CANADA

DEPARTMENT

OF

MINES AND TECHNICAL SURVEYS

GEOLOGICAL SURVEY OF CANADA

PAPER 44-30

GEOLOGY ADJACENT TO THE ALASKA HIGHWAY, BETWEEN FORT ST. JOHN AND FORT NELSON, BRITISH COLUMBIA

(REPORT AND MAP)

By

C. O. Hage

OTTAWA

1944

REPRINTED 1953

C A N A D A

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MINES AND GEOLOGY BRANCH

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Illustration

Preliminary map - Alaska Highway, Fort St. John to Fort Nelson, B. C.

GEOLOGY ADJACENT TO THE ALASKA HIGHWAY BETWEEN FORT ST. JOHN AND FORT NELSON, BRITISH COLUMBIA

INTRODUCTION

The following report is based on a geological reconnaissance in 1943 along the Alaska Highway between Fort St. John and Fort Nelson, British Columbia, a distance of 257 miles. The area investigated lies west of longitude 121 degrees and between latitudes 56 and 59 degrees. It comprises a narrow belt along the Highway except for a strip about 60 miles long between Beatton and Prophet Rivers where the work was extended to from 5 to 25 miles west of the road.

Previous geological work in this area was restricted to Peace River Valley and along the old trail from Fort St. John to Fort Nelson by way of Sikanni Chief River. Early work along Peace River was done by Selwyn (1875)[1] and Dawson (1879). It was followed

[1] A list of references is given at the end of this report.

years later by more intensive studies by McLearn (1918). Others who have contributed to the geology along Peace River include M. Y. Williams and J. B. Bocock (1932), E. M. Spieker (1921), J. A. Dresser (1922), and other geologists in the employ of oil companies. M. Y. Williams and G. S. Hume went overland from Fort St. John to Sikanni Chief River and thence to Fort Nelson in 1922. A short time was spent by the writer reviewing sections previously described along Peace River before commencing work along the Highway.

The writer wishes to acknowledge the kind assistance of the United States Army Engineers, Public Roads Administration, and, in particular, the resident engineers and American contractors working under their direction. Useful information about the country was obtained from Mr. K. F. McCusker, Fort St. John, and through the discussions in the field with Dr. S. S. Holland, geologist in charge of a field party for the British Columbia Department of Mines, and Dr. A. O. Hayes, geologist in charge of a field party for Socony Vacuum Oil Company. Messrs. Walter Blench, Allan Haase, and Bernard A. Latour were efficient student assistants.

GENERAL CHARACTER OF THE REGION

TOPOGRAPHY

The Alaska Highway trends northwesterly from Fort St. John for 97 miles, and in this distance follows the height of land between Cameron, Blueberry, and Beatton Rivers. The divide is formed of gently sloping northerly trending ridges that increase in relief to the west; towards the north the elevation of the country rises, in general, about 1,000 feet in the first 95 miles from Fort St. John.

At mile 97[2] the road assumes a more northerly route and

[2] Mile posts referred to in this report are numbered from Fort St. John.

continues in this direction for 55 miles. For the greater part of this distance it follows a high west-facing scarp that parallels the mountains 12 to 18 miles to the west. The top of the scarp, which has a plateau-like appearance from the west, is dissected by east-flowing rivers and streams including the Beatton, Sikanni Chief, Buckinghorse, and Prophet Rivers. The height of land between the Peace and Fort Nelson drainage systems lies between Beatton and Sikanni Chief Rivers and close to mile 108 on the road. The original army road in this area follows the top of the scarp across the divide and attains an elevation close to 4,200 feet a short distance north of mile post 106, the highest point along this section of the road. From there the elevation drops to 2,662 feet above sea-level at the Sikanni Chief bridge[1]. North of Buckinghorse River the scarp has

[1]Top of deck over first pier.

an average elevation of 4,000 feet, and is approximately 1,000 feet above Minaker River to the west. At mile 152 the road leaves the plateau, swings northeast for 30 miles, and then follows along or adjacent to the east bank of Prophet River, which flows almost due north to join the Muskwa 3.5 miles west of the bridge at mile 253. The elevation of the Muskwa River bridge is about 1,035 feet. Along Prophet River the road crosses numerous small streams entrenched in valleys several hundred feet deep. The plateau, which the road leaves at mile 152, can be seen several miles to the east of the Highway as far north as mile 195. The dissected part of the plateau with steeply dipping slopes has a distinct mesa-like appearance. A large remnant of the plateau can be seen to extend northward, west of Prophet River Valley. South of Trutch Creek the plateau is 1,500 feet above the creek.

Pink Mountain is a prominent topographical feature east of the front range of the Rocky Mountains and about 10 miles west of the Highway in the Beatton River area. The summit is about 5,900 feet above sea-level, or 2,700 feet above Halfway River. It is outlined by hard, resistant, quartzitic, sandstone beds, whereas the adjacent, lower lying areas, with subdued topography, are underlain largely by shale.

PHYSIOGRAPHY

The region traversed forms parts of three physiographic divisions: an eastern or Plains province underlain by flat-lying or gently folded beds and extending for several miles west of the Highway between Beatton and Prophet Rivers; a western, mountainous province of folded and faulted resistant strata; and an intermediate, transitional or Foothills belt of folded strata having moderate relief and a width of from 6 to 8 miles. Klingzat Mountain marks the eastern limit of the western, mountainous province; Pink Mountain lies within the intermediate belt; and the eastern province includes a plateau-like area that extends east of the Highway.

The western, mountainous province was investigated for 12 miles along Sikanni Chief River. The mountains there have a relief of about 3,000 feet and are composed mainly of Triassic strata and some Jurassic and Cretaceous beds. Higher mountains formed of Palaeozoic strata lie to the west, but were not investigated. The southward continuation of this eastern mountainous belt has been included with the Foothills belt along Peace River by McLearn (1940), but owing to its high relief in the area under present consideration the writer prefers to consider it as part of a mountainous province. Structurally it exhibits a series of large folds and some thrust faults. The resistance to erosion of the Triassic beds is an important factor, accounting for the relief in this unit.

In the intermediate or Foothills belt the topography is more subdued except for that of Pink Mountain, which is composed of hard, quartzitic sandstone beds of the Bullhead group. Most of the belt is underlain by Lower Cretaceous shales that weather easily. This belt, as observed either from the mountains to the west or from the plateau to the east, has a trench-like appearance paralleling the mountains and crossed by numerous streams from the west.

The eastern or Plains province is bounded on the west by a high, west-facing scarp formed largely of sandstone and conglomerate beds of Upper Cretaceous age. To the east of the scarp the country has a plateau-like appearance. It is dissected by Beatton, Sikanni Chief, Buckinghorse, Prophet, and Muskwa Rivers and may represent the remnant of a former peneplain. It slopes gently to the east and where traversed is essentially free of glacial deposits.

STRATIGRAPHY

GENERAL STATEMENT

The rocks exposed within the area traversed range in age from Lower Mississippian to Upper Cretaceous. Near the mountain front the Mesozoic strata have an aggregate thickness of about 9,500 feet. Only 900 feet of Palaeozoic rocks are exposed, and their contact with overlying Mesozoic strata was not observed. Several of the formational and group names used along Peace River have been adopted, but a new subdivision has been made of the strata of Lower Cretaceous age comprising the marine Fort St. John group.

TABLE OF FORMATIONS

Era	Period	Epoch	Group	Formation	Thickness Feet
Cenozoic	Quaternary	Pleistocene and Recent			0-700
		Unconformity			
Mesozoic	Cretaceous	Upper Cretaceous		Dunvegan	500+
		Lower Cretaceous	Fort St. John	Sikanni	980
				Buckinghorse	3,000-3,600
			Bullhead		1,200-1,600
		Unconformity ?			
	Jurassic	Lower		Fernie	18-240
		Unconformity			
	Triassic	Upper and Middle		Schooler Creek	2,500+
		Unconformity ?			
Palaeozoic	Carboniferous	Mississippian			900 (observed)

DESCRIPTIONS OF FORMATIONS

Palaeozoic

Approximately 900 feet of Palaeozoic strata are exposed along the crest of a tightly folded anticline crossing Sikanni Chief River about 2 miles west of Mount Withrow. The strata consist of light and dark grey limestone interbedded with about an equal amount of black and light-coloured chert and siliceous limestone. Beds range in thickness from 12 to 18 inches. The chert deposits are irregular but form continuous beds, and outcrops have a distinct banded appearance. Most of the limestone is crystalline, but minor amounts are crinoidal and dense.

Fossils are scarce. Those collected were identified by A. E. Wilson of the Geological Survey as of Lower Mississippian age. The collection includes the following species: cf. Triplophyllum sp., cf. Lophophyllum profundum E. and H., Productus gallatinensis Girty, Schizophoria cf. chouteauensis Weller, Spirifer cascadensis Warren, Spiriferella minnewankensis Shimer, Composita sp., cf. Straparollus sp., and Proetus sp.

The contact with the overlying Mesozoic strata was not observed, and as the investigations were not carried west of the anticline the position of the exposed beds with respect to the top of the Palaeozoic section is not known, but is believed to be very close to the top.

Triassic

Schooler Creek Formation

All strata of Triassic age in the area are included in the Schooler Creek formation. The upper part outcrops on Pink Mountain above Halfway River and at two other localities, 3 and 9 miles respectively north of the river. Several hundred feet of the upper part of the formation is exposed on Sikanni Chief River north of Pink Mountain and along the crest of an anticline about 2½ miles west of Minaker River and north of Pocketknife Creek. Klingzut Mountain and other mountains to the west for about 10 miles are composed of Triassic strata. Mount Withrow for example, which lies north of Sikanni Chief River, exposes more than 2,000 feet of these beds. As the base of the formation was not observed, its total thickness is not known, but is probably at least 2,500 feet in the vicinity of Sikanni Chief River.

The Schooler Creek strata may be subdivided for descriptive purposes into three large members. The lower member consists mainly of black shale, interbedded in the upper part with dark grey limestone. At one locality 200 feet of these black shales were observed. Their total thickness is not known. The middle member is composed of argillaceous limestone, calcareous siltstone, and sandstone interbedded with dark grey to black shale and sandy shale. It is at least 1,800 feet thick. The upper few hundred feet is predominantly bedded limestone with minor amounts of argillaceous limestone and siltstone interbedded with dark grey to black, hard, bedded shale. The limestone beds contain abundant fossils, especially pelecypods. All Schooler Creek beds are believed to be of marine origin.

Fossils collected from the upper member are predominantly of Upper Triassic age, whereas the middle and lower members contain Middle Triassic fossils. The following is based on identifications by F. H. McLearn of the Geological Survey:

	Pink Mountain	Sikanni Chief River north of Pink Mountain	Sikanni Chief River in vicinity of Mount Withrow
Upper part (Upper Triassic)			
Monotis subcircularis			X
Monotis alaskana	X	X	
Halobia	X	X	No
Halobia pacilis		X	collection
Myophoria	X	X	made
Gryphaea chakii	X	X	below
Oxytoma		X	*Monotis subcircularis*
Spiriferina		X	zone
'Clionites' n.sp.		X	
Goniomya n.sp. ?		X	
Pleuromya ? nidovana		X	
Himavotites columbianus		X	
Middle and Lower part (Middle Triassic)			
Spiriferina			X
Coenothyris			X
Daonella			X
Nathorstites			X
Frotrachyceras			X
Ptychites			X
Trigonodus ? sp.			X
Danubites ?			X
Parapopanoceras ?			X
Pecten		X	X

A fossil horizon approximately 200 feet from the top of the formation on Pink Mountain contains a large number of vertebrae and other bones. C. M. Sternberg of the Geological Survey identified those collected and photographed as ichthyosaur ribs and vertebrae belonging to the genus *Shastasaurus*.

On Pink Mountain the highest faunal zone contains *Monotis alaskana*, whereas farther west, along Sikanni Chief River, it is overlain by a zone containing *Monotis subcircularis*, the highest faunal zone in the Triassic along Peace River. The faunal zones are quite similar to those described by McLearn from the Schooler Creek of Peace River. It is uncertain, however, if the lower member of black shale is present on Peace River where the basal part of the formation is concealed.

An unconformity is thought to mark the top of the formation, especially as it is known that higher faunal zones are present in the mountains along Sikanni Chief River than on Pink Mountain. The upper, *Monotis* and *Halobia* zones were not observed on Pocketknife anticline west of Minaker River.

Jurassic

Fernie Formation

The term Fernie is used here to include all strata of Jurassic age as it does in the Foothills belt of Alberta. The best exposures were found on the west side of Pink Mountain, about 3½ miles north of Halfway River, and at several places along Sikanni Chief River. The thickness of the formation varies at different places. On Pink Mountain close to Halfway River it has a thickness of about 128 feet. Eighteen miles to the north, on Sikanni Chief River, it is only 32 feet thick. About 11 miles upstream from this locality the thickness has increased to 240 feet. On a tributary creek of Minaker River the formation has a thickness of 18 feet.

On Pink Mountain the formation consists of dark grey to black, calcareous, platy, marine shale with several interbedded dark grey limestone beds. The base is marked by 2 feet of argillaceous limestone containing fossils. The dark grey to black, fissile shale is characteristic of the formation wherever it was observed.

The Fernie formation in this region is of Lower Jurassic age. Fossils from the basal limestone were identified by F. H. McLearn as follows: Gryphaea, Pecten, Rhynchonella, and Oxytoma cf. cygnipes Young and Bird. McLearn states "A tentative Lower Jurassic correlation can be made, but the evidence is not absolutely conclusive". The black shale contains the ammonoid "Arnioceras" of Lower Jurassic age.

The formation is correlated with strata on Peace River and adjacent areas to the south where the beds are described as those of the Pine River formation. Owing, however, to some uncertainty as to the age of the beds of the original Pine River section, the southern formational name "Fernie" is here used for these Jurassic strata.

Lower Cretaceous

Bullhead Group

Overlying the Jurassic shales is a group of sandstone and shale beds and thin coal seams, all of which are of freshwater origin. On Peace River, McLearn (1917) gave the name Bullhead Mountain formation to this assemblage, which has a distinct upper member, the Gething, containing commercial coal seams. Wickenden and Shaw (1943), working on Pine River farther south, have named this thick assemblage of beds the Bullhead group. This term is used in this report to apply to all freshwater sandstone and shale beds that lie between the marine shales of Jurassic and Lower Cretaceous ages.

Strata of the basal part of the Bullhead group form the surface rocks over the greater part of Pink Mountain. Outcrops are numerous above timber line and along the streams that drain the mountain sides. There are three almost complete sections of the group exposed on Sikanni Chief River. Two of these are north of Pink Mountain and from 1 to 3 miles above the lower waterfalls, which is about 11 miles west of the bridge. The other section is located at the upper waterfalls, 9 miles upstream from the lower. The hard quartzitic character of the rocks and their resistance to erosion results in rapids and waterfalls where they cross Sikanni Chief River.

The section exposed about a mile above the waterfalls north of Pink Mountain has a calculated thickness of 900 feet, but as it is broken by an east-dipping fault of undetermined displacement, its true thickness may be considerably greater. West of Chicken Creek 835 feet of beds were measured. The lowest bed is believed to be within 200 feet of the base of the group. Overlying this section are 231 feet of alternating sandstone and shale beds that are considered transitional into the overlying marine shales and are included with the overlying formation. The western section at the upper waterfalls has a calculated thickness of 1,620 feet. Such variations in thickness may represent a thickening in the group from east to west.

The following section was measured along Sikanni Chief River west of Chicken Creek:

Top of Section	Feet
Coal and carbonaceous shale	0.3
Sandstone, dark grey, hard, medium-grained	5.5
Coal	0.7
Sandstone, dark grey, fine-grained	2.0
Shale, dark grey, fissile	3.0
Coal	0.6
Sandstone, dark grey	9.0
Shale, dark grey	2.0
Sandstone, dark grey, fine-grained	0.8
Shale, dark grey, fissile	1.0
Sandstone, dark grey, fine-grained, hard	1.0
Shale, dark grey, bedded	6.0
Sandstone, grey, medium-grained; ripple-marks	8.5
Shale, dark grey, fissile	0.5
Coal and carbonaceous shale	0.8
Sandstone, dark grey, fine-grained	4.5
Shale, dark grey	1.0
Sandstone, dark grey, bedded	20.0
Shale, dark grey	1.0
Shale, black, carbonaceous	1.3
Concealed	9.0
Sandstone, light grey, fine-grained	10.0
Conglomerate, pebbles of chert, quartzite, and quartz	0.5
Sandstone, coarse, with scattered pebbles	31.0
Sandstone, dark grey, fine-grained	35.0
Shale, dark grey	9.0
Sandstone, with scattered pebbles and lenses of conglomerate	46.0
Coal	0.2
Sandstone, dark grey, fine-grained, bedded	11.0
Shale, dark grey, fissile	5.0
Sandstone, dark grey, fine-grained	21.0
Shale, dark grey, fissile	15.0
Sandstone, dark grey, fine-grained	15.0
Shale, carbonaceous	1.0
Sandstone, dark grey, fine-grained, bedded	42.0
Shale, dark grey, bedded	1.0
Sandstone, dark grey, fine-grained	5.0
Shale, dark grey, interbedded with sandstone	11.0
Sandstone, grey, fine-grained, hard	4.5
Shale, dark grey, and sandy shale	5.5
Sandstone, brownish grey, hard, fine-grained, bedded	20.0
Shale, dark grey, bedded	4.0
Sandstone, fine-grained, quartzitic	11.0
Shale, dark grey, bedded	6.5
Sandstone, fine-grained, bedded	12.0

Shale, dark grey, fissile	1.5
Coal	0.5
Shale, dark grey, carbonaceous	2.5
Sandstone, dark grey, fine-grained	3.5
Shale, dark grey, interbedded with fine sandstone	5.0
Sandstone, light grey, fine-grained, hard	14.0
Shale, dark grey, fissile	1.2
Shale, carbonaceous	0.8
Sandstone, dark grey, fine-grained, bedded	10.0
Shale, dark grey, sandy, bedded	7.0
Coal	0.2
Shale, dark grey, fissile	2.5
Coal	0.4
Shale, dark grey, fissile	2.0
Sandstone, fine-grained, bedded, hard	5.0
Concealed	13.0
Sandstone, light grey, quartzitic	24.5
Shale, dark grey, interbedded with sandstone	3.0
Coal and coaly shale	1.0
Sandstone, fine-grained, quartzitic	9.0
Clay, dark grey	0.3
Shale, dark grey	1.0
Sandstone, dark grey, fine-grained, hard	1.5
Shale, dark grey, sandy	1.5
Sandstone, dark grey, quartzitic	40.5
Shale, light grey, bedded	1.0
Sandstone, grey, fine-grained, bedded, hard	22.0
Shale, dark grey, sandy, bedded	8.5
Sandstone, light grey, fine-grained, bedded	51.0
Shale, dark grey, sandy	2.5
Sandstone, light grey, bedded, hard	14.0
Sandstone, dark grey, fine-grained, bedded	28.0
Coal	0.7
Sandstone, dark grey, fine-grained	4.0
Siltstone, dark grey, hard	7.0
Concealed	13.0
Sandstone, grey, bedded, quartzitic; ripple-marks	25.0
Sandstone, grey, fine-grained, quartzitic; interbedded with minor amount of shale	96.0
Conglomerate and coarse sandstone	10.0
Total	834.8

Variations in lithology were observed between the sections studied. The basal beds seen on Pink Mountain are quite different from those exposed on Sikanni River. On Pink Mountain, just north of Halfway River, the base of the group is marked by a coal seam over 5 feet thick, which is overlain by 140 feet of fine-grained, dark grey sandstone interbedded with dark grey and carbonaceous shale. These beds resemble the Kootenay formation in the Foothills of southern Alberta, and are overlain by coarse-grained, quartzitic, sandstone beds with conglomerate and scattered pebbles of chert, quartzite, limestone, altered ironstone, and porphyry in the basal part. Minor amounts of dark grey carbonaceous shale are interbedded with the sandstone. In the Sikanni Chief River section north of Pink Mountain the basal beds of alternating sandstone and shale, as exposed on Pink Mountain, are apparently missing. There a seam of coal 2 inches thick marks the base of the formation and is overlain by coarse sandstone containing scattered pebbles. On a tributary stream of Minaker River, 28 miles farther north, the base of the group is marked by a 3-inch conglomerate bed composed of pebbles of quartzite, chert, porphyry, and vitreous quartz, and is overlain by a 12-inch bed of coarse, sugary, quartz sand and dark grey, coarse- to medium-grained, quartzitic sandstone. Only the

basal part of the formation is exposed in this area, and the total thickness of the group there is believed to be less than on Sikanni Chief River. The sandstones in the upper part of the group are generally finer grained and thinner than those in the lower part, and the interbedded shaly strata are thicker. The conglomerate beds in the upper 200 feet were observed at several localities.

No fossils were found in the Bullhead group, and its age is based upon its position in the stratigraphic sequence and on correlation with similar beds on Peace River, where the group is regarded as of Lower Cretaceous age. That part of the group that lies below the thick conglomerate on Pink Mountain resembles the Kootenay formation of southern Alberta and the conglomerate and overlying sandstone and shale beds resemble the lower part of the Blairmore group. The great variation in the thickness of the beds between the conglomerate and the Fernie shale suggests an interval of erosion, and the possibility of an unconformity at the base of the conglomerate should be kept in mind. There is also some evidence for believing that a disconformity, if not an unconformity, exists at the Fernie contact.

Fort St. John Group

The Fort St. John group includes the marine beds of Lower Cretaceous age that lie between the Bullhead group and the Upper Cretaceous Dunvegan formation (Wickenden and Shaw, 1943). Within the area investigated the group has been subdivided into a lower, or Buckinghorse formation and an upper, Sikanni formation.

Buckinghorse Formation. It is proposed to adopt a new formational name, Buckinghorse, for a thick assemblage of dark grey marine shales that overlies the Bullhead group. The greater part of the formation is exposed along Buckinghorse River west of the Highway. Along Sikanni Chief River a complete section is exposed west of the Highway bridge in a distance of 8.5 miles. These shales underlie the greater part of the area between the Highway and the mountains to the west. Because of their softness they are easily eroded and the area underlain by them bears a subdued topographic expression. Outcrops are largely along stream channels.

The formation consists mainly of dark grey, bedded and chunky shale containing minor, fine-grained, thin sandstone and sandy shale beds and varying amounts of brown-weathering ironstone concretions. Thin bentonite beds are present in the basal part. On Sikanni Chief River, 14 miles west of the Highway bridge, the basal beds of interbedded sandstones and shales are transitional from the Bullhead group. The following is a measured section of the passage beds at that locality:

Top of Section	Thickness Feet
Sandstone, grey, hard, fine-grained; a few chert pebbles	4.6
Shale, dark grey, thinly bedded	1.2
Sandstone, dark grey, fine-grained; ripple-marks	1.0
Shale, dark grey; interbedded with siltstone in beds 1 inch thick	5.0
Sandstone, brownish grey, medium-grained	2.7
Shale, dark grey, thinly bedded	1.4
Sandstone, dark grey, medium-grained; with small concretions	1.0

Shale, dark grey, thinly bedded	1.0
Sandstone, brownish grey, medium-grained	6.0
Conglomerate with black, bean-size chert pebbles	0.5
Sandstone, brownish grey, medium-grained	37.0
Shale, dark grey, thinly bedded	2.0
Sandstone, brownish grey, thinly bedded	2.5
Shale, dark grey; interbedded with dark grey sandstone	8.0
Sandstone, brownish grey, medium-grained, bedded	18.5
Shale, sandy, dark grey	5.0
Sandstone, dark grey, fine-grained	2.0
Shale, dark grey; with ironstone concretions at top	7.0
Sandstone, brown, fine-grained, hard	2.5
Shale, dark grey, fissile; interbedded with fine sandstone	7.0
Sandstone, dark grey, medium-grained	5.0
Shale, dark grey, fissile; interbedded with fine-grained sandstone	11.5
Sandstone, grey, medium-grained	4.5
Shale, dark grey, fissile	1.5
Sandstone, brownish grey, medium-grained	6.0
Shale, dark grey, fissile; interbedded with siltstone	3.0
Sandstone, dark grey, medium-grained	7.0
Shale, dark grey; interbedded with some sandstone	15.0
Sandstone, dark grey, fine-grained	1.5
Shale, dark grey, fissile	11.0
Sandstone, dark grey, fine-grained, hard	3.4
Shale, dark grey, fissile; ironstone concretions	17.0
Sandstone, dark grey; interbedded with dark grey siltstone	30.0
Total	232.3

Elsewhere, where observed, the transition zone was not nearly as thick. The complete section along Sikanni Chief River was not measured, but has a calculated thickness above the transition zone of 3,300 feet. The following section gives a general idea of the composition of the greater part of the formation as exposed along Buckinghorse River west of the Highway:

Top of Section	Thickness Feet
Overlying beds--Sikanni formation	
Bedded and semi-bedded, dark grey shale, with a few ironstone concretions and some interbedded thin sandstone beds	1,000
Fine-grained, dark grey sandstone, sandy shale and shale	50
Dark grey, chunky shale with sparse ironstone concretions	375
Dark grey, fissile shale and thin sandstone beds with a few concretions	75
Dark grey, fissile shale containing large, limy, light buff weathering concretions.	100
Bedded, fissile shale with ironstone beds containing a few scattered ellipsoidal concretions	825
Dark grey, chunky shale with numerous ironstone concretions	375

Shale containing three bentonite beds 1 to 6 inches thick	25
Dark grey, chunky shale with numerous ironstone concretions	475
Total	3,300

The total thickness of the formation is estimated to be between 3,300 and 3,600 feet.

Very few fossils were observed in the Buckinghorse formation. Neogastroplites and a large Inoceramus were found on Indian Creek, east of mile 182, in shale that is believed to form the upper part of the formation. On this basis (McLearn, 1944) the Buckinghorse is of Lower Cretaceous age.

Sikanni Formation. Sikanni is a proposed new formational name for the assemblage of beds that lie between the Buckinghorse and Dunvegan formations. It is composed of a lower part about 380 feet thick consisting of four sandstone members separated by shale, and an upper part believed to be largely shale though observations were limited to a few outcrops. As the contact with the overlying Dunvegan was not observed, the actual thickness of the upper part of the formation is not known, but an estimate of 600 feet is believed to be a fair approximation. The total thickness of the formation is, therefore, about 980 feet.

The lower part of the Sikanni is well exposed along Sikanni Chief River at and below the Highway bridge; along Buckinghorse River; and along the west side of the scarp between mile 135 and mile 152.

A representative section 2 miles east of the Sikanni Chief Highway bridge is as follows:

Top of Section	Thickness Feet
Shale, dark grey	?
Fourth sandstone member; fine-grained, grey, bedded and banded; small carbonaceous fragments along bedding	47
Shale, dark grey, bedded; with a few scattered ironstone concretions	44
Third sandstone member: fine-grained, grey, banded; interbedded with minor amount of shale	46
Shale, dark grey and sandy; a few ironstone concretions	71
Conglomerate; black chert pebbles	0.5
Second sandstone member: fine- to medium-grained, grey, bedded and banded	72
Shale, dark grey, banded and poorly bedded; contains ironstone concretions	65
First sandstone member: fine-grained, grey, crossbedded, banded	35
Total	380.5

The banded and bedded character of the sandstone is characteristic of the various members. The thin chert-pebble conglomerate on top of the second sandstone member was observed at mile 152 and at several places along Sikanni Chief River, and is a useful horizon marker. The lower part of the formation is of uniform character for a distance of 60 miles from the "Elbow" on Halfway River east of Pink Mountain to Prophet River.

Fossils are not plentiful, but McLearn (1944) found those collected useful in making a tentative correlation with the Peace and Pine River sections. Artica and Neogastroplites were found in the second sandstone member and Modiolus, Oxytoma, Pecten, Pinna, and Pleuromya in the third. The Neogastroplites fauna is correlated with a similar zone on Peace River. As it was found within and close to the top of the Buckinghorse formation on Bear Creek, it has a range of perhaps several hundred feet of beds in this area. The fauna found in the third sandstone member is correlated with the Goodrich fauna on Pine River and is of late Lower Cretaceous age. The correlation of the upper part of the Fort St. John group with similar rock units on Pine River is fairly well established through the Goodrich and the Neogastroplites faunas on Peace River. No beds equivalent to the Gates formation were observed on Sikanni Chief River, but on Buckinghorse River a sandy zone about 1,000 feet below the top of the Buckinghorse may be an equivalent of the Gates.

Upper Cretaceous

Dunvegan Formation and Younger Strata

The Dunvegan formation overlies the marine beds of the Fort St. John group. No complete sections of the formation were studied and hence detailed lithological information is lacking. Sections along Peace River have, however, been described by McLearn (1917) and Williams (1932). Scattered outcrops of sandstone and shale were observed along the Highway for 108 miles north from Fort St. John and are assigned to the Dunvegan formation. They consist of fine- to coarse-grained, grey, brown weathering, crossbedded sandstone interbedded with grey, brown-weathering shale. Thin coal seams are present and small fragments of carbonaceous material are common along bedding planes. Lenses and beds of pebble-conglomerate are commonly associated with the coarser sandstone beds.

Outcrops 75 feet high of medium- to coarse-grained, feldspathic sandstone containing ironstone concretions up to 4 inches in diameter were observed at several places along the east side of Charlie Lake. The sandstone beds are massive and up to 20 feet thick. Similar beds along the Highway have provided rock for road surfacing. Some of the larger quarries along the road are located as follows: 2.5 miles southwest from mile 20; at mile 49; 3.5 miles northeast from mile 50; close to mile 68; and at mile 87. These beds may not all represent the same horizon. A section about 350 feet thick exposed south of Trutch Creek and 5 miles east of the Highway is comprised of four thick sandstone beds separated by interbedded shale and sandstone. The upper sandstone bed is overlain by 50 feet of pebble-conglomerate.

Another section, east of Indian Creek at mile 189.5, is quite similar to that south of Trutch Creek. A section, 82 feet thick, of medium- to coarse-grained sandstone containing a few thin beds of pebble-conglomerate, is also exposed west of mile 106 along the scarp. On Suicide Hill, at mile 108, a 100-foot section exposed by the road-cut consists of medium-grained sandstone beds interbedded with sandy shale that contains a 3-inch seam of coal. This section underlies the thick coarse-grained sandstone at mile 106. Along the Highway northwest from Charlie Lake, and at elevations higher than the outcrops east of the lake, are outcrops of dark grey and light grey shale interbedded with fine-grained, soft sandstone beds. Most of the shale has specks of carbonaceous material. No fossils were found in any of these outcrops. They are believed to represent parts of the Dunvegan formation, but may be younger.

A collection of fossil plants from the sandstone quarry at mile 68 was examined by W. A. Bell of the Geological Survey, who identified the following: Platanus latiloba Newberry, Protophyllum undulatum Lesquereaux, Araliaeophyllum rotundiloba ? (Newberry), Magnolia ? sp., and Laurophyllum sp.

Regarding this collection Bell states that although the florule includes very few identifiable species, it is considered to be probably of Cenomanian (early Upper Cretaceous) age. The collection is not as complete as the one previously made by Williams (1932), but includes the same species. The sandstone in the quarry at mile 68 can, therefore, be said to be of the same age as the Dunvegan formation along Peace River. Consequently, the sandstone and shale beds that outcrop along the Highway from Fort St. John to mile 108 are either Dunvegan or younger.

Pleistocene

Deposits of glacial material of various types occur along almost the entire route of the Highway from Fort St. John to Fort Nelson. On the higher land the deposits are thin to absent, whereas on the lower slopes, and especially in the valley bottoms, the deposits are thick. Glacial lake clays are found in most of the larger stream valleys and boulder clay having the nature of ground moraine is the characteristic deposit elsewhere.

Bedded clay deposits up to 50 feet thick are found in Beatton, Halfway, Minaker, and Prophet River Valleys. In most instances they are underlain and overlain by till. The underlying till differs from the overlying one in the composition of the contained pebbles. Along the Halfway River, about 3 miles east of Pink Mountain, and along Minaker River north of mile 155, the underlying till contains pebbles of quartzite and sandstone. On a tributary stream flowing into the Minaker from the west a 20-foot gravel deposit underlies the glacial clay. The gravel is composed of well-rounded pebbles of sandstone of various kinds and of chert, limestone, light grey quartzite, and feldspar porphyry. Similar gravel deposits were observed along Prophet River east of Klingzut Mountain. The overlying till in all instances contains a large percentage of pebbles and boulders of igneous and metamorphic rocks, including various types of granite, schist, and gneiss. Along the banks of Prophet River this boulder clay deposit is several hundred feet thick. The lower till appears to have a source different from the overlying one and, as the pebbles and boulders contained in it are similar to the rocks outcropping in the immediate vicinity to the west, it seems reasonable to conclude that the glacier that deposited this material moved down the valleys from that direction. The source of the upper till containing the igneous and metamorphic pebbles and boulders may have been the Precambrian Shield to the northeast.

The character of the surface till varies considerably at different localities. South of Sikanni Chief River granite boulders are present, but are not numerous; north of the river igneous boulders are more numerous; and along Buckinghorse River and other streams farther north they are plentiful.

The major stream valleys are pre-glacial in age. In Prophet River Valley, for example, the present stream follows the old valley very closely, and it is only here and there that it has cut into the old river bank to expose outcroppings of the bedrock. Because of the thick deposit of glacial material in this old drainage channel outcrops along the present stream are few.

STRUCTURE

GENERAL DESCRIPTION

The character of the strata of different ages bears a marked relationship to the topographical and structural divisions. This feature may be illustrated from east to west as follows: (1) strata of Upper Cretaceous age form the largest part of the flat-lying beds of the Plains area, which includes the plateau east of the Highway; (2) strata of Lower Cretaceous age occupy an intermediate, transitional belt of gentle folds and moderate relief; (3) strata of Triassic age form the eastern range of mountains, about 15 miles wide, characterized by broad folds and some thrust faulting; (4) strata of Palaeozoic age form the main mountain range, with a relief slightly higher than the belt of Triassic rocks.

The change in the type of structures between the flat-lying beds of the Plains and the broad folds of the mountains is gradational. The size of the folds as well as the intensity of folding increases from east to west. The belt of Triassic rocks contains large folds and a number of thrust faults with stratigraphic displacements of 1,000 feet or less. A fault of this type underlies Klingzut Mountain where it crosses Sikanni Chief River, and another one crosses the river 5½ miles farther west. Pink Mountain is believed to form part of a thrust faulted block.

Most of the folds within the area mapped show closure, and this feature is interpreted as the result of folding rather than faulting. The gentle folds to the east have dips of from 5 to 10 degrees, but these increase to 50 degrees on the broader, larger folds to the west. The thick sections of resistant Triassic and Bullhead strata may in part be responsible for the type of structures in this area. The mountain building stresses that produced the Rocky Mountains have been transmitted farther from the mountains in this northern area producing folds, whereas in southern Alberta faulting has prevented the transmission of similar stresses for as great a distance from the mountains.

The major anticlinal structures east of the Triassic mountain range, which includes Klingzut Mountain, are described in more detail in the following pages.

PINK MOUNTAIN ANTICLINE

Pink Mountain is an anticlinal structure believed to be bounded on its eastern side by a west-dipping thrust fault. Both limbs have dips averaging from 30 to 60 degrees. Some of the beds along the east limb north of Halfway River are overturned. The crest is broad with gentle dips. The structure has a length of about 30 miles. It was not investigated south of Halfway River, but the topographical expression continues south almost to Cypress Creek. The greatest relief is 4 miles north of Halfway River where it has an elevation of about 5,900 feet.

The surface rocks on the mountain are largely the hard, quartzitic, sandstone strata of the lower Bullhead group. Triassic beds are exposed where creek and river channels have cut into and across the structure.

The highest structural part of the anticline corresponds with that part of the mountain having the greatest relief. The south closure between the high point and Halfway River is about 500 feet

and the north closure at the "Gap", 9.5 miles north, is over 1,000 feet. The structure exposes Upper Triassic strata on Sikanni Chief River, but upper Bullhead strata appear on a creek at the north end of Pink Mountain and 2 miles south of the river at only a slightly higher elevation. This locality marks a saddle in the major structure, and the anticline on Sikanni Chief River has separate closure from that of Pink Mountain.

The thrust fault underlying the structure was observed on Sikanni Chief River and on a creek 2 miles to the south. On Sikanni Chief River the fault dips west about 30 degrees. It is believed to be continuous along the entire east side. Field evidence to support this statement is limited to the two localities cited. The stratigraphic displacement of the fault on Sikanni Chief River is about 1,000 feet, where middle to lower Bullhead strata are thrust onto the uppermost beds of the group. On the creek at the north end of Pink Mountain upper Bullhead strata are thrust onto shales of the Buckinghorse formation. The displacement there is obviously not great, but is probably considerably less than it is in front of the highest part of the structure.

Structures immediately to the east of Pink Mountain have been mapped only along Sikanni Chief River and tributary creeks, where five anticlines in a distance of 4 miles were noted in the Bullhead group and overlying Buckinghorse shales. All of these folds show closure.

POCKETKNIFE ANTICLINE

Pocketknife anticline is the name given to a major structure trending parallel with Klingzut Mountain, west of Minaker River, and crossing Pocketknife Creek about 2 miles above its junction with the Minaker. The anticline on Buckinghorse River may be its southward continuation. Its topographic expression is outlined by Bullhead strata and rocks of Triassic age. The Triassic beds have an exposed width of 1 mile for a distance of 10 miles. South closure is shown by the plunging of Bullhead and Triassic strata immediately north of Pocketknife Creek. North closure is believed to be represented by the occurrence of Buckinghorse shales to the east of Prophet River, along what is considered to be the strike of the Triassic beds farther south. The anticline has a broad crest with dips up to 50 degrees on both limbs. No overturned beds were observed. Sections across the anticline are exposed along five streams flowing into Minaker River from the west. There are no continuous sections of the east limb and, in consequence, it is not known whether a west-dipping thrust is present. On the crest of the fold more than 600 feet of Triassic beds are exposed.

MINAKER RIVER ANTICLINE

Minaker River anticline is a gently dipping fold that crosses Minaker River above and below the mouth of Beaver Creek, and crosses the Highway at about mile 158.5. Dips range from 5 to 10 degrees. This fold is not well outlined, as outcrops in this general area are comparatively scarce except along stream channels. On Minaker River, below the mouth of Beaver Creek, the structure is modified by several smaller folds that were not observed in outcrops along the Highway. The anticline is believed to have been produced by the same forces that formed the higher more pronounced structures to the west. It seems reasonable to expect that this and similar folds will continue to depth and be present in the underlying Triassic and Palaeozoic strata.

BEAR CREEK ANTICLINE

Bear Creek anticline is a small, gentle fold exposed on Bear Creek about 2 miles east of mile 182. Outcrops are in the upper part of the Buckinghorse formation. The extent of the structure is not known, and as outcrops are scarce it will be difficult to map. A few outcrops on the creek above and below the Highway bridge at mile 188 are suggestive of an anticline that may be a continuation of the one on Bear Creek.

ECONOMIC GEOLOGY

OIL AND GAS POSSIBILITIES

The Foothills and Plains areas form a part of the northern end of promising oil territory that lies adjacent to the Rocky Mountains and in which are located oil fields in southern Alberta and the United States. North of Peace River, northwest of Hudson Hope, a number of diamond drill holes were sunk in 1921 and 1922 (Dresser, 1922) by the British Columbia Government, mainly for geological information. In 1940 to 1942, the provincial government drilled the Commotion Creek well (Hume, 1944, pages 50-51) on Pine River to a depth of 6,940 feet without encountering oil or gas. No oil seepages were seen by the writer, but several have been reported. Features that govern the accumulation of oil, such as source beds, reservoir beds, suitable structures, and impervious cover rocks, are, however, known to be represented in places.

Only the uppermost several hundred feet of the Palaeozoic section in the mountains was studied, but the lower part of the Triassic, the Jurassic, and the Lower Cretaceous strata all contain marine beds that could be the source of oil or gas. The presence of reservoir beds with sufficient porosity and permeability is important, but is a factor that is difficult to evaluate without drilling. At erosional unconformities porous horizons are usually widespread and are, therefore, very important, especially on limestone surfaces that have been weathered. Whether or not much porous and permeable beds are present in the Palaeozoic section cannot be stated until it has been examined in more detail.

Medium- to fine-grained sandstone beds are present about 500 feet from the top of the Triassic, Schooler Creek formation. On Mount Withrow two such sandstone beds, 87 and 100 feet thick, are separated by 280 feet of light grey limestone interbedded with calcareous shales and siltstones. The top of the formation is not exposed on this mountain. These sandstone members are possible reservoir beds.

Bullhead strata contain a large number of sandstone beds. Where these outcrop, in the vicinity of Pink Mountain and on Sikanni Chief River, they are indurated and have very little porosity except for a coarse sandstone 46 feet thick that lies 164 feet from the top of the group. The amount of induration of the rocks may, however, decrease away from the mountains. As these beds are known to thin northward to the Minaker River area, it is also probable that they thin to the east. The sands may become finer grained to the east, but their porosity and permeability may be as great or even greater in that direction. These beds are, therefore, possible reservoir rocks.

The presence of structures with closure has been demonstrated by geological mapping in this area. These structures have

not been mapped in detail, but several have been outlined sufficiently to show their extent and type. Before a structure that exposes Triassic strata is drilled more work should be done on the stratigraphy of the underlying Palaeozoic rocks to determine the presence of source beds and reservoir beds in these rocks. A well located on one of the folds in Cretaceous strata should test the sands in the Bullhead group and underlying Mesozoic strata. The accessibility of the area by the Alaska Highway and the presence of various types of folds in beds that contain source material and possible reservoir beds should warrant more detailed geological investigations, followed by test drilling.

Wells Drilled at Fort Nelson Airport

Three wells have been drilled at the Airport for water by the United States Army Engineers. The first well, Fort Nelson No. 1, reached a depth of 521 feet and was wholly in glacial drift. It encountered a pocket of gas and was abandoned. The second well, Fort Nelson No. 2, was drilled to a depth of 1,451 feet. It encountered the base of the drift between 720 and 730 and a flow of gas estimated to be about 150,000 cubic feet at a depth of 1,010 feet in a fine-grained sandstone. A supply of water was obtained in a coarse gravel at the base of the drift and rose to within 250 feet of the top. Seven-inch casing was set at 730 feet, but not cemented. The casing was plugged at 720 feet and perforated between 610 and 690 feet. The well makes some gas, resulting in muddy water. An analysis[1] of a

[1] Analysis by Division of Fuels, Bureau of Mines, Department of Mines and Resources.

sample of the gas is as follows:

	Per cent by volume
Methane	98.41
Ethane	0.18
Propane	Nil
Butanes	Nil
Pentanes	0.10
Carbon dioxide	0.28
Oxygen	0.91
Nitrogen	0.12
Helium	Trace
Total	100

Specific gravity (Air= 1.000) 0.575
Heating value at 760 mm. and 60°F.
B.T.U. per cu. ft.=999

The third well, Fort Nelson No. 3, was drilled only a short distance from No. 2 with the object of utilizing the gas struck in No. 2 well for fuel. It was, however, drilled to a depth of 706 feet and finished off as a water well. Cores were not taken continuously, but the impression obtained from discussions with the driller, Mr. J. K. Hawkins, was that the beds between 485 and 660 feet consist entirely of bedded silts and clays.

The logs of two of these wells are as follows:

Fort Nelson No. 2

Elevation: 1,251 (aneroid); Derrick floor: 1,254
Samples examined by C. O. Hage, December 1943

Feet	
0-160	Missing.
160-180	Glacial till, calcareous; coarse grey sand.
180-200	Coarse grey sand and some glacial till.
200-240	Glacial till containing pebbles of granite, gneiss, sandstone, limestone, etc.
240-300	Sand, coarse, grey.
300-320	Glacial till; pebbles of igneous rocks, limestone, sandstone, pieces of bedded shale.
320-350	As above, but with less till and more sand.
350-430	Glacial till, coarse sand, and fine gravel.
430-450	Sand; pebbles of quartz, quartzite, and granite.
450-470	Sand; pebbles of quartz, granite, and black chert.
470-500	Clay, grey, mixed with sand as above.
500-590	Sand, coarse as above; with numerous chert pebbles and some till or clay.
590-630	Clay or till, brownish grey, mixed with pebbles.
630-720	Sand, coarse; and pebbles of sandstone, quartzite sandstone, black and brown chert, and quartz. Base of glacial deposits between 720-730 feet.
720-780	Shale, dark grey, fissile, non-calcareous.
780-870	Shale, dark grey, fissile; and sandy shale, non-calcareous.
870-880	Missing.
880-960	Shale; dark grey; and sandy shale.
960-970	Sandstone, fine-grained, grey; calcareous cement.
970-990	Shale, dark grey; and sandy shale.
990-1060	Sandstone, fine-grained; minor amount of dark grey shale.
1060-1100	Shale, dark grey; and sandy shale.
1100-1150	Sandstone, fine-grained; sandy shale and dark grey shale.
1150-1300	Shale, dark grey, mixed with sand.
1300-1360	Shale, dark grey; and sandy shale.
1360-1370	Missing.
1370-1440	Shale, dark grey, non-calcareous.
1440-1451	No samples.

Fort Nelson No. 3

Elevation: 1,251 (aneroid); Derrick floor: 1,254
Cuttings and cores examined by C. O. Hage, September 1943

Examined from Cuttings

Feet	
280-290	Sand, coarse-grained.
290-310	Glacial till and gravel.
310-320	Sand, coarse; pebbles of quartz, quartzite, granite, and chert.
320-360	Glacial till, with some sand.
360-380	Sand, coarse, mixed with some clay.
380-400	Sand, coarse; some pebbles up to $\frac{1}{2}$ inch.
400-410	Gravel; fine and coarse sand; pebbles of sandstone, quartzite, granite, and chert.
410-430	Clay, dark grey, sandy.
430-460	Gravel; fine and coarse sand; pebbles of sandstone, quartzite, granite, and chert.
460-485	Missing.

Examined from Cores

485-493	Clay, light grey, bedded and semi-bedded; lower 6 inches silt.
493-505	Clay, light grey, bedded.
505-508	Clay, light grey, bedded; silty clay.
508-515	Missing.
515-522	Clay, light grey, silty; thought to be bedded.
522-606	Missing.
606-614	Clay, light grey, silty.
614-619	Clay, light grey, silty in part.
619-652	Missing.
652-660	Clay, medium grey, silty.
660-689	Missing; gravel reported at 675 feet.
689-694	Waterworn pebbles of black chert, quartzite, diabase, and finely crystalline granite.
694-706	Missing.

Casing was set at 682 feet. Hole filled with sand to 677 feet by swabbing operations. Water rose to within 272 feet of the top.

Well Drilled at Mile 188

A well drilled for water by the Public Roads Administration for their construction camp at mile 188 to a depth of 410 feet encountered a small flow of gas at 190 feet. The gas burned with a flare about 4 feet long as it escaped from a 1-inch pipe. It was under very little pressure. The well was reported to have drilled dark grey shale except for 50 feet of glacial drift at the top.

COAL

On Sikanni Chief River the Bullhead group contains at least 10 coal seams, none of which is over a foot thick. The seams are more common to the upper part of the group, which in this respect is similar to the Gething formation of the Peace River area. The coal is good grade bituminous, but the seams where observed are too thin to be worth mining.

At the base of the Bullhead group on Pink Mountain, immediately north of Halfway River and close to the crest of the anticline, is a seam of good grade coal over 5 feet thick. On the east side of the mountain this seam has been burnt out. Along the west side, however, pieces of float coal were observed for 3½ miles north of Halfway River. Any prospecting for this seam should be done on Pink Mountain adjacent to Halfway River.

Coal Analyses by Bureau of Mines, Ottawa

Sample No. 1: Base of Bullhead group Pink Mountain. It may not be wholly representative of the deposit, as the sample was taken close to the surface.

	As received	Dry
	Per cent	Per cent
Moisture	5.6	
Ash	4.4	4.6
Volatile matter	12.5	13.3
Fixed carbon (by difference)	77.5	82.1
Sulphur	6.0	6.3
B. T. U. per lb.	12,670	13,420
	Non-coking	

Softening temperature of ash 2,600°F.
Fuel ratio 6.20

Sample No. 2: Close to top of Bullhead group, north end of Pink Mountain.

	As received	Dry
	Per cent	Per cent
Moisture	0.6	
Ash	13.4	13.5
Volatile matter	25.9	26.1
Fixed carbon (by difference)	60.1	60.4
Sulphur	3.8	3.9
B. T. U. per lb.	13,270	13,350
Coking properties good		

Softening temperature of ash above 2,850°F.
Fuel ration 2.30

BOG IRON

Along Beatton River west of the Highway are several deposits of bog iron. One of these is 2 miles upstream from the Beatton River bridge and one-quarter mile south of the river. Another is 5 miles above the bridge on the north side of the river and on the pack trail to Lily Lake. Both deposits cover areas of several hundred square feet. The depth of the deposits was not determined except to note that it is more than 10 inches. No glacial material was found on top of the iron deposits and they can, therefore, be considered as of post-glacial age. They are believed to have been precipitated from spring waters issuing from shales of the Fort St. John group.

The following are analyses[1] of samples from the two

[1] Analyses by Section of Mineralogy, Geological Survey, Canada.

deposits:

	2 miles west of Beatton R. bridge	5 miles west of Beatton R. bridge
Fe_2O_3	79.70	78.10
MnO	Trace	None
H_2O	15.11	19.38
Insol.	3.50	Not weighed
Total	98.31	97.48

The difference between the obtained totals and 100 per cent is made up of a small quantity of organic matter, probably traces of lime and magnesium, and a little carbon dioxide.

CLAY

Beds of glacial lake clays are found along Halfway, Beatton, Minaker, and Prophet Rivers. The deposit on Halfway River is 3 miles east of Pink Mountain, is 5.0 feet thick, and is varved in beds ranging from 3 to 24 inches in thickness. No samples were analysed, but the clay should be suitable for making bricks.

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