. To utilize this coal, large quantities of water are needed.

More than 75% of Wyoming's coal reserves are in the Powder River basin which is a water-short region. Annual water requirements for a 1,000-megawatt steam-electric power plant average 14,000 acre-ft; for a 100,000 bbl per day coal liquefaction plant 20,000 to 65,000 acre-ft; and for a coal gasification plant with a capacity of 250,000,000 MCFD of pipeline gas a minimum of 10,000 acre-ft. More than 500,000 acre-ft of water will be needed annually (10.6×10^6 bbl per day) in the Powder River basin. Three alternate schemes for supplying this water have been investigated by the Wyoming Water Planning Program. The total water demand cannot be met without importing water.

Water is the controlling factor in the in-basin use of Powder River basin coal. Large quantities of water cannot be imported without political agreement. The long-range water availability affects the feasibility of in-basin use of coal and land reclamation.

MEISSNER, FRED F., Trend Minerals Corp., Denver, Colo.

HYDROCARBON ACCUMULATION IN SAN ANDRES FORMATION OF PERMIAN BASIN, SOUTHEAST NEW MEXICO AND WEST TEXAS

Porous limestones and dolomites in the San Andres Formation (Middle Permian) serve as reservoirs for many oil and gas accumulations found in the Permian basin of southeast New Mexico and West Texas. The mature state of field discovery, development, and exploitation associated with exploratory effort directed toward the San Andres, together with the wide range of factors which have been found to characterize its hydrocarbon traps, allow it to serve as an example which illustrates many of the basic truths and concepts of modern petroleum geology.

San Andres carbonate and evaporite rocks, together with their lateral formational and lithofacies equivalents, were deposited during a gross cycle of marine transgression and regression. Reservoir porosity is restricted generally to rocks deposited in shelf-margin reef, shallow-marine and intertidal environments. Many of these environments may be identified on the basis of characteristic lithology, depositional features, and fauna. A knowledge of environmental-lithologic patterns is essential to understand the stratigraphic controls affecting hydrocarbon accumulation.

Regional San Andres structure consists of a broad south-plunging syncline characterized by gentle easterly dips from outcrops in central New Mexico and westerly dips from outcrops in central Texas toward an axis near the New Mexico-Texas line. Local closed anticlines, noses, and flexures, which overlie either basement uplifts and faults or older shelf-margin reefs, interrupt the regional structural grain and significantly influence hydrocarbon accumulation.

Potentiometric data indicate that fresh water entering the San Andres in the high mountainous New Mexico outcrop area flows easterly through porous units and becomes highly saline before reaching a discharge area along the lower lying outcrop belt in central Texas. Groundwater movement has caused east-tilting oil-water contacts in many of the oil fields.

Examination of the productive fields indicates hydrocarbon accumulation is controlled by highly variable combinations of (1) structural, (2) stratigraphic,