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**Report *on the* Oil Deposits *of the*
Flathead Presented to the
Directors *of the* B. C. Oil
Company, Ltd.**

By
WILLIAM BLAKEMORE

Member Canadian Mining Institute, 1893,
Member North of England Institute of
Mining Engineers, 1894, Greenwell
Gold Medallist, 1904.



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THE THOS. R. CUSACK PRESS
Victoria, B. C.

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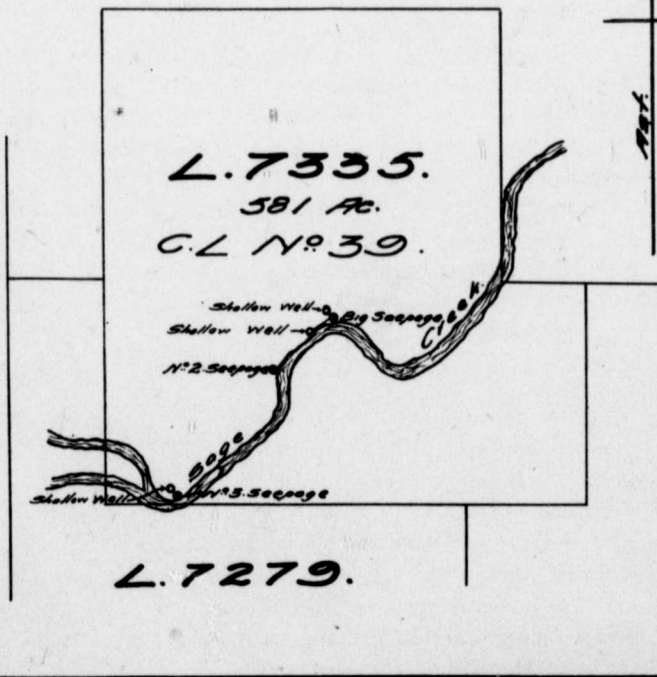
234083

SKETCH

SHEWING LOCATION OF PROPOSED
SHALLOW WELLS.

Scale: 4 ins. = 1 mile

N.



Plan. 5.

M. Blakeman

EXPERT'S REPORT

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Victoria, B. C.,

October, 6th, 1913.

To the

B. C. Oil Company, Limited,
Victoria, B.C.

Gentlemen:—

In accordance with your instructions I visited your property situate on Sage Creek near the East Bank of the Flathead River and more particularly delineated on Sketch Plan, No. 1, accompanying this report. I left Victoria on the 21st, ult., reached the Flathead Valley on the 23rd, and spent six days in the Valley, two of which were devoted to an inspection of your own claims, and the balance of the time to general observations of the geological features of the Valley.

AN OIL DISTRICT

The first thing that strikes one is that the upper reaches of the Flathead Valley, including the Valley of Sage Creek, are situated in the very heart of an oil district. A reference to Plan No. 2 will show that oil bearing rocks have been discovered over a region extending from Elk River in the West to a spot in Southern Alberta in the East, where operations are being carried on approximately seventy miles from the Elk River. The evidences of oil furnished by this observation consist of: —

(a) Cretaceous shales on the west banks of the Elk River near Lizard Creek and lying between Fernie and Elko. These shales I have many times examined and found them to be strongly impregnated with oil, quite as much so as the oil shales of Scotland which are treated for commercial purposes. As long ago as 1899 these shales attracted the attention of geologists and the initial steps were taken in Vancouver to form an exploring company, but the matter fell through because of the greater promise of the Flathead country to which the Vancouver parties interested transferred their attention.

(b) Extensive oil seepages on Sage Creek, well authenticated and commented on in numerous reports by eminent geologists and engineers. These I will treat in detail in a subsequent paragraph.

(c) Quite extensive operations, including boring of wells and pumping of oil in commercial quantities conducted on the east side of the Rocky Mountains in Southern Alberta at a point some thirty miles east of Sage Creek.

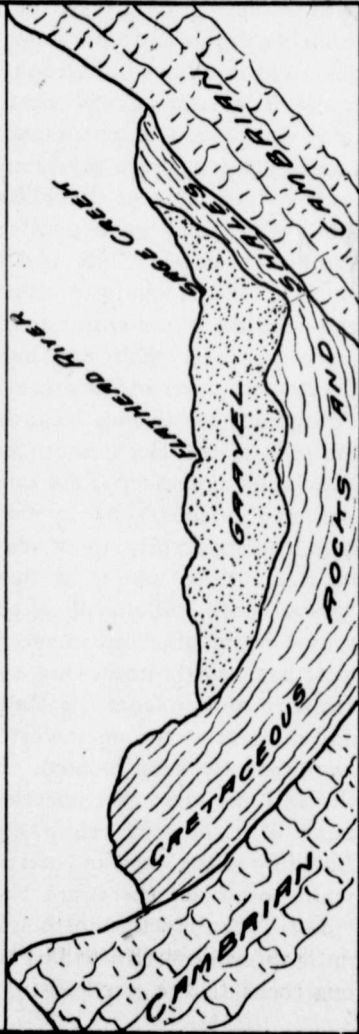
It is impossible that such wide-spread evidences of oil should exist except in a well defined oil district where at some time there must have been considerable deposits of oil, so that there is abundant evidence to justify the designation of the Sage Creek and Flathead Valleys as "an oil district."

GEOLOGICAL FORMATION

The prevailing rocks in the upper Flathead Valley, including the Sage Creek section, belong to the Cretaceous formation. The surface is covered

HYPOTHETICAL SECTION
OF THE
FLATHEAD VALLEY
SHEWING
GEOLOGICAL FORMATION.

APPROXIMATE HORIZONTAL SCALE - 2 MILES = 1 INCH.

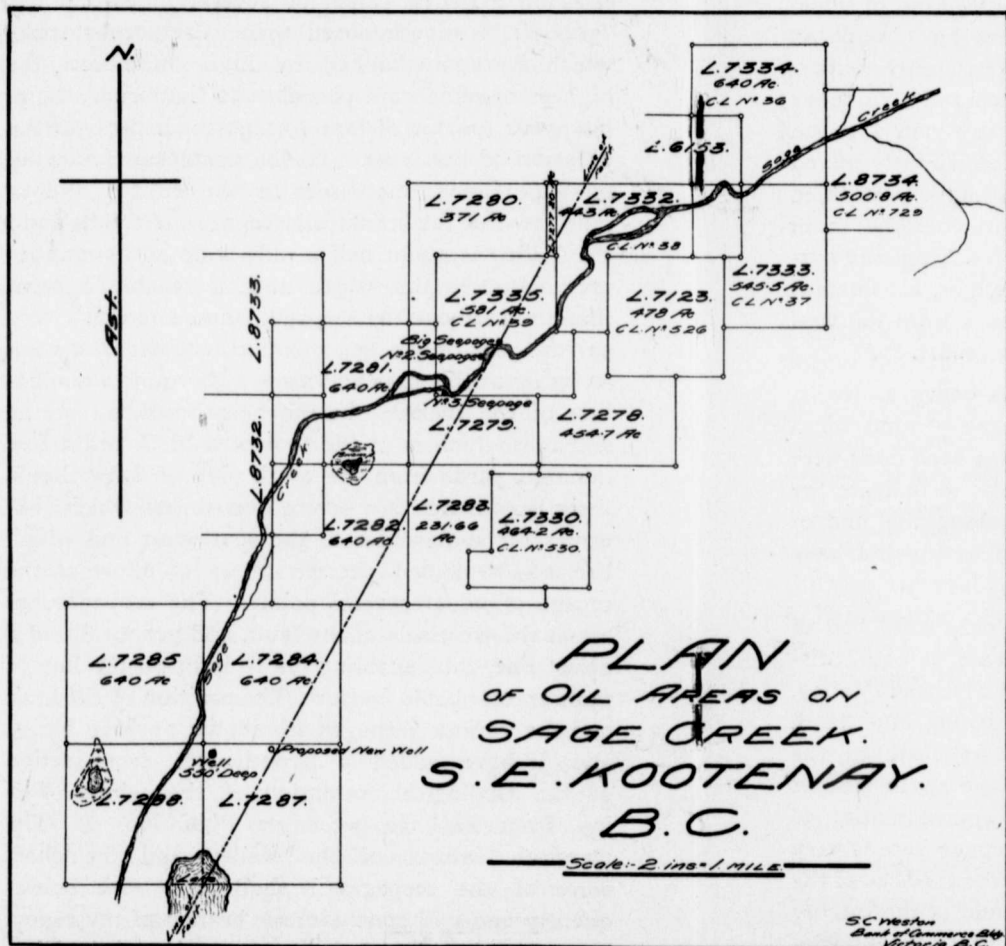


Plat. 4.

W. Blakely

with a deep gravel wash of glacial deposit. The probable depth and character of this wash will be discussed in a later paragraph. Immediately underneath it are the Cretaceous clays and shales, the most conspicuous exposure and the nearest to your property being about seven miles to the southwest, on the right bank of the Flathead River ascending the Valley, and at a point midway between the homestead of Mr. Clute and the Canadian custom house. This exposure is very clear, practically flat, and consists of several hundred feet of soft shale scarcely harder than clay band. It is the typical Cretaceous clay band which is found in many places throughout the Crow's Nest district and among the foothills of the Rockies on the Alberta side of the Provincial boundary. As one ascends the Valley the latter widens, until in the vicinity of your bore-hole it is apparently about ten miles wide from east to west. The whole of this area is filled with "gravel wash," obviously of considerable depth, the gravel being piled up in mounds. In the extreme west and north numerous rounded hills of Cretaceous rocks rise from the Valley; these are wooded and in them to the northwest important coal seams have recently been located. Behind them again in the extreme west and northwest the higher mountains of Cambrian origin appear on the horizon. Looking to the east and northeast from the site of your bore-hole, there are three or four miles of "gravel," that to the north lying comparatively flat until abruptly terminated by a mountain of Cretaceous rocks to the northeast. Due east the surface

rises on a gentle slope for several miles and the "gravel" is superimposed upon Cretaceous rocks *Page 7* which are again flanked by high mountains, the highest of which are probably of Cambrian origin, but were too far distant for me to inspect on the occasion of this visit. To the northeast, following up Sage Creek, one comes in the course of four miles to the celebrated oil seepage. At this point the Valley is about half a mile wide and continues approximately this width until it reaches a point three miles above the seepage, where there is a very narrow pass only a few hundred feet wide. I went as far up as this pass and made a thorough examination of the rocks. In the neighbourhood of the seepage, which is at the foot of a bluff and a few hundred yards from the north side of Sage Creek, there is evidence of a severe over-thrust which continues for some miles to the southwest and which has so weakened the strata as to allow of the escape of oil at several points. The seepages are all on the west side of the fault, and practically in a direct line, thus enabling me to indicate the line of fault and probable fracture. The position of the fault and the various seepages are shown on Map No. 3, and I have added a hypothetical cross-section of the Geological formation of the whole Valley from east to west on Plan No. 4. The physical features of the Valley and the character of the seepages I shall deal with subsequently and will conclude this branch of my report by saying that the whole of this section of the Flat-head Valley is a basin with a gravel pie-crust of



Plan 3.

M. Blatner

uncertain thickness, while the fruit lying underneath is represented by Cretaceous rocks which outcrop round the inner edges of the Valley, and with the dish represented by Cambrians which rear themselves in the form of lofty mountains and represent the outer edge of the Valley.

OIL SEEPAGES

I was able to examine three distinct oil seepages; one known as "The Big Seepage," already referred to; the second on the north edge of a body of water formed by a beaver dam and lying a few hundred yards southwest of "The Big Seepage," and the third half a mile southwest in rocks which lie on the south side of Sage Creek near the limit of Claim L7335. The exact location of all these seepages is shown on Plan No. 3

"The Big Seepage" is the strongest I have either seen or heard of and occurs in soft Cretaceous

shales which contain a little white oil sand of undetermined extent. Your employees have sunk an ordinary well at his point and have roughly timbered the same; it is fourteen feet deep and about four feet square. On the occasion of my visit I found that the well contained six feet of oil, slightly mixed with water and would undoubtedly have been filled to the surface with oil but for an overflow drain which had been run into it eight feet from the surface. The flow of oil, although slight, is constant and I brought a sample which I took from the well and which I hand to you with this report.

No. 2 Seepage, although not as heavy as No. 1, is quite extensive and saturates the ground for a considerable distance. No work has been done here and the only value of the seepage is to indicate the persistence of the escape of oil along the line of fracture caused by the over-thrust to which I have referred.

No. 3 Seepage occurs in the only solid bed of rock in which, so far as I am aware or could discover oil has been found in the Flathead Valley. The rocks, or rather shales, are a strong blue band, of Cretaceous formation. They lie close to the boundary of Lot No. L7335 on the south side of Sage Creek and have a natural dip approximating 30 degrees to the southwest. The seepage here is very strong; the oil bubbles up between the crevices of the rocks and a considerable area around is thoroughly impregnated with oil. Lining up these three exposures, one has no difficulty in determining the line of the fault as indicated on Plan No. 3.

JUSTIFIABLE CONCLUSIONS

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After carefully considering all the data rendered available by my inspection, I have arrived at the following conclusions:—

(a) That your property on Sage Creek is in the most favourable position in a well defined oil-bearing district.

(b) That the evidences justify the conclusion that oil in large quantities, by which I mean commercial quantities, either still exists or has existed within the area defined.

(c) That the strength and persistency of the seepages favours the view that it still exists in commercial quantities.

(d) That the theory that the disturbances which have taken place in the vicinity of the rocky ranges through several geological periods may have so broken up the strata as to have liberated the oil, is one which can only be positively determined by actual proof; but such indications as are observable do not favour this view.

(e) That there are no physical or geological difficulties in the way of making such proof. It is only a question of expenditure rightly directed.

(f) That the work you have already done has distinctly advanced your knowledge of general conditions and has not only rendered these conclusions more reliable but has pointed the way for a certain solution of the problem.

WHAT YOU HAVE PROVED

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I need not dwell further on the work you have done at the seepages. That is sufficiently covered in preceding paragraphs, and need only add that it emphasizes their importance, as indications of the existence of considerable bodies of oil. I will deal more particularly with your well which has been bored to a depth of 550 feet in the extreme north-west corner of Lot 7277.

This well is situate approximately 300 feet from the east bank of Sage Creek and at an elevation of about 150 feet above the Creek. It is bored entirely in "gravel," and you have asked me to deal specifically with the question whether the well should be continued or not. I advise that the present well be not continued, for the following reasons:—

(a) The depth of "gravel" is so great and its additional depth so uncertain that it is more than probable that the continued narrowing of the well which would be necessary, if the "gravel" should prove to be much deeper, would render it almost valueless by the time it reached bed-rock. I advise that when you are prepared to resume boring, you should start a new well at a point which I have indicated half a mile northeast of the present well. The advantage of the location I suggest is that it is half a mile nearer to the fault and to the line of seepages already referred to and indicated on Plan No. 3.

(b) It is half a mile to the slope of the hills which form the inner fringe of the Valley and on which there is every reason to believe the "gravel"

would be of a less depth than in the centre of the Valley where your present well is located.

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(c) By starting a new well at this point you would, in addition to the two advantages enumerated, be able to start with a larger bore, probably 14-inch diameter, and so reach bed-rock with a hole sufficiently large for commercial and not merely for experimental purposes.

Whilst on this point, I should like to make it clear that there are no evidences from which it is possible to estimate the depth of "gravel" in this Valley. The whole Valley has been eroded and re-filled with "wash." Erosion is always uncertain in its outline. The Valley is probably "pocketty," with a considerable range in the depth of the "wash." The nearest rocks which are exposed, viz. those referred to at seepage No. 3, would, if projected, at the angle at which they occur, be at least 6,000 feet deep at the site of your well. But such a conclusion is negatived by the fact that at a point seven miles southwest the cretaceous shales already mentioned in this report are at the surface and comparatively flat. With so little to guide one and with the certainty that there is a variation in the dip of the rocks and a probability, if not an absolute certainty, that they flatten out in the Valley, one must realize that there is absolutely no data upon which one can safely rely in computing the depth of the "gravel." All that can be safely conjectured is that the depth is considerable; that it varies, and that it is less on the slopes of the hills than in the centre of the Valley.

OTHER RECOMMENDATIONS

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You ask me to consider the advisability of boring several shallow wells near the seepages, and if I endorsed the suggestion, to select the sites of such others whilst on the ground. I think the suggestion a good one, for while it is impossible to say that oil can be found at any particular spot, the most characteristic feature of its occurrence being its fitfulness and uncertainty, I consider that the seepages on your property are so strong and indicate so clearly a definite line of fracture in the rocks, that three or four shallow wells should give good results, especially as they can be bored at comparatively little expense. I therefore indicated the location of three holes, and the position is shown on Plan No. 5.

Having considered your enterprise as a whole; having examined the property and inspected the work done, I can only conclude that while all exploration work of this kind is speculative, you have both discovered and developed impressive evidences of the existence of an oil field. While your work has not yet solved the problem of the depth and extent of the oil deposits, it has furnished you with valuable data for future operations and offers a reasonable probability of success, once you can ensure the boring of a well through bed-rock within the zone indicated by the surface seepages and the line of the "fault."

Yours truly,

W. BLAKEMORE.

NOTES

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The contractor has taken in a 1,000-ft. Keystone Drill, and already commenced work on the four sites, located by Mr. Blakemore, near the big seepage.

Arrangements are being made to have some forty tons of casing hauled in when sleighing starts; the deep wells will then be pushed.

Our plan is to develop the property to an advanced stage by the time the railroad reaches the property.

The operations of the B. C. Oil and Coal Development Company have reached the last stage and the next means that oil will be struck in a deep well.

This is assured by the operations already conducted which have shown the best point at which to sink the well, and also by the authoritative geological report of Mr. Blakemore, under whose advice the deep well has been located.

Attention is drawn to the remarkable strength of the seepages and the unusual area over which the surface indications of oil exist.

One of the most experienced well borers in the States, who has been in the business for upwards of forty years, met Mr. Blakemore accidentally during his visit to Sage Creek, and in conversation stated that in all his experience he had never seen seepages as strong and persistent.

The presence of oil shales and oil at the surface over an area extending seventy miles from east to west and twelve to fourteen miles from north to

south is quite unique and stamps the Flathead District as a natural oil field.

The long delay in striking oil in commercial quantities has been due solely to the extreme difficulty of transport and inadequacy of the capital raised.

Sage Creek is sixty miles from the Great Northern Railway and accessible only over a difficult trail. Latterly it has been brought within forty miles of the Corbin road in British Columbia and advantage has been taken of this to cut a new trail at great expense over which the plant now on the ground was taken in. Many thousands of dollars which under ordinary circumstances would have been available for actual drilling have been used to overcome transportation and location difficulties. The solution of these problems, whilst costly, has brought the Company within striking distance of their goal.

Whilst the B. C. Oil Company has been quietly pushing its way, the large monied interests have been looking on. But they have not been idle. They have kept close tab on our work, and the best evidence that they realize how near we are to success is shown by their great activity this year and last.

Several geological and survey parties have been maintained in the field, and two of the most eminent geologists of the United States Department have spent this summer in the Flathead in the interests of the Chicago, Milwaukee & St. Paul Railway.