maps of the productive part of the Phosphoria formation show the relation of the Manderson field to this stratigraphic trap.

The reservoir in the Manderson field is a stratigraphic trap formed by the facies change in the Phosphoria formation.

5. ADENA FIELD, MORGAN COUNTY, COLORADO.

LOUIS M. PERRY and HENRY D. OVERSTAKE, Pure Oil Company, Denver, Colorado.

With the discovery of stratigraphically trapped oil in Washington County, Colorado, in 1952, interest in the south-central part of the Denver basin greatly increased, resulting in the discovery of the Adena field in 1953, the largest reserve developed to date.

The Dakota "J" reservoir embraces approximately 12,000 acres and contains substantially more than 40 million barrels and 32 billion cubic feet of recoverable oil and gas. During the first year of production, more than 3 million barrels of oil were produced, resulting in a pressure decline of 92 pounds.

Oil is produced predominantly from the Dakota "J" sandstone and secondarily from the Muddy "D" sandstone of Cretaceous age. Structurally the field is characterized by relatively uniform northwest dip of approximately 50 feet per mile, though local terracing and nosing exist. Accumulation is controlled by stratigraphic variation within and below the producing zones. Locally, a permeability barrier is present on the eastern side of the field, while a basal seal below the pay zone prevents migration into the main sand body.

Most of the oil now produced in the Muddy "D" sandstone is found in the northwestern extremity of the field and is associated with those areas where the formation has its best development of porosity, permeability, and thickness.

6. GEOLOGY OF RAILROAD VALLEY AND VICINITY, NEVADA.

R. C. SPIVEY, Shell Oil Company, Los Angeles, California.

Railroad Valley is situated in the western part of a miogeosyncline where sediments representing all of the Paleozoic systems accumulated to a thickness of about 22,000 feet. The region was uplifted in late Permian or early Mesozoic time and no marine invasion is known to have occurred since. Great thicknesses of fresh-water sediments and volcanic rocks were deposited, possibly partly during Cretaceous and early Tertiary, but mostly in Miocene and later time. The faulting which has formed the present-day basin-and-range structure of the region also took place in late Tertiary and Quaternary time.

Wells drilled in Railroad Valley have penetrated several thousand feet of presumed Tertiary beds which can be compared in a general way with rocks exposed on the east side of the valley. Oil-saturated welded tuff in this Tertiary (?) section was encountered at a depth of 6,445–6,880 feet in Shell's Eagle Springs Unit 1 and the well was completed with an initial production of 373 barrels of oil per day from this zone. Shell's Eagle Springs Unit 2, about 9 miles southwest of Unit 1, encountered more than 2,000 feet of similar volcanic material but found only minor oil shows in it. The zone of welded tuff was not encountered in Unit 3, about 5 miles south of Unit 1. All three of these wells penetrated Paleozoic rocks below the Tertiary (?) but found only minor oil shows.

7. CASE HISTORY OF EAST POPLAR FIELD, ROOSEVELT COUNTY, MONTANA.

J. B. POWELL, JR., Murphy Corporation, Billings, Montana.

The discovery well for the East Poplar field was completed in March, 1952. On December 1, 1954, there were 53 producing oil wells in the field which had proved approximately 15,000 acres to be productive.

The field is located on a large, northwest-southeast anticline. Oil is obtained from limestone beds in the Charles formation of Mississippian age. The accumulation is partly controlled by porosity variations. During the first 11 months of 1954, more than one out of every 5 barrels of oil produced in Montana came from the East Poplar field.

8. SEDIMENTATION AND STRATIGRAPHY OF DAKOTA FORMATION IN SAN JUAN BASIN.

GUY C. BURTON, JR., El Paso Natural Gas Company, Farmington, New Mexico.

Exploration for gas in the Dakota formation of the San Juan basin can be designated as structural and stratigraphic. Petrographic analyses and subsurface studies of sand bodies below the top of the Graneros formation were used in attempting to designate the areas best suited for stratigraphic exploration.

High degrees of regeneration of the quartz grains composing the Dakota have hindered the drilling and exploration of the formation, and is believed responsible for the varying degrees of porosity and permeability of the Dakota in wells in adjoining sections.

The deletion of permeability by an increase in clay-mineral content of the sandstone members of the Dakota formation is believed responsible for the accumulation of gas southwest of the axis of the low part of the basin.