

MARCH 21, 1991
NARRATIVE FOR ENNIS QUADRANGLE
DILLON RESOURCE AREA MANAGEMENT PLAN/EIS

INTRODUCTION

The Ennis quadrangle (EQ) is situated at the eastern edge of the Dillon Resource Area (DRA) in eastern Madison County. A significant amount is within the Lee Metcalf Wilderness and the southern tip of the Beartrap Wilderness.

The principal topographic features are the Tobacco Root Mountains at the Northwestern corner, the Gravelly Range at the southeastern corner, the Madison Range at the eastern side and the Madison River Valley from the Beartrap Wilderness to the south edge of the quadrangle.

Structurally, the northeast corner of the EQ has been cut by the faulting (both thrust and shear) of the Spanish Peaks fault zone. The lineaments are northwest-southeast. The eastern part of the EQ-DRA south of the Spanish Peaks fault zone, features sediments of the Madison Synclinorium which is, topographically, the Madison Range. These sediments are of Cambrian up through Tertiary in age. A large Tertiary intrusion is centered at the common township corner of Ts. 6 & 7 S., Rs. 1 & 2 E. All sediment outcrop areas with rocks younger than Mississippian have a probable thickness, above the Archean basement, of over 3,000 feet in the Madison synclinorium.

Nine to ten miles west of the Madison Synclinorium - Madison Range is the Madison River Valley. This area is the site of an old (Tertiary Paleocene) arch, or overthrust or uplift, which was stripped of sediments during Paleocene and lower Eocene times. Remnants of this old uplift are expressed in Precambrian outcrops on both sides of the Madison River Valley. On the east side in Ts. 5, 6, & 7 S., R. 1 E.; and Ts. 8 & 9 S., Rs. 1 & 2 E; and on the west side in T. 4 S., R. 2 W.; T. 5 S., R. 1 W.; Ts. 6 & 7 S., R. 2 W.; Ts. 8 & 9 S. R. 1 W. Between these outcrops is a graben faulted area five to ten miles wide which has been filled with sediments of possibly middle Eocene to Recent ages. This collapsed arch may have accumulated sediments up to 12,000 feet in thickness.

Two wells for oil or gas have been drilled on the Ennis quadrangle. Both are in the Madison River Valley graben. In mid-1984 Helis Estate drilled the 1027 Boomhower in the N SW SW sec. 27, T. 8 S., R. 1 E. to a total depth of 6,382 feet in Precambrian metamorphics which were encountered at 5,918 feet. This well spudded in Quaternary alluvium and entered Tertiary Madison Valley sediments at either 1,050 or at 1,300 feet. Tertiary sediments continued to 5,918 feet. No oil or gas shows were noted.

In late 1984 Texaco drilled the 1 Granger, NE SE sec. 18, T. 7 S., R. 1 E. to a total depth of 8,585 feet into Precambrian metamorphics which were encountered at 7,524 feet. It encountered Tertiary sediments at, or near, the surface and was in Tertiary tufa when it entered Precambrian. No oil or gas shows were reported.

Gravity measurements (Schofield 1981) indicates a valley fill thickness of up to 12,000 feet at a point about 2 miles west of the Texaco well and about 2 miles west of the Helis well. The part of this valley having the greatest thickness of Tertiary sediments is shown as being on the Hebgen Lake quadrangle commencing about 1 mile south of the EQ boundary and containing southeastward for a distance of about 7 miles. From this depocenter the Tertiary thickness decreases northward. About 3 miles east of Ennis townsite the thickness is about 7,500 feet.

A hydrocarbon potential, probably gas, may be theorized for the Tertiary sediments at greater depths than encountered in the Texaco and Helis wells. Their bottom hole temperatures were 144 F and 141 F, respectively. A normal gradient of 5 F per 1,000 feet indicates that depths of 17,000 to 19,000 feet would be needed to approach 200 F (the beginning of the "oil window" temperature range which can liberate methane from humic sources). Such depths do not appear to be available in the Madison River Valley and the gas potential would therefore be restricted to the biogenic methane liberation temperatures (65 ÷ 120 F). This may mean that biogenic gas should occur at depths of less than 4,600 feet in the vicinity of the Texaco well and less than 2,400 feet near the Helis well. This data is discouraging for gas possibilities on the eastern flank of the Madison River Valley but may not be pertinent to the central and western parts of the valley.

Ts. 7, 8, & 9 S., Rs. 2 & 3 W. comprise the most prospective area on the EQ. West dipping strata of Cretaceous age through Cambrian age are repeated by thrust faulting. The Gravelly Range, at its northern end is the major topographic feature. Structural traps are probable beneath the thrusts and the sub-thrust could be tested to Precambrian at less than 10,000 feet.

OCCURRENCE POTENTIAL

Areas of Precambrian outcrops are classified as "VERY LOW" occurrence potential as is the large Tertiary intrusion on the Lee Metcalf Wilderness Area. These areas comprise about one-half of the EQ within the DRA.

Areas of "LOW" occurrence potential have less than 3,000 feet of post Precambrian sediments with one major exception. The Madison River Valley has only Tertiary sediments above the Precambrian basement. At least the east side of this graben basin seems to have a low temperature gradient. Extrapolating this data indicates that hydrocarbons may not have been generated in this basin. However, additional testing is needed in the deeper central area and on the west side. 3

Areas of "MODERATE" occurrence potential have yet to be tested. The most significant is the north part of the Gravelly Range from about the center of T. 7 S., R. 2 W. through T. 9 S., Ts. 2 & 3 W. Here exists the possibility of testing an upper Paleozoic trap on the hanging wall block and a Cretaceous Colorado group through Cambrian structure in the foot wall block at a total depth of about 11,000 feet. A test through Mississippian would only be about 9,000 feet deep.

A narrow (one to three miles wide) strip of "MODERATE" occurrence potential is shown in the Madison River Valley since the two tests have only partly evaluated this large Tertiary basin.

The third area of "MODERATE" occurrence potential is largely within the Lee Metcalf Wilderness.

There are no areas of "HIGH" occurrence potential in the EQ.

DEVELOPMENT POTENTIAL

There are no lands on the EQ that are considered to be of "HIGH" development potential.

The Gravelly Range is considered to be of "MODERATE" development potential. Two or three exploratory wells are anticipated in this area in the upcoming 15 years. A discovery well would generate development drilling at a rate of two or three wells per year. This means an additional 15 or 20 wells before the year 2006.

The large area of "LOW" development potential may experience one or two wells in the next 15 years.

No wells are expected in the areas classified as "VERY LOW".

Total predicted wells to be drilled before the year 2006 are: 3 or 4, if all are dry, and 18 to 25 if one is a discovery.

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