

man of the AAPG research committee symposium. Ralph Edwards, Champlin Oil & Refining Co., Oklahoma City, is field trip chairman.

The SEPM technical program chairman is George A. Sanderson, Jr., Pan American Petroleum Corp., Tulsa. Under his direction, general papers will be as-

sembled and, in addition, there will be a session on "Fossil Populations—Their Relation to Stratigraphy and Sedimentary Environments." Charles Mankin, Director of the Oklahoma Geological Survey, Norman, is preparing the Society's research symposium on "Environmental Aspects of Clay Minerals."

## ENFORCEMENT OF AAPG CODE OF ETHICS

AAPG President Michel T. Halbouty announces for interested members that, contrary to reports in some quarters, the Association has on several occasions taken a firm stand in ethics matters. Ethics procedures have been instigated recently at the request of members in at least 6 cases and, in each, the accused tendered his resignation before the hearings were completed, thus terminating the procedures, as provided by the Association's bylaws.

The initiation of ethics procedures requires testimony by an active member, precluding the consideration of serious charges on the basis of rumor as a protec-

tion for the professional and personal reputations of members. One of the primary obligations of Association membership is acceptance of responsibility for the enforcement of the Code of Ethics. Members are reminded that an opportunity to exercise a part of this obligation is given monthly with the publication in the *Bulletin* of membership and certification applications. Every member should, as a matter of habit, carefully scrutinize these lists and communicate to the Executive Committee or the Board of Certification any factual information—not rumors—pertaining to the applications.

## PETROLEUM EXPLORATION SOCIETY OF LIBYA EXPLORATION COMPUTING SYMPOSIUM

An Exploration Computing Symposium, organized by the Petroleum Exploration Society of Libya, was held in Tripoli, Libya, November 28-30, 1966. Approximately 200 society members and guests attended. Six of the 10 papers presented were by speakers who travelled to Libya specifically for the symposium. Angus Campbell, president of the Society, outlined the purpose of the three-morning program as both educational and technical. By providing an introduction to computing and a medium for exchange of information, the symposium benefitted both service and oil companies operating in Libya. Fred J. Wagner, chairman of the Exploration Computing Symposium, introduced the program which consisted of three parts: basic computing concepts, geological applications, and geophysical applications.

### ABSTRACTS

(In order of presentation)

DAROLD WILSON, World Trade Corporation  
(IBM), Tripoli, Libya

#### BASIC COMPUTING CONCEPTS

Basic computer concepts were presented, and these included the evolution of computers, numbering systems and data representation, stored program concepts, programming languages, operating systems, graphics, and the planning of computer applications. Films on "The Information Machine" and the "IBM 360 System" were shown.

F. J. WAGNER, Esso Standard Libya Inc., Tripoli, Libya

#### INTRODUCTION TO GEOLOGICAL COMPUTING

Methods, problems, and costs of exploration-data recording, computing, and display were discussed. Computer systems permit explorationists to retrieve data quickly and to apply statistical techniques for relating critical variables to hydrocarbon occurrence. Explora-

tion data processing has two approaches: the *project approach* which applies computing techniques only to specific problems; and the *systems approach* in which all problems with the same or related data are considered within a data-retrieval system.

W. A. READ, Institute of Geological Sciences, Edinburgh, Scotland

#### SOME GEOLOGICAL APPLICATIONS OF TREND-SURFACE ANALYSIS

Trend surfaces are represented generally by power-series polynomials, fitted by the least-squares method to areal geological data. The technique allows the regional component, represented by the trend surface, to be separated from the local components or residuals. Trend surfaces may be used to predict depths to stratigraphic horizons and to extrapolate data from known to unknown areas. Mapping of residuals can delimit structural irregularities that may have functioned as oil traps.

J. P. HEA AND C. D. CONLEY, Oasis Oil Company, Tripoli, Libya

#### COMPUTER USAGES IN RECORDING, STORAGE, AND ANALYSIS OF GEOLOGICAL DATA

A standard form for logging lithologic characteristics, porosity, and hydrocarbon shows exemplifies *systematic data-gathering*. This detailed form, used in both desert well-site and laboratory sample descriptions, enables the computer to produce a wide variety of geological maps from data stored on magnetic tapes or disks.

*Analysis programs* include lithofacies (percentage, constituent, and summary) maps, vertical variability maps, trend-surface analysis, information (entropy) maps, and contouring routines. Data evaluation includes factor and discriminant analysis as well as the more common statistical tests. Economic analysis includes the use of probability and binomial distribu-

tions. Examples of maps and statistics were given for the Sirte basin of Libya.

GEORGE DOMPS, Schlumberger, Tripoli, Libya

#### COMPUTER USAGE IN WELL LOGGING

The use of computers in well logging has advanced from a research to an operational stage. Well-site computers may be either part of standard surface equipment, allowing direct reading of some formation parameters (density-porosity) or they are additional equipment permitting on-site merging of data from several logs. Digital computers in the office are used for the complete interpretation of all zones logged. Examples were given using logs from Nigeria. Eventually all well logs can be recorded on magnetic tape. Recording and processing of dipmeter logs on tapes currently are available in Libya.

KENNETH E. BERG, Geophysical Service International, Dallas, Texas

#### ADVENT OF DIGITAL TECHNOLOGY

New technology may be evaluated either by comparison with prior methods or by studying the requirements which led to its development. Several post-war advances permitted the development of digital technology. The first was the advent of statistical communication theory and its application to geophysical data by the Geophysical Analysis Group at M.I.T. The next involved the techniques for recording high-volume seismic data in digital format. Hardware and software were then combined applying statistical communication theory to the solution of complex seismic problems.

DAVID S. MATHEWS, Texas Instruments Inc., Houston, Texas

#### STANDARD DIGITAL SEISMIC FORMATS

Various factors must be considered in answering the question, "Which tape format?" Texas Instruments chose the 21-track format after 50 engineering man-years of study. Higher data transfer rates can be made using the 9 track rather than the 7 track. A comparison of 21 track versus 9 track capabilities is made in regard to ability to handle the number of seismic channels, format and gain recovery, efficiency, reliability, the recording of the actual time of the sample, edge effects, and economics.

F. REYNOLDS, Robert H. Ray (Mandrel Industries), Houston, Texas

#### BINARY-GAIN RECORDING AND PROCESSING

Binary gain refers to a seismic digital-recording system that switches gain for each seismic channel in steps of two in response to changes in signal energy. This technique allows data recovery with low distortion. Applications of the binary-gain system are likely

in seismic data processing requiring data-shape recovery. Such applications may arise in stratigraphic-trap problems and in problems requiring true amplitude recovery. Examples of seismic-energy decay and binary-gain stepping are shown as a means of introducing SAR (synthetic amplitude recovery). SAR is used to gain control of the data while preserving the character of individual events

T. CANTWELL, Robert H. Ray (Mandrel Industries), Houston, Texas

#### CONVOLUTION AND DECONVOLUTION

A seismogram is the result of the impulse response of the earth convolved with the shot impulse. Synthetic seismogram examples showing the convolution operators for models containing up to three near-surface layers are given. Models representing Libyan conditions were constructed, and their convolution operators studied. In some places, the effect on sharp impulses was to "stretch out" the impulses giving rise to reverberatory records. Also the shape of the convolved impulses differed dramatically down the line as subsurface conditions changed.

A deconvolution process, to remove the effects of the earth filter, is applied to the seismograms and the final deconvoluted traces are shown for comparison. The deconvolution operator is determined on each trace. Deconvolution is discussed also in terms of shaping a long pulse into an impulse.

M. COX\*, Geophysical Service International, London, England

#### APPLICATION OF NEW SEISMIC METHODS TO STRATIGRAPHIC-TRAP EXPLORATION

Conventional seismic techniques are inadequate for delineating most stratigraphic traps. The effectiveness of the seismic methods is limited by unpredictable changes in near-surface layers, inadequate resolving power, additive noise, and multiple reflections. An effective solution is to transform each seismic trace into the equivalent of a smoothed multiple-free synthetic seismogram which could be constructed from an acoustic log at that location. The degree of smoothing will differ according to each exploration prospect but is basically defined by the band-width which will generate a wavelet sufficiently sharp to resolve the interfaces being investigated. Time and space varying problems are attacked by multi-channel filtering processes and by deconvolution. Controlled field tests in the United States and Canada illustrate the application of field and processing techniques to the problem of obtaining from field data the time traces which yield an adequate measure of subsurface response. Skillful blending of field-recording methods and processing techniques is required to develop a total system uniquely related to each set of seismic conditions.

\* Delivered by T. Ward

### CERTIFICATION APPLICATIONS APPROVED FOR PUBLICATION

The executive committee has approved for publication the names of the following candidates for Certification as Petroleum Geologists. This does not constitute certification but, in accordance with certification procedures, places the names of the candi-

dates and sponsors before the membership for a period of sixty days. If any member has information bearing on the qualifications of these candidates, it should be sent promptly to the Executive Committee, Box 979, Tulsa, Oklahoma 74101.