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Billings, Montana
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KEVIN-SUNBURST FIELD

T.32-36 N., R.1-4 W.
Toole County, Montana

GENERAL FIELD DATA

Regional Setting:

Kevin-Sunburst Dome, Sweetgrass Arch.

Surface Formations and Elevation:

Shales of Cretaceous Colorado Group, avg. 3,500'.

Discovery Well and Date:

Gordon Campbell-Kevin Syndicate No. 1 Goeddert, NE NE NE Sec. 16, T35N-R3W, TD 2,540', 3-14-22.

Exploration Methods:

Surface geology, subsurface geology, random drilling. Possibilities for production from Kevin-Sunburst Dome were first pointed out by Eugene Stebinger in 1916 in USGS Bull. 641-C. Although non-commercial, a test drilled in March, 1922, Sec. 16, T35N-R3W, by the Gordon Campbell-Kevin Syndicate is considered as the discovery well since it found a small amount of oil in the Madison limestone.

The first commercial well was drilled by the Sunburst Oil and Gas Company in June, 1922, Sec. 34, T36N-R2W. This test was completed at an initial flowing rate of 100 BOPD from the Sunburst sand at 1,545'.

Oldest Horizon Penetrated:

Precambrian

Horizons with Shows:

Bow Island, Burwash, Sunburst, Swift, Rierdon, Sawtooth, Madison, Nisku, Duperow.

Nature of Trap:

Stratigraphic with regional and local structural influence. Accumulation in the Madison limestone and Sawtooth occurs in a number of isolated pools and is primarily stratigraphically controlled by porosity variation on north flank of a large elliptical-shaped dome. Small structural terraces and anticlinal noses have local importance in some of the individual pools. Production in the Sunburst, Swift and Burwash sands occurs in stratigraphic traps caused by porosity lenses.

Area of Trap:

40,480 acres, numerous traps.

No. of Producing Wells: Nisku 1, Madison 795, Swift 25, Sunburst 46, Ellis 62, Cutbank 2

Abandoned Wells: Unknown

Shut In/Temp Abdn Wells: 404 (all zones)

Disposal/Injection Wells: Unknown (all zones)

Dry Holes: 60 (all zone)

Major Operators:

Texaco Inc., Frontier, Minden Oil & Gas, many others.

Drilling and Casing Practices:

Set production casing above pay zone, tail in with air, oil or cable tools.

Logging Suite:

Gamma Ray-Neutron or none at all.

Testing Practices:

Pump test.

Market:

Various purchasers.

RESERVOIR DATA

Producing Formation:

Devonian Nisku Dolomite; Mississippian Madison Limestone; Jurassic Sawtooth and Swift Sandstones; Cretaceous Sunburst and Burwash Sandstones.

Lithology, Continuity, Thickness:

Madison reservoir consists of dolomitic limestone having an average of about 10' net porosity generally at top of formation. Lithology is variable, ranging from dense to coarsely crystalline with intergranular, vuggy and fracture porosity. Secondary porosity by surface weathering is important locally. Sunburst, Swift and Burwash reservoirs consist of sandstone up to 50' in thickness. Average net porosity is about 10-15'. Porosity discontinuous in all reservoirs.

Avg. Depth (& MSL):

1,500' (+2,000') Madison

Porosity/Permeability:

20% porosity, permeability extremely variable.

Oil, Gas Column: (Water Contact MSL):

Various from +1,400' to +2,150' in Madison.

Avg. Net Pay Thickness:

10'

Area this Reservoir:

40,480 acres (all reservoirs)

Order/Docket No. and Spacing Details:

Order No.'s 8-54, 28-55; oil, 9 wells per 40 acres, 3 wells on any side of tract no closer than 220' from 40 acre tract line. Gas, well no closer than 330' from legal subdivision line and no closer than 2,400' from any other producible well on the same lease or unit. Order No. 83-76, Nisku, 640 acre spacing, location no closer than 990' from spacing unit boundary.

BO/MCF Per Acre-Foot:

227 Bbl ultimate recovery.

Drive Mechanism:

Madison and Sawtooth water drive and solution gas; other reservoirs gravity and solution gas.

Character of Oil/Gas:

Variable. Madison-Sawtooth oil is dark green to black, mixed base, 27-40 degrees API gravity, about 1.3% sulphur. Sunburst oil is dark green, 37-41 degrees API gravity with about 1.0% sulphur. and Burwash oils are generally similar to Sunburst crude.

Gas-Oil Ratio:

Unknown

Water Rw, Salinity:

Slightly sulfurous brackish water in Madison and Sawtooth; fresh to brackish waters in other reservoirs.

Avg. Saturation:

35%

Initial and Present Pressure:

Unknown

Temperature:

81 degrees F

Initial Potential (High,Low,Avg.):

F 1,200 BOPD, P 1/2 BOPD, P 20 BOPD

Decline Rate:

Unknown

Present Daily Avg. Production:

1,951 BOPD

Amount of Water Produced:

Unknown, probably several times oil volume.

Completion/Perforation/Treatment:

Early wells drilled with cable tools. Completed by setting production casing on top pay zone. Madison wells are generally acidized. More recent wells drilled with air and completion practice unchanged.

Cumulative Production:

74,982,822 bbls (1-1-84)

Est. Ultimate Primary Recovery:

70,570,000 bbls

Est. Ultimate Secondary Recovery:

7,970,000 bbls

Secondary Recovery Method:

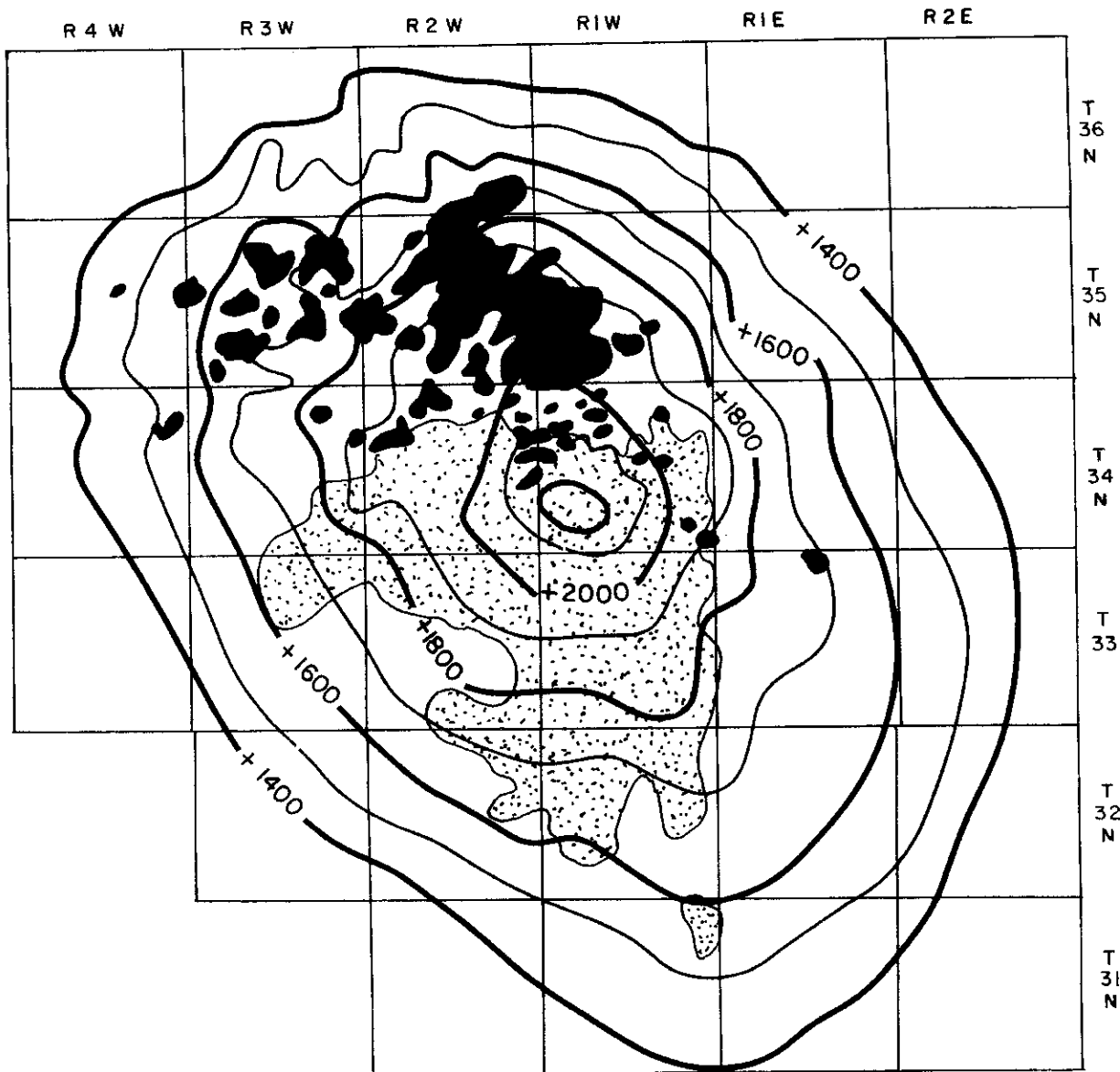
Water flood

DISCUSSION

Development of the Kevin-Sunburst Field was intense from 1922 into 1944. Sporadic development drilling took place from 1948 until 1972. A new generation of development began in 1973 continuing until the present.

REFERENCES

Anonymous, 1957, Billings Geological Society, Montana Oil and Gas Fields Symposium. Montana Board of Oil & Gas Conservation, 1983, Annual Review, Vols. 1-27. Gates, Bryan, 1961, Billings Geological Society, Revision to Montana Oil and Gas Fields Symposium.



KEVIN - SUNBURST DOME



Toole County, Montana

STRUCTURE CONTOURS ON
MADISON LIMESTONE

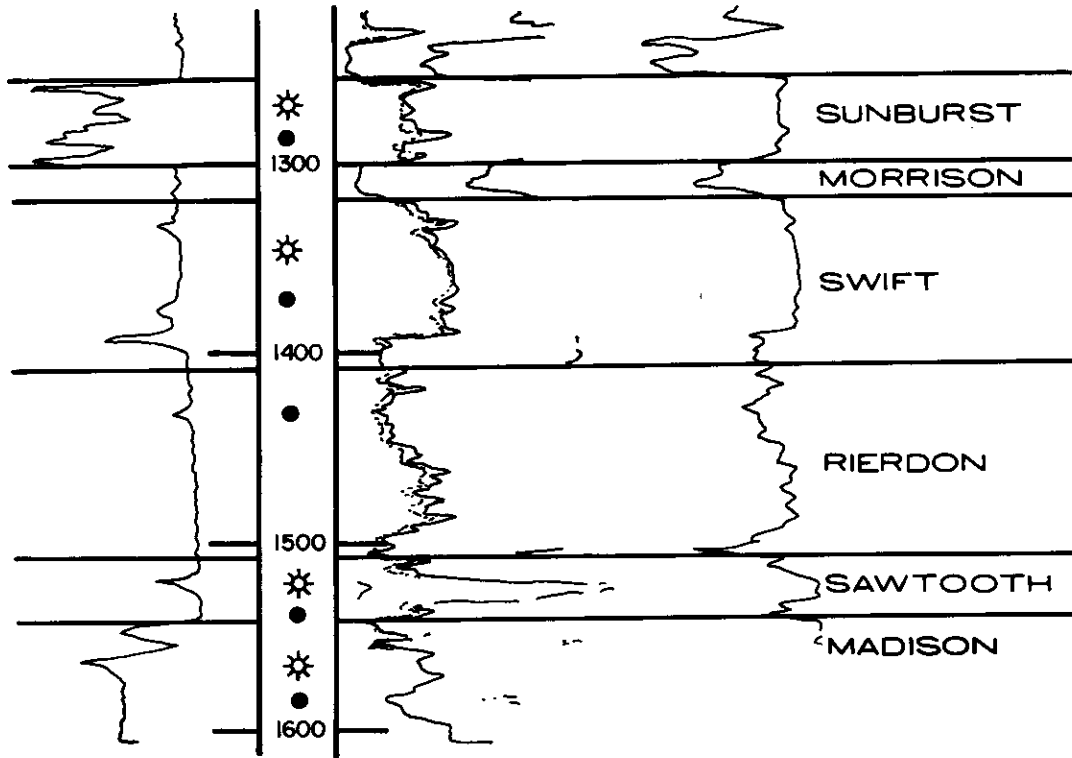
C.I. = 100'

FEB., 85

SCALE: 0 2 4 6 MILES

-  OIL PRODUCING AREA
-  GAS PRODUCING AREA

TYPICAL LOG KEVIN-SUNBURST FIELD



DIAGRAMATIC CROSS SECTION KEVIN SUNBURST DOME

