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CANADA
DEPARTMENT OF MINES AND RESOURCES

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MINES AND GEOLOGY BRANCH

BUREAU OF GEOLOGY AND TOPOGRAPHY

GEOLOGICAL SURVEY

PRELIMINARY REPORT

PEKISKO HILLS AREA

BY

G. S. Hume

Paper 37-1

OTTAWA

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LOCATION

Pekisko Hills area is 25 miles southwest of the town of High River, Alberta, in townships 16 and 17, ranges 2 and 3, west of the Fifth meridian (Figure 1). It lies about 10 miles south of the south end of Turner Valley gas and oil field and to the south of Pekisko creek, a tributary of Highwood river. Part of the uplift that constitutes the prospective gas and oil structure is on the E.P. ranch in townships 16 and 17, range 3. The remainder, including the centre of the uplift, is on range 2, on land adjoining the E.P. ranch on the east.

PREVIOUS WORK AND ACKNOWLEDGMENTS

The Pekisko Hills uplift was drilled on the recommendation of Dr. Robin Willis. The interpretation of some of the structural features presented in this report is different from that placed on the same facts by Dr. Willis, a condition likely to occur where complicated structure is involved. The writer has endeavoured, therefore, to show as many dips and strikes as possible and has re-surveyed, by plane table, on the scale of 10 inches to the mile (Figure 3), part of the map presented in Figure 2 in order that the complicated west flank might be shown more adequately. The interpretation given here is based on the observations recorded on these two maps, but it is recognized that other interpretations may accord with the facts. Some of the structural features have been discussed with Dr. Willis to whom the writer expresses his thanks. In order, however, that in so far as possible an independent opinion regarding the structure might be obtained the use of Dr. Willis' maps was avoided while making the survey. The discovery that Pekisko hills had a core of limestone at such shallow depths as found by drilling must be regarded as a notable achievement for which the credit is entirely due to Dr. Willis. The writer was assisted in the field work by J. Frank Blue, A.D. Graves, and H.G. Bagnall, all of the University of Alberta.

PHYSICAL FEATURES

The Pekisko Hills uplift is expressed topographically by a series of hills. This is quite unlike central Turner Valley, which as the name implies is a valley and is flanked by northwest-trending ridges. The difference is explained by the fact that the Pekisko Hills uplift exposes hard Lower Cretaceous Blairmore strata at the surface, whereas in Turner Valley softer Upper Cretaceous Alberta shales form the valley bottom. The topography is thus directly related to the resistance to erosion of the strata exposed at the surface. Pekisko hills rise to an elevation of about 4,750 feet. The trend of the hills in the Pekisko Hills uplift is north and south and small hills show the continuation of the structure as far south as township 15. To the north of Pekisko creek the uplift is represented by a series of hills and is considerably wider than it is south of the creek and is much more complicated structurally. The northern hills also form the southern part of the Highwood uplift.

STRATIGRAPHY

The sequence of formations in Pekisko Hills area is similar to that in Turner Valley, except that a greater thickness of Bearpaw shales separates the Belly River and Edmonton strata. The lowest exposed strata in Pekisko Hills area are the lime bands in the lower part of the Blairmore formation. All strata older than the Blairmore are known only from drilling.

Table of Formations

Age	Formation	Thickness (Feet)	Description
Tertiary	Paskapoo		Heavy-bedded, drab, grey to light-coloured sandstone alternating with dark grey, brownish, and greenish shales. Certain strata are highly carbonaceous with thin coal seams. Unios and gasteropods are abundant at other horizons. Basal rocks conglomeratic or sandstones with isolated chert pebbles. Non-marine.
Upper Cretaceous	Edmonton	1,100±	The lower strata consist of rusty brown sandstones and grey shales and are associated with carbonaceous layers, coal seams, and white bentonitic beds. Above these are heavy sandstone beds of grey and chocolate colour alternating with grey, brown, and greenish shales with ironstone. The upper strata are grey sandstones and shales. Non-marine.
	Bearpaw	100 to 150	Dark shales with coal seams up to 1 foot in thickness. May be partly marine.
	Belly River	1,900	Grey sandstones alternate with grey and greenish shales. Ironstone is present. A discontinuous oyster zone and a conglomerate bed occur near the base and coaly beds near the top. Non-marine.
	Upper Alberta shale	1,500 to 1,600	Very sandy shale at top grades downwards into grey shale with thin sandstone layers. Abundant ironstone nodules occur at certain horizons. Marine.
	Cardium	200	Grey sandstone and sandy shale; very poorly developed in this area and usually only two thin bands of sandy shale separated by shale.
	Lower Alberta shale	850	Grey shale and rusty shale with some ironstone nodules and thin, brownish sandstone beds; poorly exposed in this area.

Table of Formations (Cont'd)

Age	Formation	Thickness (Feet)	Description
Lower Cretaceous	Blairmore	1,200 to 1,500	The upper strata are green and grey sandstones with dark grey and greenish shales. The Home sand is a white or grey sandstone and below it is a series of thin, yellowish weathering limestone beds containing pelecypods. The basal bed is a conglomeratic sandstone not exposed in this area.
	Kootenay	100	Coal and coaly shale with brown and grey sandstones.
Jurassic	Fernie	225 to 250	Brown sand in upper part; grey to dark shales with lime bands near the base.
Palaeozoic	Rundle	1,400±	Limestone, in part light grey and in part dark; relatively little shale; the top is an erosion surface.
	Banff shales	700	Limy shales and limestones.

Wells drilled on the Pekisko Hills uplift will commence in the Blairmore formation (Figures 2 and 3) and will encounter strata as shown by the log of Pekisko Hills No. 1 well drilled on sec. 6, tp. 17, range 2, W. 5th mer. This well was commenced in strata between the McDougall-Segur and the underlying Home sand. The McDougall-Segur horizon consists of several, heavy, grey sandstone beds separated by a little shale. The base of the McDougall-Segur sandstone is considered to be 400 feet stratigraphically below the "grit zone", a conglomeratic quartz sandstone at the base of the Lower Alberta shale and usually considered the boundary between it and the underlying Blairmore formation. Between the grit and the top of the McDougall-Segur sandstone are other sandstone beds separated by sandy shales and usually by one or more layers of purplish or reddish beds of shale. One of these sandstone beds, known as the Stockmen's sandstone, is not always easily recognized in this area as it seems to be highly variable laterally. Where present it is composed of very hard sandstone in beds 1 to 2 feet thick and commonly is of a light grey colour quite distinct from the "salt and pepper" texture of the McDougall-Segur sands. In many places another very heavy sandstone occurs only a short distance below the grit zone. This also varies laterally and in some places closely resembles the McDougall-Segur sandstone. Most of the interval between the grit and McDougall-Segur sandstone is, however, composed of greenish, sandy shales and minor sandstone beds. The thickness from the base of the McDougall-Segur sandstone to the Home sand is rather difficult to determine accurately in the Pekisko Hills uplift, but is considered to be about 650 feet. The Home sand, about 3 feet thick, is a white to light-grey sandstone with a sugary texture and is easily recognized. It is composed almost entirely of white and grey, rounded quartz grains. The Home sand was encountered at a depth of 190 feet in the Pekisko Hills No. 1 well, the log[1] of which is as follows:

[1] Log from records of Petroleum and Natural Gas Division, Dept. of Lands and Mines, Alberta.

	Depth Feet
Drift	0 - 25
Blairmore	
Green-grey sand and shale	25 - 54
Green-grey sandstone and light green-grey shale	54 - 58
Green-grey shale and fine-grained sandstone	60 - 80
Light green-grey, fine-grained sandstone with shale	80 - 85
Dark green-grey shale with some fine-grained sandstone	85 - 96
Dark green-grey shale and sandy shale with ironstone	96 - 130
Light green-grey sandstone with shale and ironstone	130 - 140
Light green-grey shale and fine-grained sandstone	140 - 145

	Depth Feet
Light green-grey sandstone and shale	145 - 155
Light yellowish grey sandstone with some shale Water at 160 feet	155 - 165
Green-grey shale and sandstone	165 - 175
Green-grey sandstone with shale	175 - 180
Dark green-grey shale and fine-grained sandstone	180 - 185
Light green-grey sandstone. Sandstone lighter in colour, medium grained, and calcareous 190 to 205 feet. Probably equivalent to the Home sand of Turner Valley	185 - 205
Brownish grey limestone, trace of fossils	210 - 215
Green-grey shale and calcareous sandstone	215 - 225
Light grey, limy sandstone	225 - 260
Brown limestone and limy sandstone	260 - 270
Limy sandstone with some dark shale	270 - 285
Limy sandstone, black shale, and coal fragments	285 - 290
Light grey to brownish, limy sandstone	290 - 310
Dark grey shale and sandy shale with a little, soft, green, bentonitic shale	310 - 315
Dark grey shale	315 - 320
Light grey, limy sandstone	320 - 330
Shaly limestone and dark grey calcareous shale	330 - 340
Dark grey calcareous shale and sandy shale	340 - 350
Grey calcareous sandstone and shale	350 - 360
Light grey, limy sandstone with dark grey shale	360 - 375
Dark grey shale and sandy shale	375 - 390
Dark grey shale and calcareous sandstone pyrites	390 - 395
Light grey sandstone with coarse, angular grains. Top of Dalhousie sand	395 - 400
Light grey sandstone with chert fragments	400 - 405
Quartzite or siliceous sandstone with abundant, round, oolitic grains of siderite	405 - 415
Grey, siliceous sandstone	415 - 450

	Depth Feet
Kootenay	
Dark, carbonaceous, sandy shale	450 - 455
Shaly sandstone and sandy shale partly pyritic and micaceous	455 - 465
Grey sandstone with some shale	465 - 485
Gas show	480 - 485
Carbonaceous shale with coal and pyrites	485 - 490
Light grey sandstone and sandy shale	490 - 505
Dark grey shale with little sandstone	505 - 520
Light grey sandstone and dark shale	520 - 525
Brownish sandstone with carbonaceous streaks	525 - 540
Light grey sandstone with dark shale	540 - 550
Dark grey shale with a little sandstone	550 - 555
Brownish sandstone and dark shale	555 - 565
Dark grey shale	565 - 570
Light brown, granular sandstone	570 - 645
Brownish sandstone with grey, sandy shale, in part micaceous and in part carbonaceous	645 - 650
Deep brown sandstone with pyrite and carbonaceous shale	650 - 670
Brownish sandstone and dark shale	670 - 690
Brownish, sandy shale and shaly sandstone	690 - 695
Fernie	
Dark grey shale in part sandy. Glauconite in some fragments, pyrite at 735 and 815 to 855 feet	695 - 855
Dark grey shale with pyrite and belemnites	855 - 870
Dark grey shale with some limestone fragments and belemnites 875 to 885 feet, limestone 925 to 930 feet	870 - 935
Brown to grey shale with oolitic grains and glauconite. Abundant belemnites	935 - 943
Dark grey shale with glauconite and pyrite	943 - 965
Dark grey shale, limy fragments, numerous belemnites. Slightly calcareous sandstone with black phosphatic pebbles (Belemnite conglomerate)	965 - 970
Dark grey shale	970 -1,040

	Depth Feet
Limy sandstone	1,040 - 1,050
Light grey to brownish, calcareous sandstone	1,050 - 1,065
Palaeozoic limestone	
Light buff, slightly dolomitic limestone, trace of chert 1,097 to 1,105 feet	1,065 - 1,110
Gas at 1,071 to 1,076 feet and 1,081 to 1,082 feet. Estimated flow 1,000 M. cu.ft. Gas 1,106 to 1,136 feet.	
Buff limestone, partly dolomitic, partly crystalline and porous	1,110 - 1,230
Grey limestone with considerable shaly limestone	1,230 - 1,240
Fault	
Fernie repeated	
Dark grey shale with belemnites and oolitic glauconite at 1,255 to 1,260 feet	1,230 - 1,290
Dark shale with Belemnite conglomerate	1,290 - 1,300
Palaeozoic limestone	
Buff limestone, partly crystalline	1,300 - 1,312
Samples missing	1,312 - 1,320
Gas flow 2,200 M. cu.ft. at	1,320 - 1,335
Buff limestone partly dolomitic, partly crystalline	1,335 - 1,510
Buff limestone with anhydrite. Chert at 1,590 to 1,605, 1,670 to 1,695 feet	1,510 - 1,855
Light grey limestone, chert at 1,925 to 2,010 feet and gypsum 1,965 to 1,975 feet	1,855 - 2,010
Light grey limestone, partly crystalline chert at 2,120 to 2,125, 2,240 to 2,265 feet	2,010 - 2,265
Light and dark grey limestone, partly crystalline	2,265 - 3,480
Dense to very finely crystalline, dark grey limestone	3,480 - 3,670
Dark grey to buff limestone, coarsely crystalline at 3,830 to 3,850 and 3,875 to 3,900 feet. Traces of dark grey shale and chert below 3,820 feet	3,670 - 3,960
Dark grey to buff crystalline limestone, some chert and shaly limestone	3,960 - 4,280
Dark grey, dense limestone	4,285 - 4,355
Dark grey, coarsely crystalline limestone	4,355 - 4,400

STRUCTURE

The dominant structure of the Pekisko Hills uplift is a syncline in Blairmore strata (Figures 2 and 3) with anticlines on either side of it. To the south, in the north part of sec. 30, tp. 16, range 2, the syncline becomes sharply compressed and, farther south, is believed to pass into a fault. East of the syncline in sec. 6, tp. 17, range 2, are two anticlines separated by another syncline. The more westerly of these two anticlines exposes strata below the McDougall-Segur sandstone horizon, and on it, in section 7, the Western Alberta well was drilled (Figure 2). The anticline is not symmetrical, and it is thought that a fault is present on its western flank beginning in the north part of section 6, and gradually increasing in displacement southward. Near the south boundary of section 6 the east flank of the anticline is entirely cut off, and south of this Blairmore strata are thrust eastward, presumably onto Alberta shales.

The other anticline that occurs along the east side of secs. 6 and 7, tp. 17, and sec. 31, tp. 16, range 2, exposes the grit beds on either flank with a small amount of Blairmore strata in the core. To the north, in northeast section 6, and southeast section 7, there is a small fault repeating the grit on the east side of the anticline. The relationships can be most easily explained by an east dipping or underthrust fault. East of this anticline the strata dip eastward with the higher Belly River beds occurring in a ridge about one-half mile east of the crest of the anticline. To the east of this again, in the valley of Stimson creek, rather poorly exposed Edmonton beds are present, east of which, in high hills, Paskapoo sandstones outcrop. The sequence suggests the normal succession of beds with the Bearpaw concealed, but southwards from township 17 to the south of township 16, the Paskapoo-Edmonton boundary and the Alberta shale-Belly River boundary, the two geological horizons most easily followed in this part of the area gradually approach one another. It is obvious, therefore, that a fault occurs in the area intervening between them, even though the exposures are insufficient to accurately locate it. To the north in sections 20, 21, and 28, extremely crumpled, crushed, and slickensided zones are present in Edmonton strata, indicating great disturbance but without marked stratigraphic displacement as far as can be determined. West of these disturbed zones another fault is present at about the horizon of the Bearpaw formation. These zones of deformation are believed to be due to a fault or faults similar in type to the sole fault underlying Turner Valley and it is suspected, therefore, that the Pekisko structure is underlain by a low-angle fault, but at a sufficient depth, as proved by Pekisko Hills No.1 well, to be some distance below the top of the Palaeozoic limestone. The suspected relationships between this structure and the probable low-angle fault have been diagramatically shown by Link.[1] It is

[1]Link, T.A.: Bull. Am. Ass. Pet. Geol., vol. 19, No. 10, p. 1,459 (1935).

possible, however, that instead of the Palaeozoic limestone core being entirely cut off from the mass from which it has been derived the low-angle fault turns downward steeply in the limestone which has merely been displaced upwards along it. In the foothills faults of this type may, therefore, have a steeply inclined plane at the outcrop, a low-angle part at some distance west of the outcrop, and a steeper, deeper part.[2] At the outcrops of faults

[2]See also Hume, G.S.: Trans. Roy. Soc., Canada, vol. 29, sec.IV, Fig. 4, p. 137 (1935).

of this type the stratigraphic displacement appears to be small in comparison with the amount of displacement that has been proved at depth by drilling in such structures as Turner Valley. The explanation of this is probably in the fact that at the outcrop the fault plane has an inclination closely approaching the dip of the strata cut by it, and thus a relatively large displacement would show little stratigraphic displacement, whereas as the fault becomes less steeply inclined at depth and cuts obliquely across the strata the stratigraphic displacement increases. Thus it is suspected that below the low-angle fault believed to cut Palaeozoic strata under the Pekisko Hills structure, there are younger, Mesozoic strata. In some foothills' areas, where structures apparently favourable for oil and gas accumulation are present at the surface, drilling has encountered low-angle faults above the prospective productive Palaeozoic limestone. In these cases the structure below such a fault may no longer be favourable for oil and gas accumulations. Further, the repetition of strata produced by faulting may be so great that the depth to any possible productive horizon becomes prohibitive for drilling. Such conditions, however, are not likely to occur in the Pekisko Hills uplift, since Pekisko Hills No. 1 well drilled continuously in Palaeozoic strata from 1,300 to 4,400 feet without reaching the low-angle fault believed to be under the structure.

The main uplift of Pekisko hills is west of the Blairmore syncline in sec. 31, tp. 16, range 2, and secs. 6 and 7, tp. 17, range 2. On the hill in the southwest of section 6 the lowest beds anywhere exposed in this area outcrop and indicate that the maximum structural uplift occurs at this place. The beds belong to the lime series in the lower part of the Blairmore formation, and a few outcrops contain fossils characteristic of this zone. The hill is in reality double crested, with a depression and small valley between the two highest parts. On the eastern or higher peak the structure is a dome extending into an anticline trending slightly west of north. This anticline cannot be traced far south, but is well marked to the north throughout the whole of section 6. The western peak of the hill is also an anticline showing a very unsymmetrical anticlinal crest on its western edge with easterly dips of only 5 to 10 degrees, and westerly dips of 70 degrees. Part way down the west flank of the hill, however, the dips suddenly change to 60 to 65 degrees east, but lower down at the base of the steeper part of the hill such outcrops as do occur mostly show a west dip of about 40 degrees. The sharp, east dips in this area probably in part represent overturned beds. They have been interpreted by the writer as indicative of an eastward dipping, or underthrust fault (Figure 4, cross-sections B-B' and C-C'). Dr. Willis believes that they indicated that the anticline is overturned on its western limb, and that Pekisko Hills No. 1 well actually encountered this overturn in drilling the top of the limestone. The structural interpretation based on them, therefore, is of some importance in predicting the position of the limestone surface under the west flank of the Pekisko Hills structure. It seems to the writer that the overturning is not general enough on the west flank to indicate that it has any considerable importance. It is, therefore, regarded as a minor, rather than a major, feature, and interpreted as having produced only a slight modification of the anticlinal structure.

The details of the structure in the western part of section 6 are difficult to understand. It is obvious there is a slight amount of faulting, as this is shown by offsetting of the Home sand, an easily recognizable horizon. Faulting has also probably occurred in the east part of sec. 36, tp. 16, range 3, as the distance between the McDougall-Segur sandstone and the crest of the anticline which in southwest sec. 31, tp. 76, range 2, exposes beds above the Home sand, is too great for the normal thickness of sediments. Very little direct evidence of faulting in this particular area was seen, but dips of 80 to 85 degrees close to other dips of 45 degrees or less probably are due to the influence of faulting, and in one place crumpling was actually observed. Although the indefinite information on these faults makes it difficult to predict the depth to the Palaeozoic limestone at any particular place the general structure is readily discernible and is shown in Figure 4, cross-sections B-B', C-C', and D-D'.

PETROLEUM AND NATURAL GAS PROSPECTS

In the Western Alberta well drilled on sec. 7, tp. 17, range 2, several small flows of gas were encountered. An oil show occurred at 1,920 to 1,939 feet near the base of the Blairmore. Cores taken as low as 80 feet in the Palaeozoic limestone, according to Dr. Robin Willis, showed oil saturation. The well was, however, drilled 180 feet in the limestone before a test was made, when it was found to contain oil and water. There is no doubt that the well is very crooked as was shown by acid bottle tests, but no directional surveys were made. If the deviation in the well is all in one direction it has been calculated to be 1,130 feet from the vertical at a measured depth of 3,200 feet. It is obvious, therefore, that the depths to the various horizons are probably greatly in excess of what the vertical depths would be at the same location. A directional survey is the only method by which the direction of deviation can be settled. It is apparent, though, that the well does not give a true picture of the prospects for oil even at the location where it was drilled. It is very important, however, to know that water is present in this well in the upper part of the Palaeozoic limestone, the top of which was here encountered at more than 2,000 feet lower structurally than in Pekisko Hills No. 1 well. In the spring of 1934 a test of the water-level was made by the Halliburton Company for Dr. Robin Willis. It was found to be at 1,595 feet, which when corrected for deviation is calculated to be at a vertical depth of 1,520 feet or an elevation of 2,627 feet above sea-level. The pressure necessary to raise this water from 3,200 feet (corrected depth for deviation 2,930 feet) to 1,520 feet, or a distance of 1,410 feet, in the well, is slightly more than 600 pounds.

In Pekisko Hills No. 1 well no water was encountered to a depth of 4,400 feet. The top of the Palaeozoic limestone occurred at 1,065 feet and between 1,071 and 1,082 feet a flow of gas estimated at 1,000 M. cubic feet was obtained. Owing to an overturned fold or repetition by faulting the top of the limestone was repeated at 1,300 feet and at 1,320 feet to 1,335 feet 2,200 M. cubic feet of gas was obtained. Lower in the limestone some crude oil was struck, but not in sufficient volume to give a commercial yield. The pressure of this gas was rather low and as pointed out by Dr. Willis the difference between this low pressure and the pressure in the Western Alberta well must be accounted for by a column of fluid on the flank of the structure above the level where oil and water occurred in the Western Alberta well. Since oil-saturated limestone cores occurred as low as 80 feet in the limestone in the Western Alberta well and the well was not tested until 180 feet had been drilled, it is obvious that the water is under the oil in the lower 100 feet. It is inferred, therefore, by Dr. Willis, that oil must lie on the flank of the structure above the oil-saturated zone in the limestone of the Western Alberta well and that the excess of pressure in the Western Alberta well over Pekisko Hills No. 1 well is due to a column of oil calculated to be 920 feet high. Since the oil-saturated cores are known as low as a vertical depth of 2,930 feet, or an elevation of about 1,215 feet above sea-level, the oil-saturated zone might, therefore, reasonably be expected to extend 920 feet above this on the flank of the structure or to an elevation of about 2,135 feet above sea-level. It would appear, therefore, that a well that reached the Palaeozoic oil-saturated horizon below a level of 2,135 feet and above a level of 1,215 feet should have a reasonable chance of success. It is quite obvious, though, that since the water in the Western Alberta rose only to a level of 1,520 feet from the surface any well drilled on this structure would not be expected to flow.

From the map of this area (Figure 2) it is apparent that Western Alberta No. 1 and Pekisko Hills No. 1 wells are on different anticlines on the uplift. This is thought to have no significance in reference to the conclusions given above, as both wells are on the same regional structure. The Western Alberta well is a considerable distance down the north plunge of the structure on the east anticline, whereas Pekisko Hills No. 1 well is on the east flank of the west anticline. To the west of the Pekisko Hills uplift the general structure is synclinal and hence, with a larger drainage basin to the west than to the east where the structure is cut off by faulting, more oil might presumably collect. For this reason, therefore, the west flank is believed to be a more preferable location for another well than the east flank, although as pointed out by Dr. Willis it is probable that owing to structural complications by faulting the depth to the Palaeozoic limestone cannot be so accurately predicted as on the east flank. In such a well the depth to the limestone should be within the limits already prescribed for the oil-saturated zone between 1,215 and 2,135 feet above sea-level.

The average dip of beds on the west flank of the Pekisko structure is between 50 and 60 degrees. A well drilled through strata dipping at these angles has a drilling thickness 1.6 to 2 times the stratigraphic thickness. The stratigraphic thickness from the top of the Blairmore to the Palaeozoic limestone, in this area, is considered to be about 1,500 feet.

On a dip of 50 degrees, therefore, this would require an estimated drilling depth of 2,400 feet from the top of the Blairmore to the top of the Palaeozoic limestone. On 60 degrees the drilling depth would be 3,000 feet. In practice it has been found that these calculated depths are usually exceeded in foothills areas because of the presence of small faults which give a certain amount of repetition, so that an estimated depth of 2,400 feet for strata dipping at 50 degrees or 3,000 feet for strata dipping at 60 degrees is, therefore, a minimum from the top of the Blairmore to the top of the Palaeozoic limestone. It is apparent with these features in mind that the best location for a test of the west flank is on the E.P. Ranch. In sec. 36, tp. 16, range 3, the grit at the base of the Lower Alberta shale is exposed, but wells commencing at the top of the Blairmore in this area are likely to encounter some faulting. In sec. 1, tp. 17, range 3, the position of the grit is not accurately known because of lack of exposures. The McDougall-Segur zone, however, is well exposed and a well located west or above its outcropping beds could start at an elevation of approximately 4,200 to 4,300 feet at the base of the hill as shown on Figure 2. A drilling depth between 2,400 to 3,000 feet at such a location would reach the presumed oil-saturated zone in the Palaeozoic limestone at the desired elevations.

In the absence of drilling rights on the E.P. ranch the choice of location must necessarily be confined to range 2 and hence in certain parts of this area the depth to the Palaeozoic limestone may not be as great as could be desired in view of the possibilities of only gas in the higher parts of the structure. However, a well could be located in the northwest corner of sec. 6, tp. 17, range 2, which would begin at or slightly below the McDougall-Segur horizon and at an elevation of about 4,300 feet. As the surface dips in this area are somewhat steeper than on the west flank on the E.P. ranch the drilling depths for the same stratigraphic thickness are likely to be somewhat greater. The depth at such a location is, however, not easy to calculate precisely on account of certain structural complications, and section A-A' should be taken as representing only approximate conditions in regard to the depth to the Palaeozoic limestone. Since the structure as a whole plunges northwards the depth to the Palaeozoic limestone would be expected to be considerably in excess of that in Pekisko Hills No. 1 well, and although the same anticline would be drilled the test would be on the west instead of on the east flank of the fold. Also such a test would by reason of greater depth be expected to avoid the gas zone on the top of the structure as proved by Pekisko Hills No. 1 well. The depth, however, ought to be somewhat less than Western Alberta No. 1 well and thus avoid the water that was found there under the oil-saturated bands in the top of the limestone. At such a location the most decisive test would be made by a well 2,500 to 2,800 feet deep to the presumed oil zone in the top of the Palaeozoic limestone.