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MINES AND GEOLOGY BRANCH

BUREAU OF GEOLOGY AND TOPOGRAPHY

GEOLOGICAL SURVEY

PRELIMINARY REPORT

GEOLOGY OF THE VICINITY OF TABER, ALBERTA

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INTRODUCTION

The town of Taber is about 30 miles east of Lethbridge, Alberta, on the Crows Nest line of the Canadian Pacific railway. For a number of years there has been extensive coal mining in the vicinity, but some of the mines are now abandoned. Intermittent prospecting for oil and gas has been carried on here, but it was not until the drilling of certain test holes by Majestic Mines, Limited, in 1930 and 1931, that the true nature of the structure could be appreciated. In September 1936 the Plains Petroleum Corporation began the drilling of a well about 2 miles southwest of Taber, and in March 1937 this well obtained a flow of petroleum, apparently in commercial quantities. This discovery has aroused considerable interest in the geology of Taber district.

During the summer of 1935 a geological survey was made by Sproule along Oldman river east from Lethbridge, and in the course of this work the structure of the Taber coal field was studied in detail. A series of elevations were determined on key horizons along the river valley and its tributary coulées, and these were correlated with the data from mine plans and test hole logs. From this compilation it was possible to demonstrate the presence of a dome-like structure southwest of Taber, but the character of its southwestern flank could not be determined. Additional data of value to the structural plotting were obtained in 1936 by J.A. Thomson, conducting a water resources survey under the direction of R.T.D. Wickenden. Thomson obtained elevations on the top of the Lower Milk River sandstone in a number of artesian wells near Taber. From these various data the accompanying structural map was prepared.

The writers acknowledge their indebtedness to Mr. Harold Huntrod, of Taber, who provided mine plans of the older collieries in the district, many of which had been surveyed by his father, the late Mr. E.S.F. Huntrod. They are also obliged to Mr. A.F. Mewburn for supplying information on test holes drilled by Majestic Mines, Limited, and to the local operators of the various Taber coal mines who allowed access to their mine plans.

STRATIGRAPHY

According to the interpretation of the writers, the rocks exposed in the vicinity of Taber all belong to the Foremost division of the Belly River formation. This is contrary to the usual geological mapping here, which places the contact between Foremost and "Pale" beds at the top of the Taber coal seam. The highest seam of Foremost type actually occurs about 176 feet stratigraphically above the Taber seam, and rises out of the river valley some distance west of Taber. The intervening beds are predominantly of Foremost type, and for this reason, as well as for consistency in structural mapping, the highest seam is taken as the top of the Foremost beds. This question will be discussed further in a later report.

The Foremost beds in Taber district consist principally of brown sandstone and coarsely bedded shale, with carbonaceous beds varying from impure lignite to sub-bituminous coal. In places there are lenses of light grey or buff, massive, cross-bedded sandstone. Ferruginous concretions and thick beds of fossils are conspicuous in places. There is much lateral variability to the beds, and this makes structural studies difficult, but with care the coal seams and fossil beds may be used successfully as key horizons. The following section is offered as typical of Foremost beds near Taber, and as giving

the general assemblage of strata usually associated with the Taber seam.

Section of Foremost Beds in ls. 3, sec. 9, tp. 10, range 17, W. 4th mer.

	Feet
Silt, fine, possibly glacial	8
Shale, sandy, rusty or brown, partly carbonaceous	9.5
Shale, carbonaceous, reddish, with ½-inch coal seam near top	2.5
Clay, sandy and carbonaceous, banded rusty, grey, brown, and yellow, with ferruginous streaks; abundant selenite crystals	9.2
Sandstone, fine grained, irregularly bedded, lenticular, with fine carbonaceous partings	3.5
Shale, sandy, grey-brown, ferruginous in lower part	2.5
Shell bed; fragmentary Unios	0.1
Shale, carbonaceous, sandy in lower part	0.5
Shale, coarsely friable, rusty grey	7.9
Shale, carbonaceous, rusty	1.3
Sand, argillaceous, grey	1.3
Shale, carbonaceous, grey	1.2
Sandstone, grey to buff	0.9
Sandstone, soft, argillaceous, grey	2.0
Sandstone, hard, silty, brown	2.5
Shale, soft, grey, with numerous Unio shells and other fossils	0.4
Shale, dark grey	0.7
Shale, carbonaceous, black	1.2
Coal, with shaly partings; Taber seam	2.8
Shale, carbonaceous, brown	0.7
Shale, carbonaceous, rusty, passing to grey, sandy shale and grey sand	11.1

	Feet
Clay ironstone, changing laterally to sandy shale	0 to 1.5
Sand, grey	4.8
Shale, carbonaceous, brown to grey	6.0
Shale, grey	6.0
Ironstone	0 to 1.0
Shale, sandy, dark grey-brown	3.8
Ironstone, sandy	0 to 0.8
Shale, grey	3.3
Ironstone and ferruginous sandstone	0.2 to 0.5
Shale, sandy, grey	3.8
Shale, carbonaceous, black to brown	1.0
Shale, sandy, grey	13.7
Shale, sandy, grey, with irregular ironstone nodules	3.1
Sandstone, indurated	1.7 to 2.1
Sand and shale, grey	12.5
Ironstone and ferruginous sandstone, fossiliferous	1.4
Clay ironstone, fossiliferous	1.5
Shale and sandstone, grey and buff	11.3

To the west and south of Taber the coal seam passes over to carbonaceous shale with thin coal partings. The associated beds also change, especially the massive sandstones, which commonly lens into sandy shale. This suggests that the Taber coal field was a topographically low area during Foremost time.

The formations lying below the Foremost beds have been penetrated by a number of wells and test holes near Taber, and the data obtained from these borings are summarized in the following table. More detailed information on these strata will be available when the samples from the Plains Petroleum well are studied.

Summary of Formations Penetrated by Drilling in Taber District

Age	Formation	Description
Upper Cretaceous	Foremost	Brown and grey sandstone and shale, with carbonaceous beds; total thickness about 500 feet; Taber seam about 325 feet from base.
	Pakowki	Dark grey shale, with some sandstone; chert pebbles at base; about 215 feet thick.
	Upper Milk River	Fine sandstone and shale, with some carbonaceous beds; thickness 65 to 100 feet.
	Lower Milk River	Massive, water-bearing sandstone, becoming shaly in lower part, transitional to Alberta shale; about 130 feet thick.
	Alberta	Dark grey shale, with some light grey sandstone in lower part; thickness about 1,880 feet.
Lower Cretaceous	Blairmore and (?) Kootenay	Grey, green, and reddish shale, with light grey sandstone in lower part; petroliferous sandstone about 600 feet from top; total thickness not determined

STRUCTURE

The regional dip in Taber district is somewhat west of north, and varies from 25 to 50 feet to the mile. This dip may be observed along Oldman river from section 19 to sec. 8, tp. 10, range 17. As the river swings eastward, in section 9, it traverses obliquely a narrow anticlinal fold, shown by outcrops and by the log of Canadian Western Natural Gas test hole No. 3. Southeast of this fold is a very narrow syncline, as determined from elevations on the coal. To the southwest this trough broadens and deepens, as indicated by Canadian Western Natural Gas test

holes Nos. 1 and 6. Approaching the town of Taber a series of plunging folds are encountered in the tributary coulées and the mine workings. Southwest of Taber is a series of test holes drilled by Majestic Mines, Limited, which indicate a pronounced rise in the strata to sec. 24, tp. 9, range 17. Southeast of here the dip reverses, as shown by test holes Nos. 4 and 5, but the north-northwesterly dip is resumed on the south side of township 9, range 16. There is thus evidence of a structural nose or dome southwest of Taber, centring around secs.13 and 24, tp. 9, range 17. Further details on the north side of this structure can be obtained from water well records. With regard to the southwest flank, adequate information is lacking. The artesian well drilled in the southwest quarter of sec. 10, tp. 9, range 17, would supply some of this missing data, but the record of the depth to the aquifer is not available. The contours of the accompanying map are drawn in this vicinity on the assumption that the well penetrated about 20 feet of the Lower Milk River sandstone. This gives about 30 feet of closure on the south-western side, but there may be as much as 50 feet, or the structure may be narrowly open on this side.

OIL AND GAS POSSIBILITIES

The Cole-Hunter, or Alberta Pacific Consolidated well, in ls. 3, sec. 11, tp. 10, range 17, encountered a strong show of oil in the basal sandstone of the Lower Cretaceous. Current reports on the Plains Petroleum well (ls. 14, sec. 25, tp. 9, range 17) indicate that a flow of oil, with some water, has been obtained from about the same horizon.

The Taber structure may or may not be closed on all sides, but there is no doubt about the existence of over 50 feet of closure on the southeast flank. This is a very important component of the structure, as it constitutes a reversal of the

regional dip, and, therefore, probably forms an impediment to the migration of oil. It is probable that this southeastern flank is not as simple as represented, but rather is complicated by folds similar to those on the northern side. However, this cannot be determined from the available data.

The evaluation of the Taber structure as an oil reservoir would be greatly facilitated by the drilling of one or two test holes on the southwestern flank, in sec. 9, 10, 15, or 16, tp. 9, range 17. Further drilling for oil should be confined at present to the north side, either east or west of the Plains Petroleum well, and a little higher on the structure. Wells drilled near the summit of the structure probably will encounter gas.

It is currently reported that the Plains Petroleum well will be deepened to test the oil possibilities of the basal Ellis and upper Madison strata. The results of this test will be very important to the evaluation of the Taber field.