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CANADA

DEPARTMENT OF MINES AND RESOURCES

MINES, FORESTS AND SCIENTIFIC SERVICES BRANCH

GEOLOGICAL SURVEY OF CANADA

PAPER 49-7

lat. 53°45' – 54°00'
long. 118°45' – 119°00'

A LA PECHE MAP-AREA
ALBERTA

(Report and Map)

Scale 2,640 FT. to 1" or ½ mile

By

E. J. W. Irish

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Paper 49-7

À LA PÊCHE MAP-AREA,

ALBERTA

(Summary Account)

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E.J.W. Irish

OTTAWA
1949

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Illustration

Preliminary map - À la Pêche, Alberta.....In envelope.

À LA PÊCHE MAP-AREA, ALBERTA

INTRODUCTION

Location

À la Pêche map-area, comprising 185 square miles, is situated in the Foothills belt of west-central Alberta, just southeast of Smoky River, between latitudes 53°45' and 54°00' and longitudes 118°45' and 119°00'. The nearest railway is the transcontinental line of the Canadian National, which follows the valley of Athabaska River about 60 miles southeast of the map-area. Entrace, a village on the railway about 190 miles west of Edmonton, provides the nearest store, post office, and telegraph service.

Accessibility

The village of Entrance is the outfitting point for the large region extending north and northwest and including the Smoky River territory. This region has for many years been visited by coal prospectors, hunting parties, and, more recently, by exploratory geological parties representing oil companies.

Entrance may be reached by Canadian National Railway or by a branch road that connects with the Edmonton-Jasper highway 2 miles to the south. No roads existed until recently throughout the extensive territory north of Entrance and Athabaska River, but travel is facilitated by good pack-trails, which are maintained by rangers of the Alberta Forest Service.

À la Pêche map-area may be reached via three routes. The principal means of access, at the time this field work was done, was by road from Entrance to the Muskeg No. 1 oil well, which is just inside the east boundary of the area, approximately 1 mile north of Muskeg River. This road, 72 miles long, follows the eastern edge of the Foothills northwesterly from Entrance along the route of the old Lower trail to the Indian village of Grande Cache and Smoky River. From the

end of the road at the Muskeg well, the Lower trail continues westward across and beyond the map-area to Smoky River. Muskeg No. 1 well has recently been abandoned, so that the road will not be repaired in future and will soon become impassable for trucks.

A second route into the map-area is the Mountain trail, which leaves the Muskeg road about 1 mile north of Wildhog River (about 20 miles north of Entrance), follows the river westward to Rock Lake, and then follows up Rock Creek to its source. Leaving Rock Creek, the trail crosses the divide and follows down Sulphur River to join the Lower trail at Grande Cache near Smoky River. The Mountain trail crosses the southwest corner of the area.

A third route into the area is the Muskeg River trail, which leaves the road at the Muskeg Ranger Station and follows up Muskeg River, crossing the southeast corner of À la Pêche map-area. The À la Pêche trail leaves the Muskeg trail just inside the eastern boundary, and crosses the map-area from east to west to join the Mountain trail near the western boundary.

Besides the main trails just described, several branch trails may be used. Horses are the only means of transportation for both men and supplies.

Previous Work

Little geological work had been done in the Foothills region between Athabaska and Smoky Rivers prior to 1939. The only published geological information on the map-area is contained in reports by J. MacVicar (1917, 1920, 1924), who made a reconnaissance survey of the region north of the Grand Trunk Pacific railway (now the Canadian National railway). In 1924, James McEvoy examined the Smoky River coalfields, Alberta, for the Dominion Fuel Board. More recently, the Foothills region north of Athabaska River has been actively prospected for petroleum by various oil companies.

Acknowledgments

The present report is based on field work completed during the summer of 1948, and incorporates the geology of an area in the vicinity of Muskeg No. 1 well, which was done by A.H. Lang during the summer of 1947. The writer was ably assisted in the field by Messrs. T.G. Perry, R.D. Hughes, and A.R. Nielsen. He is indebted for many courtesies to members of the Alberta Forest Branch, to Mr. Rufe Neighbor and Mr. S.H. Clark, of Entrance, and to personnel of Imperial Oil Limited and Northwest Construction Company.

Fossils collected from the area were identified by W.A. Bell and F.H. McLearn of the Geological Survey of Canada.

PHYSICAL FEATURES

Topography

À la Pêche map-area lies within the Foothills of west-central Alberta, and is occupied by a series of ridges and valleys that trend in a general northwesterly direction. Two large valleys cross the map-area from east to west, roughly dividing the map into three parts. Muskeg River occupies the more northerly of these valleys and the more southerly one is occupied in part by Cowlick Creek and in part by À la Pêche Creek.

The northern division, that area lying north of Muskeg River, is occupied by Bingo Ridge, a large, poorly defined ridge rising to a maximum elevation of 5,580 feet. This ridge is timbered except for areas that have been burned.

The central division, the largest of the three, is occupied by considerably dissected, northwesterly trending ridges, most of which rise to elevations barely exceeding 6,000 feet. On these, small areas of the tops are above timber-line. Most of the creek valleys between the ridges are narrow and canyon-like, although on

some of the gentler slopes the streams are swampy and have poorly-defined courses.

The southern division is occupied by a low area of swamps and muskegs except in the extreme southwest corner, where Haden Ridge rises to an elevation of more than 6,400 feet.

The greatest elevations, in the map-area are on the ridges in the central division and in the southwest corner of the southern division. Mason ridge, in the central division, attains an altitude of more than 6,400 feet, and the average relief for this region is about 2,500 feet. Haden Ridge in the southwest corner of the map-area also reaches an elevation of more than 6,400 feet above sea-level, but the relief in this part is only about 2,000 feet.

Timber-line is at about 6,000 feet above sea-level, and most of the hills below this elevation are timbered to the top. The forest consists mainly of jack pine with lesser amounts of spruce, aspen, and balsam fir. Fire has burned over large areas, and these are now covered by a thick tangle of logs and second growth jack pine. Wild flowers are varied and numerous.

Game is not plentiful in this district, probably because of its proximity to the Indian settlement of Grande Cache, but deer, moose, and bear can be found. Small fur-bearing animals are numerous, and much trapping is done throughout the district. Fish, including Dolly Varden trout, Arctic trout or grayling, and Rocky Mountain whitefish are found in the larger streams.

Drainage

The principal streams draining À la Pêche map-area are Muskeg River and Mason, Sterne, Susa, and Cowlick Creeks. Cowlick Creek, with several small tributaries, drains the southwestern corner, and Muskeg River most of the remainder of the map-area.

Muskeg River has its source in the mountains to the south. It flows northeasterly through swampy country across the southeastern corner of À la Pêche map-area; thence it swings northerly and around in a long curve to enter the area again on a westerly course in a wide valley. The river then flows westward across two-thirds of the map-area, and finally turns northwesterly and leaves the area near the northwest corner. Through most of the map-area this river has cut a deep canyon in the floor of the original valley. Mason and Sterne Creeks are the two largest tributaries flowing northward; both have cut deep canyons in parts of their courses.

Susa Creek, draining Grande Cache and Peavine Lakes to the east, enters Muskeg River at the point where the river turns to flow northwest.

Cowlick Creek, fed by smaller creeks flowing south and north from the ridges of the central and southern divisions, flows westward in a wide valley that is out of proportion to the size of the creek.

The valley of Muskeg River, where not canyon-like, has large grassy flats and at least one well-defined terrace. Where canyons exist, no flats occur, but the pine-covered terraces are generally well defined. The wide valley of Cowlick Creek shows no well-defined terraces, though remnants occur in places. Large swampy flats with some dry grassy areas are typical of this valley. Most of the tributary creeks flow through muskeg or swamp in parts of their courses and are choked with alder and willow in many places.

GENERAL GEOLOGY

General Statement

The map-area is underlain by marine and non-marine sedimentary strata ranging in age from Triassic to Upper Cretaceous. These strata have been deformed by northwesterly trending folds and by strike thrust

faults, and, as a result, the formations are, in general, exposed as long, relatively narrow, northwesterly trending bands and tongues.

Bedrock is best exposed in the stream beds, especially where canyons have developed, but good rock exposures are found also on the higher ridges. Outcrops are scarce on the lower timbered ridges and in the large areas of muskeg.

The positions of contacts in much of the map-area can only be inferred from limited outcrop data, and probably more minor faults and folds are present than are indicated on the map.

Table of Formations

Period or epoch	Formation or group, and approximate thickness (feet)	Subdivision and approximate thickness (feet)	Lithology
Upper Cretaceous	Brazeau 6,000		Sandstone, shale, conglomerate (non-marine)
		Solomon member 100	Sandstone (marine)
	Wapiabi 1,500		Shale, shaly sandstone (marine)
	Bighorn 600		Quartzitic sandstone, shale, sandy shale (marine and non-marine)
	Kaskapau 1,800		Shale and minor siltstone (marine)
	Dunvegan 400		Sandstone, shale, and sandy shale (marine and non-marine)

	Fort St. John 400		Shale and sandy shale (marine)
	Luscar 2,000		Sandstone, shale, conglomerate, coal (non-marine)
Lower Cretaceous	Cadomin 30-100		Conglomerate
	Nikanassin 900		Quartzitic, sandstone and shale (marine and non-marine)
Jurassic	Fernie 900		Shale and quartzitic sandstone (marine)
Triassic	Spray River 1,130	Whitehorse member 130	Limestone and dolomite (marine)
		1,000	Quartzitic sandstone and siltstone (marine)

Triassic

Spray River Formation

Strata of the Spray River formation occur only in the extreme southeastern corner of the map-area, where they are poorly exposed on a northwesterly plunging anticlinal fold.

Most of this formation consists of thin-bedded, hard, grey, reddish brown weathering siltstone and sandstone. No section could be measured in the map-area, but in adjacent areas these strata are approximately 1,000 feet thick, and this figure has been assumed for À la Pêche area.

Overlying the siltstone, and forming the top of the Triassic Spray River formation, is the Whitehorse limestone member. Its distribution is identical with that of the underlying siltstone in the southeast corner of the map-area. The Whitehorse member consists of grey to white, buff, cream, and light grey weathering limestone, dolomite, and silty limestone. Some beds are hard, compact, and brittle, whereas others are soft and porous.

No complete section of the Whitehorse member was obtained in A la Pêche area, but less than 5 miles to the southeast it is known to be between 80 and 130 feet thick. This limestone is an excellent horizon marker both because of its lithology and because of its cream-white colour when weathered, and for this reason it has been mapped separately.

Jurassic

Fernie Group

Strata of the Fernie group occur in a few isolated patches. The largest is in the southeast corner, where two northwesterly plunging anticlinal folds are represented by a few small exposures.

Two small areas of Fernie strata occur where erosion has exposed them in the Susa Creek anticline, one where Susa Creek cuts through the fold, and the other where the west fork of Mason Creek exposes the same fold.

Only the uppermost part of the Fernie is exposed, and the strata consist predominantly of grey, quartzitic, buff to grey weathering sandstone with interbedded dark grey, silty shale.

Lower Cretaceous

Nikanassin Formation

The Nikanassin formation overlies the Fernie group conformably. It occurs as long, relatively narrow, irregular and disconnected bands, which have been exposed by erosion of the narrow anticlines. The most extensive and most northerly area of Nikanassin strata is that occurring in the Susa Creek anticline. This is one of the most persistent structures in the map-area, and Nikanassin beds are exposed in it from the east to the west border. Southeast of the Mason fold, Nikanassin beds are exposed in several less persistent and less regular anticlines.

In areas a few miles southeast of À la Pêche area, the Fernie beds are gradational upward into the Nikanassin. For this reason an arbitrary division between the formations has been adopted to facilitate field mapping. This division has been taken as the base of the first massive 20- foot bed of sandstone. The same stratigraphic conditions appear to apply in À la Pêche map-area, and, therefore, the same formational contact has been used for mapping purposes.

No complete section of the Nikanassin could be measured, but the thickness of the formation approaches 900 feet as scaled from structure-sections. This checks well with a thickness of 904 feet measured on Berland River farther south.

The strata consist of marine and non-marine, hard, grey, light buff and grey weathering quartzitic sandstone, with some interbedded shale. The lower part is composed of thick-bedded, fine- to medium-grained, quartzitic sandstone, with minor amounts of interbedded grey and black shale, and softer, brown sandstone. Grey and brownish, buff weathering sandstone, grey silty shale, and thin coaly beds predominate in the upper part of the formation.

In all places in this map-area where the Nikanassin formation was seen in contact with the overlying Cadomin formation, the uppermost stratum of the Nikanassin is a 6-inch to 1-foot bed of black carbonaceous shale.

Cadomin Formation

The Cadomin formation lies stratigraphically above the Nikanassin with apparent conformity. In À la Pêche map-area, it occurs as long, narrow, sinuous bands on either flank of most of the larger anticlinal folds. The two bands may close at one end or at both ends depending on the plunge of the structure. The Cadomin formation usually outcrops boldly, and for this reason is an excellent horizon marker. It

proved exceptionally useful in this area because it outlines minor structures on the major folds. In the area between the Adam's Creek trail and Muskeg River, it is known that the formation is intricately folded and possibly faulted, but lack of exposures prevented more detailed mapping.

The Cadomin formation is a hard, closely packed, and well-cemented conglomerate with minor amounts of sandstone. The pebbles generally range from ½ inch to 3 inches in diameter, and consist chiefly of black, grey, green, brown, and red chert, and pink, green, and white quartzite. The matrix is siliceous, and the rock fractures across the pebbles rather than around them.

The thickness of the formation ranges between 30 and 100 feet, but is commonly between 50 and 75 feet thick. In most exposures in the map-area the conglomerate includes lenses and beds of hard, grey, quartzitic sandstone, and carbonized wood is sometimes present near the base. Where Susa Creek anticline crosses Sterne Creek, the Cadomin shows two distinct conglomerate bands each about 35 feet thick separated by 30 to 50 feet of sandstone and sandy shale. This division was also noticed where the formation crosses the headwaters of Sterne Creek, but a single conglomerate band is more usual in À la Pêche map-area, where, also, considerably more sandstone is present than in map-areas farther southeast.

Luscar Formation

The Luscar formation overlies the Cadomin conglomerate with apparent conformity. Luscar strata underlie the greater part of the southwestern two-thirds of the map-area south of the Susa Creek anticline. Excellent exposures of Luscar strata occur on Sterne Creek and on the west fork of Mason Creek, but it is difficult to ascertain the thickness of the formation because of considerable repetition due to

close folding and much faulting. Other good exposures of the formation occur on the first south-flowing tributary of Cowlick Creek east of the west boundary of the map-area, and on the north-flowing tributary of Cowlick Creek just east of the Mountain trail. Incomplete sections were measured on these two creeks. Sandstone beds of the upper part of the Luscar may be equivalent in age to the Mountain Park formation.

The formation consists of non-marine and brackish water, fine- to medium-grained, grey, greyish green, and brownish, buff to brown weathering sandstone; grey, greenish grey, and black shale; coal seams from 6 inches to 10 feet thick; and thin, yellow weathering ironstone bands associated usually with shale.

On both Sterne and Mason Creeks the lower 200 feet of the formation contains a 20-foot zone of pebbly sandstone and conglomerate interbedded with sandstone. These pebbles are similar to those of the Cadomin formation, but are smaller and yield a finer conglomerate. In some places this conglomerate and pebble-bed zone is absent.

The Luscar formation shows lateral variations in lithology within relatively short distances, but the general type of sediment as a whole is consistent.

The following incomplete section was measured on the first north-flowing tributary of Cowlick Creek east of the Mountain trail.

	Thickness
Overlying beds: covered	Feet
Sandstone, fine-grained, hard, dark grey; weathers light grey to buff, thin-bedded, calcareous	8.3
Shale, silty, grey, grey weathering; carbonaceous in places; 2-foot coal seam near top	28.5
Coal	5.0
Shale, silty, grey-brown, grey weathering; 8-inch ironstone bed near top	25.1

	Thickness Feet
Sandstone, hard, medium- to coarse-grained, grey, buff to brown weathering; thin-bedded to platy; some beds finely laminated.....	10.0
Shale, interbedded with siltstone and fine sandstone; mostly grey weathering; some bands brown weathering; plant remains.....	73.6
Sandstone, fine and coarse bands interbedded; grey, grey and buff weathering.....	74.7
Covered, mainly silty sandstone with some yellow weathering ironstone bands.....	94.1
Shale, interbedded with silty shale and siltstone, dark grey, dark grey weathering; beds from 1 inch to 8 inches; one or two 2-foot bands of yellow weathering ironstone.....	76.3
Sandstone, hard, fine-grained, dark grey, yellow weathering; very calcareous.....	13.9
Sandstone, hard, fine-grained, greyish brown, buff weathering; calcareous.....	4.6
Sandstone, hard, fine-grained, grey, buff weathering; finely laminated and crossbedded; very calcareous.....	13.1
Sandstone, fine-grained, brownish grey, buff weathering	12.1
Conglomerate; pebbles of chert and quartzite up to ½ inch..	0.5
Sandstone, fine-grained, brownish grey, buff weathering....	6.0
Sandstone, medium- to coarse-grained, brownish grey, buff weathering, thin-bedded, hard.....	16.6
Shale, silty; dark grey to black.....	9.2
Sandstone and shale, in beds up to 3 feet thick; brownish weathering.....	31.1
Sandstone, medium-grained, grey, buff weathering, thin-bedded to platy.....	27.4
Shale, dark grey; some silty bands; brackish water pelecypods.....	17.7
Sandstone, fine-grained, grey; a few thin shale bands.....	11.6
Sandstone, fine-grained, grey, hard, laminated.....	11.9
Shale, silty, brownish grey to chocolate-brown; a few thin, grey, sandstone bands.....	17.9

	Feet
Sandstone, fine-grained, platy, brownish grey, buff weathering; some interbedded dark grey shale; plant stems common	11.4
Sandstone, fine-grained, grey; in beds up to 4 feet thick; interbedded dark grey shaly and silty sandstone in beds up to 6 inches thick; abundant plant remains	19.8
Sandstone, fine-grained, hard, grey, grey weathering	12.1
Shale, silty, grey to black; some carbonaceous shale	12.6
Sandstone, fine-grained, very hard, grey and grey weathering, slightly calcareous	23.1
Covered	19.6
Siltstone, fine-grained, brownish grey and brown weathering; contains plant remains	21.8
Shale, silty, brownish grey, with interbedded carbonaceous shale	3.7
Siltstone, fine-grained, brownish grey, brown weathering; finely laminated and platy weathering; slightly calcareous	3.9
Sandstone, silty, fine-grained, grey and grey weathering; carbonized plant remains throughout and 2 feet of dark grey carbonaceous shale with $\frac{1}{4}$-inch coal lenses near the base	15.4
Sandstone, grey, grey to buff weathering, fine-grained; small conglomerate lenses with pebbles up to $\frac{3}{4}$ inch in diameter; scattered wood fragments; slightly calcareous	31.0
Total	764.2

Underlying beds: Cadomin formation

Plant fossils are quite abundant in the Luscar strata, but the non-marine fauna is scarce. Plant fossils collected in À la Pêche map-area are as follows:

Ferns

Coniopteris brevifolia (Fontaine)

Conifers

Athrotaxites ungeri Halle
Elatides dickensiana Herr

These species indicate an Aptian (late Lower Cretaceous) age and are typical of the Luscar formation.

Fort St. John Group

Lying conformably above the Luscar formation is about 400 feet of dark grey to black shale, much of which is silty. No fossils were found in this shale, but its stratigraphic position below the Dunvegan formation suggests that it is equivalent in age to a part of the Fort St. John group of the Peace River district.

In À la Pêche map-area, exposures of Fort St. John shale are confined mainly to the southwestern part of the area, although one or two small exposures occur in the northwest part. The strata occurs either as long, narrow bands or tongues on anticlinal or synclinal folds.

The Fort St. John of this map-area consists mainly of dark grey to black silty shale, and is about 400 feet thick. Between 15 and 35 feet above the base is a zone of dark grey, medium-grained, hard sandstone in beds ranging in thickness between 1 foot and 6 feet. These are interbedded with thin shale bands.

The most complete exposure is on the south-flowing tributary of Cowlick Creek, near the western boundary of the map-area.

Upper Cretaceous

Dunvegan Formation

The Dunvegan formation overlies the Fort St. John shale conformably. It occurs as long, narrow bands and tongues, and its distribution is nearly identical with that of the Fort St. John group.

The Dunvegan consists of hard, fine- to medium-grained, grey sandstone and dark grey to black, silty shale. In À la Pêche map-area, the formation contains more shale than sandstone. Cross-beds and carbonized wood fragments are common in some of the sandstone.

A 6-inch bed composed almost entirely of crushed oyster shells was seen in one exposure, and a similar coquina was noticed on Little Berland River southeast of À la Pêche area. Poorly preserved specimens of Inoceramus rutherfordi Warren occur in the sandstone about 10 feet above the oyster coquina.

The following section was measured on the first south-flowing tributary of Cowlick Creek east of the western border of the map-area; part of it extends west of the western border.

	Thickness Feet
Overlying beds: Kaskapau formation	
Sandstone, fine-grained, light grey, grey weathering; beds up to 1 foot thick	15
Covered	107
Shale, silty, dark grey; a few bands of hard, grey sandstone up to 4 feet thick	130
Sandstone, very hard, fine-grained, grey, grey weathering, platy; beds up to 2 feet thick; minor amounts of interbedded shale	36
Shale, silty, dark grey to black; a few thin grey sandstone beds	61
Sandstone, hard, fine- to medium-grained, grey, grey to buff weathering; in beds up to 3 feet thick; minor amounts of interbedded grey shale	54
Total	403

Underlying beds: Fort St. John group

Specimens of Inoceramus rutherfordi Warren were collected from the talus at the base of a steep cliff farther up the creek on which the above section was measured.

Kaskapau Formation

Lying between the Dunvegan and Bighorn formations is a succession of black, silty to fissile, marine shales. In the reports on Entrance, Brûlé, Moberly Creek, Moon Creek, and Pierre Greys Lakes

map-areas north of Athabaska River, these strata have been referred to the 'Blackstone' formation, in consonance with the nomenclature of southern Alberta. At the same time, it was pointed out that the 'Blackstone' formation north of Athabaska River is equivalent to only a part of the Blackstone formation farther south. North of Athabaska River the stratigraphic interval between the Luscar (or Mountain Park) and the Bighorn formations is represented by the Fort St. John group, the Dunvegan formation and the overlying marine shale formation previously referred to as 'Blackstone'.

The marine shale formation that north of Athabaska River occupies the interval between the Dunvegan formation and the overlying Bighorn formation, appears to be more nearly equivalent to the Kaskapau formation of the Peace River district, even though the Badheart sandstone overlying the Kaskapau in that district may be slightly younger than the Bighorn. It seems more appropriate, therefore, to refer these shales in À la Pêche area to the Kaskapau formation.

The largest area underlain by the Kaskapau is a band extending northwesterly across the map-area and lying between the Mason syncline and the Susa Creek anticline. This band has an average width of 1½ miles. A narrower, northwesterly trending band in the southwest part of the map-area has a normal contact with the Dunvegan formation on the northeast and a fault contact against the Luscar formation on the south. Smaller areas underlain by Kaskapau shale occur in both the southeast and southwest corners of the map-area.

The formation consists almostly entirely of black-fissile to thin-bedded, somewhat silty, marine shale, with numerous interbedded, hard, grey, yellow weathering, concretionary, discontinuous ironstone beds up to 1½ feet thick. Toward the top of the formation are a few, thin, hard, grey, fine-grained sandstone beds and at least one bed of silty limestone. A 20-foot zone at the top consists of interbedded

sandstone and silty shale in beds up to 4 inches thick. Sandstone increases in amount toward the top.

The formation is well exposed only where Susa Creek and Muskeg River have cut deep canyons. Although exposures along Muskeg River are good, the beds are too contorted for satisfactory measurements. On Susa Creek the stratigraphic interval between the Dunvegan and Bighorn formations was obtained. Exposures of the Kaskapau shale are not continuous, but it is improbable that much repetition of strata occurs here, so that the stratigraphic interval represents approximately the thickness of the formation. The thickness of the Kaskapau on Susa Creek is, therefore, considered to be 1,800 feet.

The only fossils collected from these shales in À la Pêche map-area are as follows:

Pelecypods:
- Inoceramus corpulentus McLearn
- Inoceramus labiatus Schlotheim

Bighorn Formation

The Bighorn formation overlies conformably the Kaskapau. In À la Pêche map-area, the principal exposures are along a narrow strip following the southwestern limb of the Mason syncline. Good exposures of this band occur on Beach Ridge south of Muskeg River and along the escarpment paralleling the east side of Muskeg River Valley where the river is flowing northwesterly. The Kaskapau-Bighorn contact is well exposed along this escarpment. A good, although, not complete, section of the Bighorn is exposed where the formation has been cut by Muskeg River.

Bighorn beds are also exposed on Susa Creek near the fault on the northeast side of the Susa Creek anticline. The

exposure on Susa Creek is the only evidence that the Bighorn formation is present, and it is probable that it does not persist far either north or south of the creek.

A segment of this same band of Bighorn has been mapped close to the Mason fault near the eastern border of the area. The only evidence for its presence there was considerable talus resembling Bighorn sandstone. However, the band is present in the adjacent map-area and so it has been assumed to reach a short distance into À la Pêche map-area before being cut off by the fault.

The formation consists mainly of sandstone with minor amounts of shale, conglomerate, and local thin coal seams. Two, and probably three, hard, thick sandstone bands occur in the formation in the map-area. The lowest sandstone band where crossed by Muskeg River is between 40 and 50 feet thick and contains 8 feet of pebble-conglomerate near the base. This sandstone is grey, medium grained, and rather platy. Above it are about 100 feet of poorly exposed strata composed mainly of sandstone and silty sandstone with minor amounts of shale. Overlying this zone, and well exposed, is the second prominent sandstone member. This consists of between 75 and 100 feet of hard, grey sandstone with between 2 and 4 feet of conglomerate near its base.

Above the second sandstone memberthe formation is again mostly covered, but, at the contact with the overlying Wapiabi, 6 feet of pebbly sandstone and conglomerate are exposed, and contain coaly material. The total thickness of this uppermost bed could not be determined, but poor exposures at other localities tend to support this indication of a hard, thick, conglomeratic sandstone member at the top of the formation. The interval between the top of the second sandstone band and the base of the Wapiabi is approximately 380 feet, and appears to be occupied by silty sandstone and silty shale.

The measured stratigraphic interval between the lower and upper contacts of the Bighorn indicates a thickness of 600 feet for the formation.

Specimens of Inoceramus leylandensis McLearn were collected about 30 feet above the base of the lowermost sandstone band of the Bighorn formation just east of McDonald Flats.

Wapiabi Formation

The Wapiabi formation overlies the Bighorn formation conformably. It occupies small areas in the northeast part of the map-area, forming the core of the Muskeg anticline and occurring on both limbs of the Mason syncline. Two very small areas underlain by these strata occur along the northeast side of the Mason fault. Wapiabi strata are poorly exposed, and no complete section was obtained. The thickness of the formation is assumed to be about 1,500 feet, which is the stratigraphic interval measured between the Bighorn and Brazeau formations in Moon Creek area to the southeast. Its distribution is known chiefly from the positions of the underlying Bighorn and the overlying Solomon sandstones, which outcrop prominently.

The formation consists of soft, friable, dark grey to black, marine shale, with some interbedded sandy shale and siltstone. The uppermost 200 feet consists of coarser grained, dark green, glauconitic, sandy shale.

Poorly preserved specimens of Scaphites ventricosus and Oxytoma cf. nebrascensis were collected from the Wapiabi strata exposed on the first south-flowing creek east of McDonald Flats.

Brazeau Formation

The Brazeau formation, of late Upper Cretaceous age, overlies the Wapiabi shales, and underlies areas on both limbs of the Muskeg anticline and a large area in the centre of the Mason syncline.

The Solomon Member. The Solomon sandstone, forming the lower 100 feet of the Brazeau formation, is a useful horizon marker, and has been mapped separately. It forms four thin, northwesterly trending bands in À la Pêche area because of its exposure on each limb of both the Muskeg anticline and the Mason syncline.

The Solomon member consists of a distinctive, hard, grey to greenish grey, buff weathering, slabby sandstone. Marine fossils have been found in it in nearby areas but not in À la Pêche area.

Main Part of the Brazeau Formation. The remainder of the formation above the Solomon member consists of roughly 6,000 feet of thick-bedded sandstone, conglomerate, and shale. The sandstone is generally medium to coarse grained, grey and greenish grey, green and brown weathering, commonly crossbedded and soft. The conglomerate consists mainly of pebbles from ½ to 1 inch in diameter, composed of white, grey, and black quartzite and chert. In places it is closely packed, and elsewhere it shows all gradations from conglomerate to sandstone with scattered pebbles. Conglomerate is common toward the base of the formation and much of it is crossbedded like the sandstone. The shales are dark grey and greenish grey, and are commonly silty. The formation contains some beds that appear to be water-lain ash.

Plant remains occur at many localities in the sandstone and shale, but no identifiable fossil plants were collected in À la Pêche map-area.

STRUCTURAL GEOLOGY

Northwesterly trending complex folds and thrust faults are the dominant structural features of the area. With a few exceptions, anticlines form the ridges and synclines the valleys. In all cases, the anticlines are relatively narrow and compressed, whereas the synclines are relatively more open. The folds are irregular, and form an en échelon pattern with a prevailing plunge to the northwest. Deformation becomes more intense and the structures more complex toward the southwest.

Folds

Numerous anticlines occur, and three of these are continuous across the map-area. The most northerly, or Muskeg anticline, crosses the northeast corner of the area and exposes Wapiabi shales at the crest. Muskeg No. 1 well was drilled close to the axis of this structure near the eastern boundary of the map-area. Southwest of the Muskeg anticline, and separated from it by the Mason syncline, is the Susa Creek anticline. This is a narrow, compressed structure, which, for most of its length exposes Nikanassin strata in the core; in places beds of Fernie age are exposed.

Farther southwest, the next continuous fold is the Sterne Creek anticline. This is a northwesterly continuation of the Cabin Creek structure, which occurs to the southeast of this area. This fold is also narrow and compressed, and the oldest strata exposed in it are Nikanassin.

Between the Sterne Creek and Susa Creek anticlines is a contorted area underlain mainly by Luscar beds. Southwest of the Sterne Creek structure are numerous, irregular, complex and en échelon folds, which involve strata ranging in age from Triassic to Upper Cretaceous.

Faults

All faults in the map-area are probably strike faults along which strata have been overthrust from the southwest to the northeast. The faults themselves are seldom visible, and their positions are in most places approximate or inferred, but from the distribution of the strata and from the general conditions known to prevail in other areas, it is probable that all fault surfaces dip to the southwest. The number of faults increases toward the southwest, where the strata are more intensely deformed. It is probable that more minor faults and folds occur than those that have been mapped.

All faults mapped appear to be continuous across the area. Two of these have brought Luscar strata up against Kaskapau shale, and this appears to be the maximum displacement in this map-area. The relatively straight traces of all faults suggest that the faults dip steeply at the surface.

ECONOMIC GEOLOGY

Coal

No coal more than 2 inches thick was observed in any formation except the Luscar, but seams ranging from 2 inches to 6 feet occur in the Luscar formation of À la Pêche map-area.

On Sterne Creek, a seam 6 feet thick outcrops in two places in the creek banks. Two seams are exposed on the south-flowing tributary of Cowlick Creek just east of the west border of the area. The upper one is 2.4 feet thick, and occurs 506 feet below the top of the formation; the lower seam is 2 feet thick and occurs 890 feet below the top of the formation. The upper seam is overlain by grey silty shale containing coaly bands, and the lower seam is overlain by silty shale and underlain by interbedded fine sandstone and shale.

The only other coal outcrop seen is on the north-flowing

tributary of Cowlick Creek just east of the Mountain trail. There a good exposure of the lower part of the Luscar formation reveals a 5-foot coal seam 725 feet above the Cadomin formation.

It is probable that three different seams are represented toward the middle of the formation, and it is possible that other seams are present but are not exposed.

Oil and Gas

The possibilities of obtaining oil or gas from this area are not promising. The Muskeg anticline, the most likely structure for the accumulation of oil and gas in the map-area, was tested with disappointing results. A test well, Muskeg No. 1, was drilled in sec. 24, tp. 57, rge. 6, W. 6th mer., to a depth of 10,709 feet. This well penetrated into the Upper Devonian Boule formation. No gas or oil was obtained, so it is improbable that more complex structures to the southwest will be considered in the near future. At present, the log of this well is not available.

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