cline against a large, normal fault, known as the Russell fault. This fault trends approximately N. 30° W., and dips steeply to the southwest. The Dibblee sand lies at depths ranging generally from 2,800 to 3,200 feet. The Colgrove zone lies approximately 1,000 feet below the top of the Dibblee.

The South Cuyama field, discovered in May of this year, lies in the foothills at the south margin of the valley, about 4 miles southeast of the Russell Ranch field in Santa Barbara County. Its productive limits have not yet been determined, but present development and productive outposts extend over an area 3 miles long and more than 1½ miles wide. This oil field occurs on an elongated faulted dome, its long axis trending northwest and southeast. Production is from the Dibblee zone, encountered at depths ranging from 4,000 to 4,400 feet. Exploration has not yet been carried below this zone. Unlike the Russell Ranch field, South Cuyama has a gas cap area at the crest of the dome.

The Dibblee sand is a friable, well sorted arkose, ranging from fine- to coarse-grained. It is characterized by high porosity, high permeability, and high productive indices. Potentials in both fields range upward to several thousand barrels per day. The Colgrove sand is similar in character to the Dibblee and well potentials are comparable, though generally somewhat smaller due to the lesser thickness of sand. Both fields are being developed on a ten-acre spacing pattern, with duplicate wells where the Colgrove zone is productive.

10:45 Nomination of Officers.

10:55 (4) GEOLOGY AND PROBLEMS OF EXPLORING FOR OIL IN NORTHERN ALASKA

Col. O. F. Kotick, USA, Naval Petroleum Reserve No. 4, Fairbanks, Alaska (read by Frank Morgan, Richfield Oil Corporation, Los Angeles).

The Arctic is a land of natural excesses and severities. Special problems are presented by the excessively cold temperatures, protracted periods of darkness, winds, fogs, permafrost, and magnetic storms.

The Lisburne limestone (Mississippian) forms prominent scarps and slopes along the north front of the Brooks Mountain Range, which is the northwestern extension of the Rocky Mountains. In the foothill belt north of the mountains, Permian, Triassic, Jurassic, and Cretaceous rocks are represented.

Cretaceous rocks make up the bulk of the drillable sediments of the Arctic basin. These rocks attain a maximum thickness of about 22,000 feet, principally dark shales with some fine, tight sandstones and silts.

Northward thrust faults provide the major structural features along the front of the Brooks Range; this orogeny has resulted in the lower Mesozoic rocks immediately in front of the Range being broken up into a highly complex zone of isoclinal and overturned folds and thrust faults. Farther north the outcropping Cretaceous rocks are gently folded into long east-west trending structures, slightly steeper on the north limbs.

All types of known accepted tools have been or are being used in this exploration project including magnetometer, gravity meter, seismograph, core drill, surface and subsurface geology, aerial photography, and photo-geology, and test wells with all accepted devices for well survey. Eight test wells have been drilled to date, and twelve more are planned through 1952.

The natives, organization and planning for exploration, and the extraneous activities supported by Navy funds are described briefly.

THURSDAY AFTERNOON, 2:00–4:00

Presiding: WILLIAM F. BARBAT, Standard Oil Company of California, San Francisco
LOYDE H. METZNER, Signal Oil and Gas Company, Los Angeles

2:00 (1) OFFSHORE SEISMIC PROBLEMS AFFECTING GEOLOGIC EVALUATION

Curtis H. Johnson, General Petroleum Corporation, Los Angeles, and Robert B. Galeski, Honolulu Oil Corporation, Los Angeles.

During 1948 and 1949 joint seismic operations were conducted offshore the coast of California by a group averaging 14 oil companies employing two crews for a total of 13 crew-months. This joint effort was required by the California Division of Fish and Game to minimize damage to fish. During this work a notable variety of problems were encountered.

It is concluded that geophysical methods other than seismic are not of sufficient resolving powers in the California offshore areas to detail structure.

Problems peculiar to marine work are: secondary energy bursts, circumvented by either firing charges shallow or jetting them into the bottom; multiple reflections from the ocean floor, which result in apparent reflections below basement for shallow water, unusable records in water around 500 feet deep and complete repetitions of section for very deep water; occurrence of high angle "erratics," interpreted in terms of faulting, buried stream channels, and bottom irregularities; constant velocity in deep water, handled by projecting shots and detectors to the ocean floor; surveying over vast expanses of water, accomplished by the use of shoran; and timing the programming of specific lines to best overcome bad weather, ocean traffic hazards, and damage to fish.