R. W. STAPP, Relation of Lower Cretaceous depositional environment to oil accumulation, northeastern Powder River basin, Wyoming

MILTON O. CHILDERS, Reservoirs of lacustrine origin in Rocky Mountains—exploration criteria

JOSEPH R. CLAIR, RICHARD W. VOLK, Pre-Permian Paleozoics of Las Animas arch—new oil province

ROBERT W. SCOTT, Petroleum potential along south flank, San Juan basin, New Mexico

TUESDAY AFTERNOON, OCTOBER 25

New Influences in Petroleum Exploration

Presiding: JOHN W. ROLD, W. EARL WEST, JR.

LLOYD C. PRAY, PHILIP W. CHOQUETTE, Genesis of carbonate reservoir facies

CHARLES H. HEWITT, Role of geology in reservoir engineering

W. S. FREDERICK, SR., Abnormally high formation pressures at borehole and beyond

GEORGE V. KELLER, Electrical prospecting methods in oil exploration

H. B. EVANS, JOHN C. HARMS, PHILIP W. CHOQUETTE, GRAPE*—Device for continuous porosity determinations

JOHN P. HOBSON, JR., Cyclic sedimentary sequences in Frontier Formation (Upper Cretaceous), Casper arch area, Wyoming, and some stratigraphic and possible paleoenvironmental implications

FLOW IN ALLUVIAL CHANNELS: film prepared by Colorado State University, Engineering Research Center

WEDNESDAY MORNING, OCTOBER 26

Use of Sedimentary Structures in Petroleum Exploration

Presiding: R. DANA RUSSELL, WILSON M. LAIRD

EDWIN D. MCKEE, Study of sedimentary structures

DARYL B. SIMONS, Interpretations of sedimentary structures by flume experiments

CHARLES D. MASTERS, Stratigraphic analysis through determination of depositional environments

M. DANE PICARD, Paleocurrents and shoreline orientations in Green River Formation (Eocene), Raven Ridge and Red Wash areas, northeastern Uinta basin, Utah

PERRY O. ROEHL, Analogs of Recent low-energy carbonate deposits in Stony Mountain (Ordovician) and Interlake (Silurian) Formations, Montana

DONALD W. LANE, Primary structures and sedimentary environments in Dakota Sandstone, northwestern Colorado

WEDNESDAY AFTERNOON, OCTOBER 26

Recent Field Developments

Presiding: SHERMAN A. WENGERD, JOHN C. OSMOND

R. E. SWENSON, Trap mechanics in Nisku in northeastern Montana

GRAHAM S. CAMPBELL, Douglas Creek trend, case history, Uinta basin, Utah

A. V. ROBERTSON COE, Pitchfork oil field, Park County, Wyoming

JERRY L. BRANCH, General drilling history and new developments in northwestern Montana

KENNETH E. CARTER, Cache field, Montezuma County, Colorado

* Gamma-Ray Attenuation Porosity Evaluator.

D. KEITH MURRAY, LOUIS C. BORTZ, Eagle Springs field, Nevada

ABSTRACTS OF PAPERS

(In sequence as presented in technical program)

1. JOHN J. SULLIVAN, Independent geologist, Casper, Wyoming

EXPLORATION FOR OIL AND GAS IN WYOMING

During 1965, Wyoming retained first position as the most active state in the Rocky Mountains despite 119 fewer wells than in 1964. A total of 312 exploratory tests was drilled during the year, a 13% decrease from 1964, and a 23½% decline since 1963. The Wyoming success ratio was 10.26%, down 1% from 1964, but considerably better than the overall Rocky Mountain ratio of 7.1%, the lowest in recent history. A total of 636 development wells was drilled with 423 completions for a 66.5% success ratio. This is an increase of 1.2% from 1964 when 94 more wells were drilled.

Although overall activity in Wyoming decreased in 1965, it is apparent that it was an outstanding year. It is estimated that approximately 285 million bbls. of new oil were found with a gain in oil reserves of more than 150 million bbls. This oil was found at a cost of $0.74/bbl., the cheapest in the Rockies. Wyoming production increased by 5.6 million bbls. and the state led the region with 143.7 million bbls. produced for a daily average of 373,823 barrels. This was approximately 70% of the total oil produced in the northern states.

The year 1965 will be remembered as a turning point in the pattern of exploratory thinking in Wyoming. Despite the fact that exploratory drilling declined and fewer discoveries were made, more reserves were found than in any other year during the past two decades. The discovery of prolific deep production stimulated renewed interest in deep prospects previously condemned by depth. A more critical analysis of geologic data was evidenced by the improved caliber of wildcat prospects which found more oil for less overall expenditure. Geophysical activity increased by nearly 30% from 1964, and lease acreage increased nearly 3% for the first gain in 5 years. Considering all phases of exploration, Wyoming remained the most prospective state in the Rockies during 1965 and holds greater promise for 1966.

2. PAUL W. BURCHELL, Utah Oil and Gas Conservation Commission, Salt Lake City, AND JOHN C. OSMOND, Independent geologist, Salt Lake City

REVIEW OF OIL AND GAS DEVELOPMENTS IN UTAH AND NEVADA, 1965–1966

The most significant development in Utah was the January 1, 1966, completion of the Phillips Petroleum Company's "A"-1 Bridger Lake Fork well in Summit County. The well was tested for 2,753 b/d of 40.3° API gravity oil.

Drilling activity for 1965 in Utah decreased from 1964. There were 37 fewer wells and 233,422 less feet drilled. It is estimated that the number of wells to be drilled in 1966 will be fewer than those completed in 1965. However, the total footage will be about the same.

Since Utah reached its peak production in 1959, the state has experienced a continued drop in oil production of about 3 million bbls. per year. This rate of decline was observed for 1965, and will be about the same for 1966.

The Uinta basin in Utah was the only geologic province that remained active as a result of several successful wildcat completions. These discoveries were significant because they expanded the Red Wash field into a belt of production that presently extends for 50 mi.

Although exploration for conventional oil fields has declined in recent years, a great upturn in drilling activity became apparent in the evaluation of numerous oil shale and bituminous sandstone deposits of Utah. Shell Oil Company presently is conducting a steam-injection pilot flood in the Sunnyside area and two additional thermal recovery projects are pending.

Drilling activity in Nevada has been concentrated in the Eagle Springs oil field. Presently there are 10 producing wells which have proved the existence of 800 productive acres. Elsewhere, Gulf Oil Corporation is drilling the fifth well in its current series to evaluate the stratigraphy and petroleum potential of various basin valleys in east-central Nevada. It has been reported that Gulf Oil Corporation will drill several additional wells.

3. ALEXANDER C. BOARDMAN, Petroleum geologist, Denver, Colorado

EXPLORATION DEVELOPMENTS IN COLORADO-NEBRASKA, 1965–1966

During the past 12 months, total exploration and development drilling in the Denver basin maintained the relatively low but consistent plateau established during the previous year. Approximately 80–90% of the tests were drilled by independent operators. Major oil companies have been active in development drilling, secondary-recovery projects, and exploration in pre-Cretaceous formations, particularly the Permian and Pennsylvanian.

Significant discoveries in the Cretaceous "D" and "J" sandstone bodies were found in the older so-called "fairway" part of the basin. Here both subsurface control and land are available. In the available-land category are Logan and Morgan Counties, Colorado, and Cheyenne County, Nebraska.

Seismic activity took place only in the following areas: Weld County, east of Black Hollow field, the extreme southern part of the basin in Crowley and Pueblo Counties, and in the evaluation of "D" and "J" sandstone prospects.

The Colorado and Nebraska legislatures passed involuntary unitization laws. This, together with improved secondary-recovery methods, should increase ultimate recovery and profit on a per-well basis.

Largely because of the increased number of tests and information available, a few companies are using computers in their exploration programs.

The exploration pattern established during the past few years should continue.

4. ROBERT T. YOUNG, Consultant, Durango, Colorado

EXPLORATION AND DEVELOPMENT OF FOUR CORNERS AREA, 1965–1966

Important oil and gas production has been established in Cretaceous, Permian, Pennsylvanian, Mississippian, and Devonian rocks. To date, Cretaceous terrigenous clastic and Pennsylvanian carbonate reservoirs have been the most productive of oil and gas.

Although exploratory and development drilling in the Four Corners area decreased from 1964, there was activity in all basins and significant developments in two previously dormant parts of the area. These are the Chaco slope, where significant new oil discoveries were made in the Cretaceous Gallup Sandstone, and in the Colorado part of the Blanding basin, where important thicknesses of Pennsylvanian algal carbonate were found. Both areas, especially the Chaco slope, will be the sites of considerable activity during 1966.

5. HERMAN ASHMORE, Amerada Petroleum Corporation, Williston, North Dakota

EXPLORATION AND DEVELOPMENT, MONTANA AND DAKOTAS, 1965–1966

Total exploratory drilling in the three-state area has increased from the preceding year. This is primarily the result of successful operations in the Sweetgrass arch area of Montana. This paper relates exploration developments in the three-state area. Examples are given of exploratory drilling that utilized some of the concepts presented in papers given at previous annual meetings of the Rocky Mountain Section. Areas of greatest drilling activity are outlined and discussed. Secondary recovery projects approved by appropriate state agencies are listed and discussed.

6. KEITH W. CALDERWOOD AND W. C. FACKLER, Phillips Petroleum Company, Anchorage, Alaska

SIGNIFICANT OIL AND GAS DEVELOPMENTS IN ALASKA, 1965–1966

Recent oil exploration in Alaska is centered in five sedimentary basins: Cook Inlet basin; Arctic (North) Slope province; Bristol Bay basin; Gulf of Alaska province; and Copper River basin. Surface and seismic exploration parties have been active in each, greatest emphasis being in the Cook Inlet basin and the Arctic (North) Slope province.

The oil industry in Alaska during 1965 drilled 19 exploratory wells, resulting in the discovery of 3 oil fields, 3 gas fields, and extensions of 2 oil fields and 1 gas field. The 3 oil discoveries, all under Cook Inlet waters, are Granite Point, Trading Bay, and McArthur River. The gas discoveries are on the upland area of the Cook Inlet basin at Birch Hill, North Fork, and Moquawkie. The Granite Point discovery was extended north more than 3 mi. by subsequent drilling. A discovery was made 6 mi. south of production at Middle Ground Shoal. Gas production at the Cook Inlet field was extended about 2 mi. southwest. Two exploratory wells drilled in 1965–66 on the Arctic (North) Slope were reported non-productive. Two shallow dry exploratory wells were drilled on the north flank of the Copper River basin. Both were unsuccessful.

The first two permanent platforms in Cook Inlet were installed at Middle Ground Shoal oil field during 1965, and development drilling began. A twin 8-mi. crude-oil pipeline was completed connecting the two platforms with an onshore treating facility. This furnished the first outlet for crude oil other than that at the Swanson River field. Contracts were let for 6 additional offshore-drilling and production platforms to be erected during 1966.