SURFACE GEOLOGY
of the
PEEL PLATEAU AREA

Imperial Oil Limited
1961

7-46-37

SURFACE GEOLOGY OF THE PEEL PLATEAU AREA

Imperial Oil Limited

1961

TABLE OF CONTENTS

ENCLOSURES IN POCKET

LOCATION MAP OF OUTCROP SECTIONS

GEOLOGICAL CORRELATION SECTION

LOGS OF OUTCROP SECTIONS -- (19)

ISOPACH: TOP OF HUME TO TOP OF CAMBRIAN-PRECAMBRIAN UNIT

ISOPACH: BASE OF CRETACEOUS TO TOP OF HUME

SURFACE GEOLOGY OF THE PEEL PLATEAU AREA

INTRODUCTION

PRESENT STUDY

Area Covered

The Peel Plateau area is located between Latitudes 64°30' and 66°00' North. It extends along the Mackenzie Mountains for 185 miles from the mouth of the Mountain River to the Wind River in the west. It includes the northern end of the Mackenzie Plain, the Peel Plateau, the first few ranges of the Mackenzie Mountains to the south, and the Bonnet Plume Basin. Thus the area covered in the 1961 field season comprises some 12,000 square miles.

Accessibility

Access into this remote region is difficult except by float equipped aircraft operating from Norman Wells or Inuvik in the Northwest Territories and Dawson City in the Yukon Territory.

Norman Wells and Inuvik can be reached by air throughout the year and during the summer months of June to October by water as well. The Mackenzie River is the main artery into this remote region. Equipment can be sent from Edmonton by rail to Grimshaw or to Waterways in Alberta. From Grimshaw, the material is then trucked 380 miles north to Hay River on the Great Slave Lake. Large barges travel the Mackenzie River as far north as the Arctic Coast. From Waterways, equipment goes

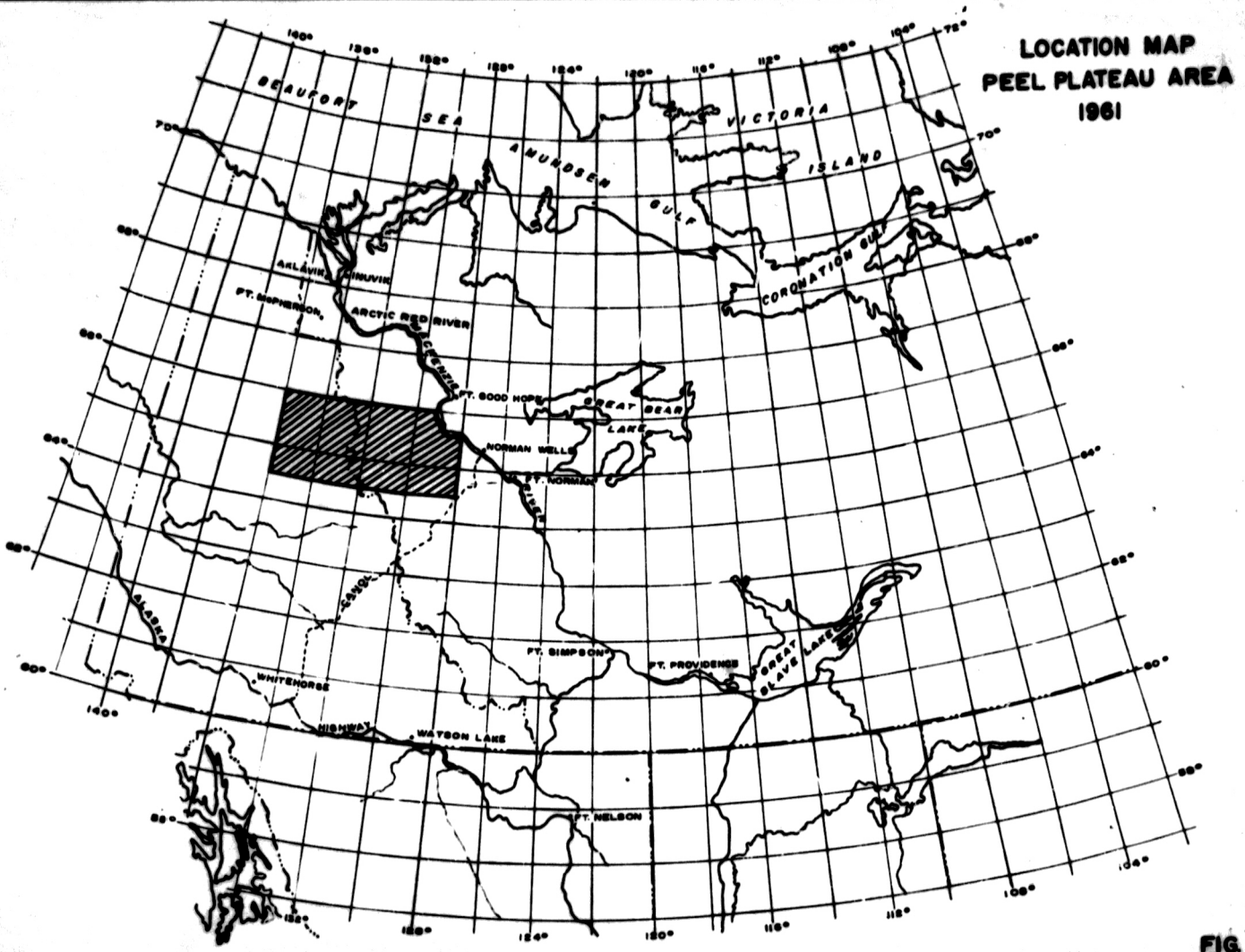

LOCATION MAP
PEEL PLATEAU AREA
1961
BEAUFORT SEA
AMUNDSEN GULF
VICTORIA ISLAND
CORONATION GULF
ARCTIC RED RIVER
FT. GOOD HOPE
GREAT BEAR LAKE
NORMAN WELLS
FT. NORMAN
MACKENZIE
YUKON
ALASKA
WHITEHORSE
HIGHWAY
WATSON LAKE
FT. SIMPSON
FT. PROVIDENCE
GREAT SLAVE LAKE
FT. NELSON

FIG. 1.

via the Athabasca and Slave River waterways to Great Slave Lake.

Equipment and supplies can also be transported by truck, along the Alaska Highway, to Dawson City in the Yukon and from Dawson City by float-equipped aircraft.

Heavy equipment for surveys and/or drilling could be transported in the winter months by cat train from Dawson City on the road which was built to supply DEW line operations farther north. Barges along the Mackenzie River could also transport heavy drilling equipment which could be stored until freeze-up. Cat trains could complete the haul to the desired location.

Purpose of Study

The purpose of the 1961 field work was to provide additional stratigraphic information with which to obtain an improved geological understanding of the Norman Wells area where Imperial Oil Limited conducted geological field work in 1959 for the intent of evaluating its land holdings. The Devonian and Silurian systems were studied most extensively by means of measured stratigraphic sections. A few pre-Devonian and Cretaceous sections were measured as well.

Method of Study

Crew. --An eight man geological crew spent 102 days in the field between May 16th and August 25th, 1961. Support aircraft included a Hiller HE helicopter, a Beaver fixed-wing and occasionally the Company's Otter and DC-3. The crew consisted of the following personnel:

Imperial Oil Limited	R. A. Meneley	Party Chief
	M. Mazurkewich	Assistant Party Chief
	D. C. Waylett	Senior Geologist
	K. J. Roy	Senior Geologist
	H. R. Balkwill	Senior Geologist
	R. B. Vaughan	Senior Geologist
	S. W. Montgomery	Summer Student
	F. L. Wynne	Summer Student
	Eric Steadman	Cook
Okanagan Helicopters Limited	E. Phillips	Helicopter Pilot
	S. Vriesinga	Engineer
Gateway Aviation Limited	S. Moffat	Beaver Pilot (June 15 - August 25)
	D. Hanson	Mechanic

Base Camps. --The project area was worked from four base camps. The first was located at Norman Wells, the second at the mouth of the Mountain River, the third at Matheson Lake and the fourth at Margaret Lake. The crew, equipment and part of the supplies were flown to Norman Wells airport from Dawson Creek in two trips in the DC-3. The crew was housed and fed for the first part of the season in the Imperial Oil quarters at Norman Wells. A combination of a ready gas supply, good communications and comfortable living quarters made this an ideal base for operations. The bulk of the equipment and non-perishable supplies for the balance of the season were barged from Fort Nelson to Norman Wells by Mr. Dick Turner of South Nahanni. A portion of the non-perishables and enough aviation gas were barged for operations at the Mountain River base camp. For the base camp at Matheson Lake, supplies and aviation gas were barged to the mouth of the Mountain River and transported from there by Otter.

For the final base camp, aviation fuel and supplies were barged down the Mackenzie and then up the Peel river to as far as water depth would allow. From the Peel river, the Otter transported the gas and supplies to Margaret Lake. Sufficient fresh food to last until the end of the season was flown to Norman Wells with the DC-3 and was stored under refrigeration. Weekly supply trips by Beaver were then made between the base camps and Norman Wells.

Communications. --Communications between the field crew and the Dawson Creek District Office were maintained by a Spilsbury & Tindall TRT-300 transistorized Radiotelephone powered by a 12-volt heavy duty wet battery.

From base camps, very satisfactory communications were maintained through the Department of Transport telegraph services and the Imperial Oil station at Norman Wells. At lengths up to 5 days complete radio black-outs occurred during the course of the field season.

Ground-to-air communications were maintained with all aircraft involved in the operations. The high quality of ground-to-air communications added much to the safety of the operation, and greatly facilitated the use of the helicopter and the fixed wing aircraft as a team.

Base camp to fly camp communication schedules were maintained twice daily. The fly camp radios were Spilsbury and Tindall PRT-20 transistorized radios powered by 90-volt "B" batteries and six "D" size flashlight batteries. These light, small, compact radios

proved more than satisfactory as many hours of helicopter time was saved in not having to check fly camps daily.

Weather. --Generally good weather prevailed during June and July, the two best months of the season. The long daylight hours allowed some time to be made up for any lost due to showers or low cloud. Most "weather days" occurred in the latter part of August.

Out of 102 days in the field, 21 days were lost due to weather. This represents about 21% of the total time in the field and indicates a rather good season for this part of the country.

Operations. --The geological crew was divided into three sub-crews of two men each consisting of a senior geologist and a student assistant. These sub-crews were engaged solely with measuring stratigraphic sections. They operated mainly from fly camps and returned to base camp after each section was completed to write up the field notes and plot a log of the outcrop section. The fly camps varied in length from five to fifteen days -- averaging eight days.

A variety of measuring techniques were used, the choice depending on the dip and the type of exposure of the section. Plane table surveying was used to tie-in various gently dipping outcrops along creek beds and to measure long covered intervals. Tape and brunton measurements were made along more steeply dipping exposures in creek beds and along ridge tops, while the five-foot stick was used to measure steep cliffs.

A light rubber dingy was a valuable asset in measuring

sections along streams. Both the Snake River and Imperial sections were traversed in this manner. Automatically inflating life jackets were worn on such occasions.

A consistent sample interval of 10 feet was maintained. Ideally, one rock chip was taken from each five foot interval. Lithologic breaks within the 10 foot interval were noted in the field descriptions. In Pre-Devonian sections the sample interval was increased to 50 feet. The exposure of sections was generally good, ranging from mostly excellent in the Mackenzie Mountains to poor in the Peel Plateau. Stratigraphic reconnaissance was done by the Party Chief using a helicopter. Later, after the Beaver fixed-wing joined the party reconnaissance was also carried out by the Assistant Party Chief and to a lesser extent by the other senior geologists.

The helicopter was unserviceable for only one day during the summer while the Beaver was serviceable at all times during its stay with the crew. Flying hours for the helicopter totalled 357 hours for the season and approximately 130 hours for the Beaver.

PREVIOUS INVESTIGATIONS

Oil was discovered at Norman Wells in 1920 and this aroused geological interest in the Mackenzie River Peel Plateau Area. The Geological Survey Memoir 108, "The Mackenzie River Basin", by Camsell and Malcolm summarizes information as then known. Further work in the immediate years following the oil discovery was conducted by Kindle, Bosworth, Williams, Dowling and Hume. The information obtained from this work is published in the Geological Survey Summary Reports.

At the outbreak of World War II, interest was once again renewed. In 1942, the wartime Canol Project was initiated, a part of which was an extensive geological investigation of the Norman Wells and adjacent areas. This was carried out under the direction of Dr. T. A. Link with the co-operation of Imperial Oil Ltd. and the Canadian and United States governments. The several reports of the Canol geologists are available and pertinent publications are listed in the bibliography. In Geological Survey of Canada Memoir No. 273, Hume (1954) has compiled the results of a study of the literature into a single volume. A report on the stratigraphy and depositional tectonics of the general region by L. J. Martin (1959) makes an excellent summary of the literature dealing with the geology of the area.

In recent years, many oil companies have undertaken studies along the whole length of the Mackenzie Mountains.

STRATIGRAPHY

General Remarks

Sediments ranging in age from Precambrian to Quaternary make up the estimated 40,000 feet of sedimentary section which is found in the Peel Plateau Area. The stratigraphic column is by no means complete, erosion and non-deposition have created great gaps in the stratigraphic section.

Table I gives a summary of the stratigraphic terminology as used in this area and Norman Wells.

The thicknesses and descriptions of the measured sections are recorded on strip logs which are enclosed in this report. Section locations are marked on the accompanying location map; also indicated is the line of projected geological correlation section.

Proterozoic

Proterozoic sediments outcrop throughout the Mackenzie Mountains and underlie the disturbed belt and Interior plains north of the Mackenzie Mountains as far as the Arctic Coast. Crystalline and high-grade metamorphic rocks are known to outcrop along the Hornaday River (G.S.C. Map 18 - 1960) and on the Yukon High in the southwest. Neither of these localities were visited.

Rocks of Proterozoic age were not examined in any detail during the 1961 field season. In general, the lithology of the series appears similar to that described at Mt. Cap in the Wrigley area. The Proterozoic is easily recognized in the field

TABLE I

TABLE OF FORMATIONS

	SYSTEM	FORMATION or GROUP		LITHOLOGY
CENOZOIC	Quaternary			Soil, till, alluvium
	Tertiary			Poorly consolidated sediments and lignite.
MESOZOIC	Cretaceous	Little Bear		Massive sandstone.
		Slater River		Shale, some siltstone and sandstone.
		Sans Sault		Sandstone, conglomerate and shale.
PALAEOZOIC	Upper Devonian	Imperial		Greenish siltstone, sandstone and shale.
	Middle Devonian	Canol		Dark grey siliceous shale.
		Kee Scarp		Bioclastic limestone.
		Hare Indian		Dark grey, bituminous, concretionary shale.
		Hume		Massive microcrystalline and bioclastic limestone.
	Lower Devonian	Bear Rock		Microcrystalline, limestone and dolomite, breccia.
	Silurian & Ordovician	Ronning	Mt. Kindle	Bioclastic and dark grey dolomite
			Franklin Mtn.	Light grey microcrystalline and cryptocrystalline dolomite, some limestone.
	Middle Cambrian	Saline River		Gypsiferous shale.
		Mt. Cap		Dark petroliferous shale.
	Lower Cambrian	Mt. Clark		Buff and pink orthoquartzite
PROTEROZOIC	Precambrian			Variable sandstone, siltstone, dolomite, limestone conglomerate. grey, green, red.

or on air photos by its dark weathering colors which contrast with the light weathering Palaeozoic carbonates. The lithology is quite variable and includes siltstones, silty shales, silty dolomite and light grey weathering siliceous dolomites which appear similar to the Palaeozoic carbonates. The sequence is also characterized by numerous diorite sills and dikes. The sills appear as 50 to 200 feet thick massive beds which weather dark greenish brown and rusty brown and stand out as prominent cliffs; in contrast, the dikes are generally thinner, and dark rusty brown on exposed surfaces.

In the vicinity of Snake River a section of massive dark brown weathering conglomerate is present which appears to be younger than the Proterozoic rocks already described although the exact relationship was not determined. An angular unconformity separates the conglomerate from the overlying carbonates. The conglomerate consisted of pebbles and boulders up to one foot in diameter of diorite, quartzite and argillite in a matrix of mudstone. No bedding is visible in small outcrops but 20 to 50 feet thick massive beds can be seen in cliff-like outcrops.

About 2,000 feet of massive dark maroon conglomerate was seen in the Illtyd Mountains near the Wind River, but was not examined.

Cambrian

There is very little detailed knowledge regarding the Cambrian rocks and considerably more work must be done in dating the section. The Cambrian was not studied in great detail within the project area.

The Cambrian strata consists of clastics, probably equivalent to the red quartzites and variegated shales of the Katherine and Macdougal groups. The section appears to be much thicker at the Norman Wells and Mt. Cap areas. It is estimated that several thousand feet of Cambrian clastics are present in the Snake River - Arctic Red River area. Martin (1959) described, from the upper Snake River, an undetermined thickness of sandstones, carbonates, and evaporites similar to the Cambrian of the Norman Wells area. Other Cambrian outcrops were described by Canol geologists from the Mackenzie Mountain front and by Bell (1959) from the Franklin Mountains south and east of the report area.

A generalized breakdown for the Cambrian is given in the Table of Formations.

Ordovician and Silurian

There is no lithologic break at the systemic boundary between Ordovician and Silurian, and it becomes exceedingly difficult if not impossible to separate the two systems; they are therefore mapped as the Ronning formation east of the Hume River section and in the Devonian and Older Carbonate Unit west of the Hume River section. (~~Ref.~~ #9).

In the Norman Wells area the Ronning formation consists of massive, well bedded, cliff forming grey dolomite, weathers grey and buff, mainly fine to microcrystalline with some quartz silt, and some silicified fossil zones. An abrupt morphological break occurs at the base of the Ronning. The upper surface of the Ronning is the

pre-Devonian erosion surface. The Ronning in the eastern part of the area ranges in thickness from 870 feet at Two Bit Creek (4) to 2500 feet at Black Rock Lake (6).

In the western part of the area the Ordovician-Silurian is generally a carbonate section with the lower part dark grey dolomites, dolomitic limestone and limestones with abundant black chert in places. The upper part is similar but is more bioclastic. The section at Pack Rat Creek (17) becomes increasingly more clastic as more shale and argillite interbeds appear.

Stelck (1947) described an Ordovician sequence of black shales, bedded cherts and argillites exposed in the lower canyon of the Peel River. Martin (1959) reports that the Silurian in the southern Richardson Mountains consists mainly of black graptolite shales and bedded black cherts.

Throughout the project area the lower part of the Ronning formation and the Devonian and older Carbonate unit may include Cambrian beds.

Devonian

Miscorrelation of the Devonian stratigraphic units by early workers in the Norman Wells area gave rise to a great deal of confusion. Bassett (1960) redefined many of the formations in the Lower, Middle, and Upper Devonian in the Norman Wells area. He renamed the lower Ramparts limestone of Hume the Hume formation, and called the Fort Creek shale of Hume the Canol formation. His interpretation is presented in the following table:

UPPER DEVONIAN		Imperial Formation
MIDDLE DEVONIAN	FORT CREEK GROUP	Canol Formation
		Kee Scarp Formation
		Hare Indian Formation
		Hume Formation
LOWER DEVONIAN		Bear Rock Formation
SILURIAN		

Bear Rock Formation. --In the Norman Wells region, the Bear Rock Formation is typically a breccia of dolomite blocks in a matrix of dolomite and/or limestone. The fragments range from gravel size to angular blocks several feet across. The breccia often has considerable vuggy porosity, the vugs at times reaching cavernous size. Minor amounts of gypsum and anhydrite are present in some outcrops. In places there is considerable bituminous material in the vugs and the rocks often emit a strong petroliferous odor.

The Bear Rock Formation was deposited on the eroded surface of the Ronning Formation. In the Norman Wells area, the contact is sharp and channeling is evident in some sections. The dolomite breccia is evident in some sections. The dolomite breccia facies does not continue west of the Hume River section (9); however, the stratigraphic interval corresponding to the Bear Rock Formation is

occupied by bedded dolomite described by McKinnon (1944) on the Arctic Red River as, "light-gray, dense. and finely crystalline, approximately 500 feet thick." The correlation with the Bear Rock is based entirely on the stratigraphic position of this unit. Martin (1959) described 1500 feet of non-fossiliferous, fine grained dolomite occupying the same stratigraphic interval on the Snake River and treated it as a Bear Rock equivalent. Throughout the area west of Hume River, the Bear Rock and Hume formations cannot be distinguished from the Ordovician-Silurian Ronning formation so they are included in the Devonian and Older Carbonate Unit.

Hume Formation. --The Hume Formation, as defined by Bassett (1960) is an easily correlated unit in the Norman Wells area. West of Arctic Red River, the Hume thickens rapidly and a facies change makes the correlation difficult. The Hume is included in the Devonian and older Carbonate Unit west of Arctic Red River.

In the Norman Wells area the Hume has a distinctive morphologic breakdown. The upper unit is a very massive and resistant ridge-forming limestone. The lower part consists of interbedded argillaceous limestone and shales, less resistant and more recessive weathering. In certain sections the base is again thick bedded and grades into the bedded upper part of the Bear Rock. Variations in thickness of the Hume are very gradual.

In the Snake River area, the Hume is a grey to dark grey limestone, somewhat bioclastic, argillaceous, with interbedded dark grey and black of the shale. The shale content increases towards

the base of the section. As much as 2500 feet of Hume equivalent is probably present in this area.

Hare Indian Formation. --The Hare Indian and Kee Scarp formations are restricted mainly to the area around Norman Wells. Bassett (1960) defines the Hare Indian as the shale sequence above the Hume formation and below the Kee Scarp formation where it is present. Where the Kee Scarp is absent the Hare Indian and Canol formations combine to form the Fort Creek Group. The lower contact is abrupt but conformable, while the upper contact is gradational through a sequence of interbedded bituminous limestone and calcareous shale below the Kee Scarp.

The Hare Indian is absent west of approximately the Hume River section (9).

Kee Scarp Formation. --From an economic standpoint, the Kee Scarp is the most interesting formation in the Norman Wells area. since the oil at Norman Wells is produced from it. The formation gets its name from the Kee Scarp where it outcrops a few miles east of Norman Wells in the Discovery Range.

Lithologically, the formation is a reef limestone, consisting of bioclastic fragments derived from corals and stromatoporoids with a fine argillaceous limestone matrix.

Hume (1954) lists and summarizes thicknesses and descriptions of many of the outcrops and some well sections studied by Canol geologists. The Kee Scarp was only examined at the Ramparts and at the Imperial Anticline. The Kee Scarp is not present at the Hume River section (9) or west of the same section.

Canol Formation. -- The term, 'Canol Formation' was proposed by Bassett (1960) for the black shale unit which directly overlies the Kee Scarp formation except where the latter is most thickly developed. In areas where the Kee Scarp is not present, the Canol formation overlies the Hare Indian shale with which the contact is more or less gradational, and often it is difficult to pick the contact. The Canol is generally dark grey, siliceous, bituminous, blocky and contains some large calcareous concretions.

This formation is of a widespread extent, and Bassett (1960) mentions that it can be recognized as far south as the Nahanni area. It has been traced northward to about Latitude 68° North and is probably present throughout the project area.

The Canol Formation is arbitrarily placed at the top of the Middle Devonian Series.

The Canol formation varies in thickness in the Norman Wells area but is generally in the order of 200 feet. West of the Snake River the Canol is probably in the order of 1300 feet thick.

Upper Devonian

Imperial Formation. --The Imperial Formation of Upper Devonian age has its type section on the northern flank of the Imperial Mountain range on the Imperial River, 10 miles southwest of its junction with the Carcajou River. The formation here is about 2,000 feet thick and consists of a clastic sequence of sandstone, siltstone and shale, with an increasing gradation of grain size from the bottom up. The

rocks usually show a greenish coloration in the sands and silts and medium grey shales. Both marine fossils and carbonaceous plant material have been found in this formation.

The Fort Creek - Imperial contact west of the Charlie Creek section (7) is probably conformable and difficult to pick, therefore the Imperial Formation in this area includes shales of the Fort Creek Group. The upper contact with the lower Cretaceous sandstone is generally slightly unconformable.

Cretaceous

The Cretaceous has the greatest surface distribution of any system in the project area. Cretaceous is represented both by Lower and Upper Cretaceous marine and non-marine sediments with the Lower Cretaceous occupying a greater thickness of the section. A major unconformity exists at the base.

The Cretaceous system of the Peel Plateau area consists of three units; a basal sand or conglomerate, a thick shale with some siltstone and sandstone beds and a thick section of massive sandstones. These were named by McKinnon (1944) as the A, B, and C units, respectively.

Martin (1959) suggested a possible correlation with the named formations in the Norman Wells area, as follows: The "A" unit is equivalent to the Sans Sault Group, which thins from Martin's estimated 2,000 feet at Mountain River to less than 500 feet west of Arctic Red River; the "B" unit is equivalent to the Slater River Formation, which has the same lithologic character; finally, the "C" unit is equivalent to the Little Bear Formation.

In the Snake River Area, Sans Sault is about 700 feet thick; the basal sandstone and conglomerate about 60 feet thick. Above it is a series of interbedded shales, siltstones and sandstones becoming essentially a sandstone in the upper part. The middle shale or Slater River formation is composed of dark grey, thin bedded, soft shale with occasional siltstone, sandstone and ironstone beds and is about 1200-1400 feet thick. The Little Bear formation is essentially a sandstone. The total thickness of this unit is unknown, but thicknesses of approximately 250 feet have been estimated for erosional remnants in the area.

Tertiary

Tertiary sediments in excess of 2,000 feet are present in the Bonnet Plume Basin. The beds consist of loosely consolidated conglomerates, gravels, cross-bedded sandstones and shales with some lignite beds. These sediments are probably of a continental origin. The beds lie with high angular unconformity, on Ordovician-Silurian beds and earlier in the Bonnet Plume Basin.

The basal conglomerates probably vary in thickness filling the irregularities in the Pre-Tertiary deposit surface.

Quaternary

The greater part of the low areas east of the Richardson Mountains is covered by a considerable thickness of glacial till. The large-scale glacial grooves observed on the air photographs indicate the direction of advance of the continental ice sheet into

the Peel Plateau Area.

In the mountains, Quaternary deposits occur as rock pediments along fault scarps and steep folds of the mountain front, also as alluvial fans where rivers issue from the mountains, and as valley alluvian along braided stream flats.

STRUCTURAL GEOLOGY

The project area includes parts of six physiographic divisions: the Mackenzie Plain, the Peel Plateau, the Mackenzie Mountains, the Bonnett Plume Basin, the Interior Plains, and the Wernecke Mountains as defined by Bostock (1948).

Peel Plateau Basin

The Peel Plateau Basin is a large, triangular, topographic terrace located at the intersection of the Richardson and Mackenzie Mountains. Structurally and topographically, there is no clear-cut boundary between the Peel Plateau Basin and the Interior Plains.

The combination of north-south and east-west structural deformation (Mackenzie Mountains - Richardson Knorr mountain trend) has produced a number of northwest trending arcuate anticlinal structures.

Mackenzie Mountains

The Mackenzie Mountains are characterized by broad, gentle-crested anticlines which parallel the westerly trend of the mountain front. Topographically, this part of the Mackenzie Mountains is designated by Bostock as the Canyon Ranges.

Folding, rather than faulting, is most common in the Canyon Ranges and in these very broad folds and resulting high plateau areas, early Paleozoic rocks are well exposed in several deeply incised river canyons.

The dominance of northwesterly-trending faults west of 132° indicates the emergence at the mountain front of the main structural

trends within the Backbone Ranges as distinguished from the more gently folded Canyon Ranges.

Wernecke Mountains

The Wernecke Mountains, the northwestern segment of the Selwyn Mountains, lie immediately south of Beonnet Plume Basin. There is no clear-cut boundary between the Wernecke Mountains and the Mackenzie Mountains to the east. In this area, the dominant structure consists of northwesterly-trending fault blocks, with the dip of the beds mainly to the southwest. To the west are the folded Ogilvie Mountains.

The Mackenzie Plains

The Mackenzie Plain is an elongate structural basin, about 30 miles wide, morphologically, it is an area of relatively low elevation and relief. Several anticlines are superimposed on this synclinal basin; the largest of these anticlines forms the Imperial Mountains where erosion has exposed some older Paleozoic rocks. The remainder of the plain is underlain by Cretaceous and some Quaternary sediments. To the north the Mackenzie Plain broadens and joins the Interior Plains area.

BIBLIOGRAPHY

BASSETT, H. G., (1960) Devonian Stratigraphy, Central Mackenzie River Region, N.W.T.; Shell Oil Company of Canada Ltd.

BATH, G. D., (1944) Final Geological Report on "The Mackenzie River Camsell Bend to Fort Norman", N.W.T.; Imperial Oil Ltd., Canol Project, Assignment No. 34

BELL, W. A., (1959) Stratigraphy and Sedimentation of Middle Ordovician and Older Sediments in the Wrigley-Fort Norman Area, Mackenzie District, N.W.T., C.I.M., Bulletin, January, 1959.

BOSTOCK, H. S. (1948) Physiography of the Canadian Cordillera, with special reference to the area north of the fifty-fifth parallel; Geol. Surv. Canada, Memoir 247.

DECKER, C. E., WARREN, P. S., and STELCK, C. R. (1947) Ordovician and Silurian rocks in Yukon Territory, Northwestern Canada; Am. Assoc. Petroleum Geologists Bull., Vol. 31.

HUME, G. S., (1954) The Lower Mackenzie River Area, Northwest Territories and Yukon; Geol. Surv. Canada, Memoir 273.

McKINNON, F. A., (1944) Final Geological Report on Ramparts River Area; Imperial Oil Ltd., Canol Project; Assignment No. 16

McKINNON, F. A., (1944) Final Geological Report on Arctic Red River Area, N.W.T., Imperial Oil Ltd., Canol Project, Assignment No. 22

MARTIN, L. J., (1959) Stratigraphy and Depositional Tectonics of north Yukon-Lower Mackenzie area, Canada; Am. Assoc. Pet. Geologists Bull., Vol. 43, pp. 2399 - 2455.

STELCK, C. R. (1943) Upper Peel River Area, Yukon; Imperial Oil Ltd., Canol Project; Assignment No. 23

STEWART, J. S., (1945) Recent Exploratory Deep Well Drilling in Mackenzie River Valley, Northwest Territories; Geol. Survey Canada, Paper 45-29.

LOG OF OUTCROP SECTION

STATION NO. 2

LITTLE KEELE RIVER

LOCATION: LSD. SEC. TWP. RGE. W. M.
UNIT ZONE N.T.S.
SEC. F-52 LAT 64°50' LONG. 128°00'

Description of location: Section measured along small creeks on southwest limits on syncline on either side of divide between Little Keele and Mountain Rivers.

ELEVATION MEASURED June, 1961
METHOD Tape and Brunton

FORMATIONS

DEVONIAN	2110'+
Imperial Formation	530'+
FORT CREEK GROUP	650'
Hume Formation	380'
Bear Rock Formation	390'
SILURIAN - ORDOVICIAN	1705'
Ronning Formation	1705'
CAMBRIAN - PRECAMBRIAN	1655'+

TO ACCOMPANY REPORT

Surface Geology of the Peel Plateau Area.

BY: Imperial Oil Limited

DATE: 1961

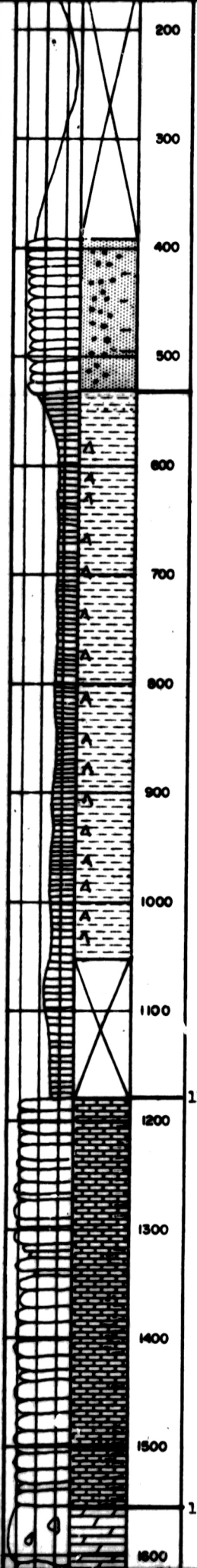
LEGEND

Coal | Salt | Anhydrite | Dolomite | Limestone | Massive Chert | Conglomerate | Sandstone | Siltstone | Shale

IMPERIAL OIL LIMITED EXPLORATION DEPARTMENT PEACE RIVER DISTRICT

Res.	Lith.	Footage	Description
		0	0' DEVONIAN Imperial Formation
		100	Siltstone grading to sandstone, light to dark green grey, weathers light to dark grey, rusty in part, slabby bedding, argillaceous, grades to siltstone towards base.
		200	
		300	
		400	

1 of



Interbedded siltstone and shale, mainly shale.

530' — FORT CREEK GROUP

Shale, black, grey and yellowish weathering, fissile to platy, siliceous, some scattered concretions.

Concealed.

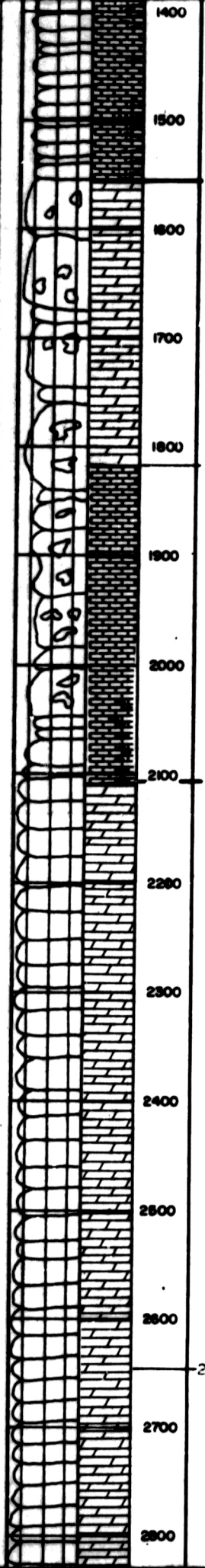
1180' — Hume Formation

Limestone, microcrystalline, some bioclastic, dark grey brown to brown-black, weathers yellow buff, slabby bedding, fractured at the top, some large corals, fetid odor, fossiliferous, corals brachs and trilobites.

1560' — Bear Rock Formation

Dolomite, light to dark grey brown, weathers grey to buff, breccia, complete size range, sub-rounded fragments, some vuggy and intercrystalline porosity, massive bedding.

2 of



1560' — Bear Rock Formation

Dolomite, light to dark grey brown, weathers grey to buff, breccia, complete size range, sub-rounded fragments, some vuggy and intercrystalline porosity, massive bedding.

1820' —

Limestone, buff to dark grey, weathers yellow-orange to green grey, breccia, complete size range, microcrystalline, fractures filled with calcite, massive.

2110' — SILURIAN/ORDOVICIAN
Ronning Formation

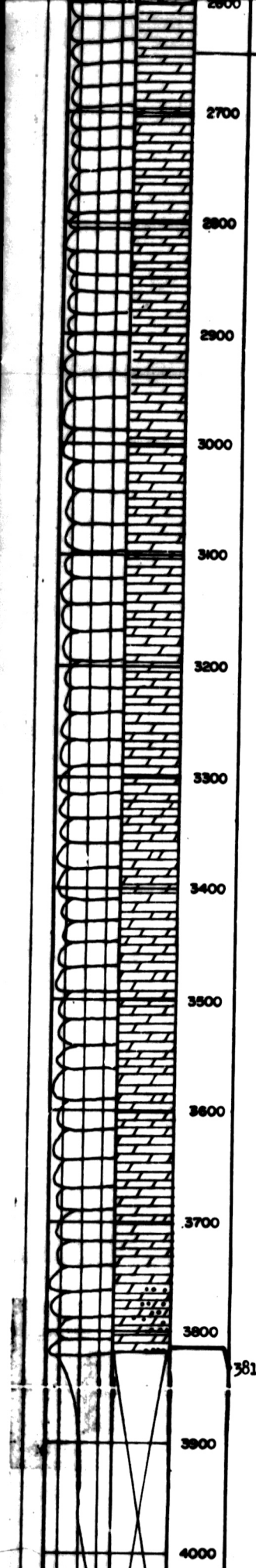
Dolomite, various shades of grey and dark brown, weathers buff to grey, fine to microcrystalline, slabby to massive bedding, traces siliceous cement, fossiliferous in part.

30

Maybe faulted?

2650' —

Dolomite, medium to light brown and medium to light grey, buff to grey weathering, coarse to microcrystalline, slabby to blocky bedding, traces quartz sand grains, becoming more sandy towards the base.



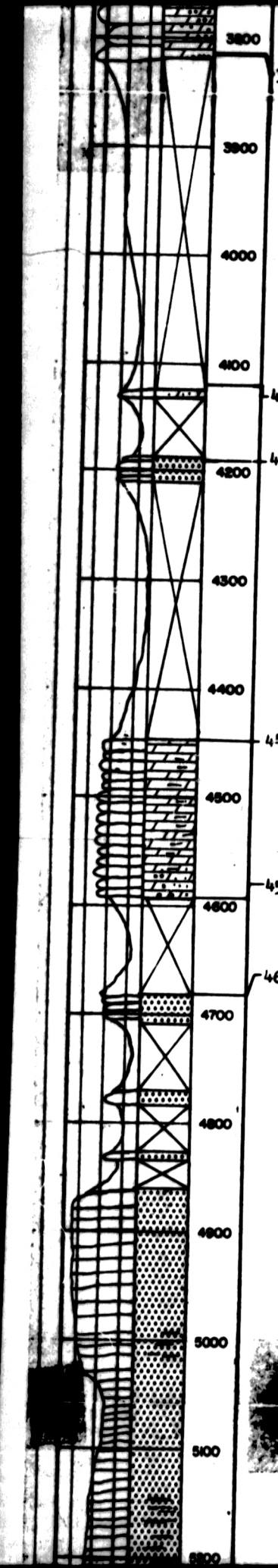
2650'

Dolomite, medium to light brown and medium to light grey, buff to grey weathering, coarse to microcrystalline, slabby to blocky bedding, traces quartz sand grains, becoming more sandy towards the base.

40

3815' CAMBRIAN/PRECAMBRIAN

Concealed.



3815' CAMBRIAN/PRECAMBRIAN

Concealed.

4120'

Dolomite, dark grey brown, weathers rust, hard, fine to microcrystalline, slabby bedding, silty.

4190'

Quartzose sandstone, green grey to black, weathers rust, mainly fine grained, slabby bedding.

4450'

Dolomite, dark grey to brown, weathers rust, microcrystalline, slabby nodular bedding, with some thin interbeds of shale and sandstone.

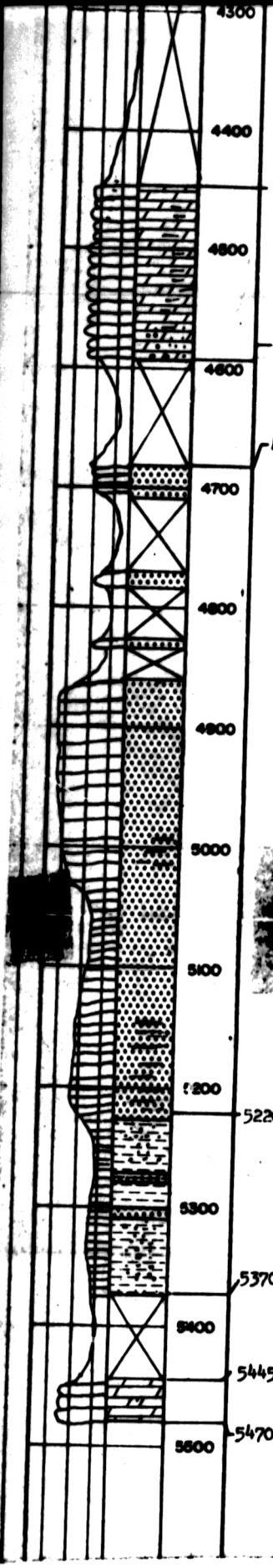
4590'

Concealed.

4680'

Sandstone, pink to maroon, weathers maroon, fine to medium quartz grains, cross-bedded in part, ferruginous cement, slabby to blocky, with some interbedded red, green and black shale.

.150



4450' ——————————

Dolomite, dark grey to brown, weathers rust, microcrystalline, slabby nodular bedding, with some thin interbeds of shale and sandstone.

4590' ——————————

Concealed.

4680' ——————————

Sandstone, pink to maroon, weathers maroon, fine to medium quartz grains, cross-bedded in part, ferruginous cement, slabby to blocky, with some interbedded red, green and black shale.

5220' ——————————

As above, with up to 60% interbedded shales.

5370' ——————————

Concealed.

5445' ——————————

Dolomite, dark grey, weathers buff, microcrystalline slabby to blocky bedding.

5470' —————— Base of Section ——————

LOG OF OUTCROP SECTION

STATION NO.3

IMPERIAL RIVER

LOCATION: LSD. SEC. TWP. RGE. W. M.
UNIT ZONE N.T.S.
SECN-28 LAT 65°10' LONG. 127°45'

Description of location: Measured along Imperial River where it flows northeast from the Carcajou Range of the MacKenzie Mountains.

ELEVATION:

MEASURED: July, 1961
METHOD: Plane table

FORMATIONS

CRETACEOUS	1715'+
DEVONIAN	3535'
Imperial Formation	1985'
FORT CREEK GROUP	700'
Hume Formation	350'
Bear Rock Formation	500'
SILURIAN-ORDOVICIAN	2100'
Ronning Formation	2100'
CAMBRIAN-PRECAMBRIAN	100'+

TO ACCOMPANY REPORT

Surface Geology of the Peel Plateau Area.

BY: Imperial Oil Limited

DATE: 1961

DESCRIBED

BY: PR 2 DATE: 1961

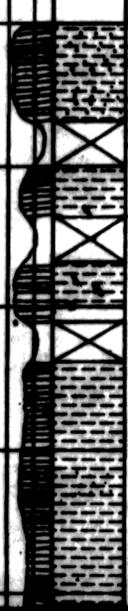
LEGEND

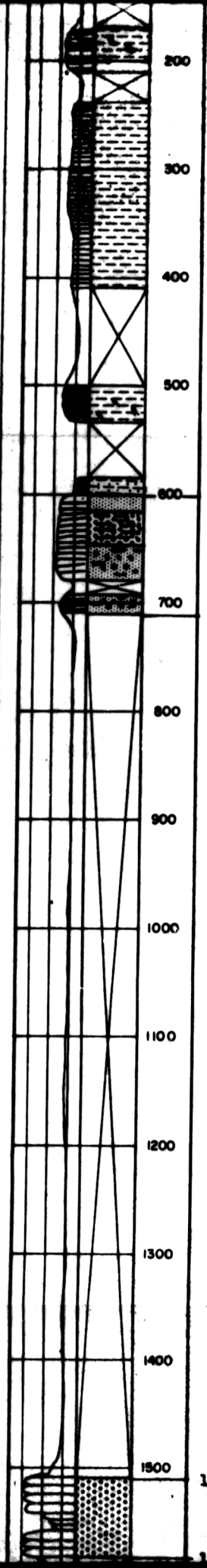
Coal Salt Anhydrite Dolomite Limestone Massive Chert Conglomerate Sandstone Siltstone Shale

IMPERIAL OIL LIMITED EXPLORATION DEPARTMENT PEACE RIVER DISTRICT

1 of 7

Res.	Lith.	Footage	Description
			Section is composited with section PR2-59-6.
		0	0' — CRETACEOUS —
		100	
		200	Shale, medium to dark grey and black, weathers medium grey with rusty and yellow patches, fissile, occasional siltstone band.
		300	
		400	





Shale, medium to dark grey and black, weathers medium grey with rusty and yellow patches, fissile, occasional siltstone band.

600'

Interbedded and gradational sandstone, siltstone and shale, abundant worm trails on bedding planes.

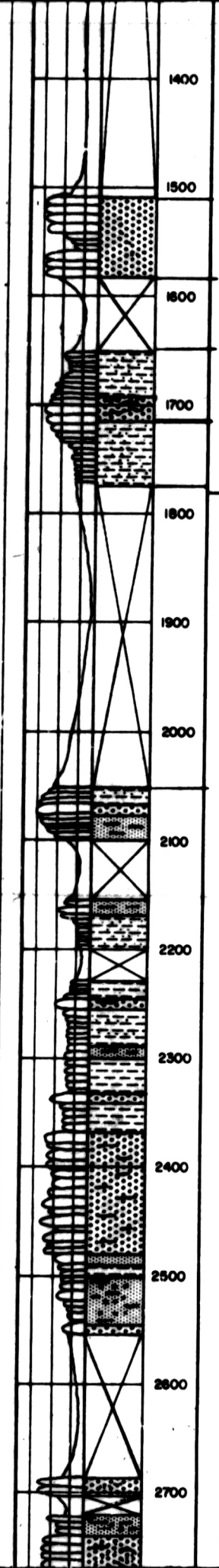
710'

The thickness of this covered interval was determined by a plane table measurement. Difficulty in determining the thickness was encountered due to (1) long distance between outcrops (2) variability in strike and dip of the outcrops at each end.

1510'

Sandstone, buff, silty, very fine quartz grains, cross bedded, glauconitic.

1580'



1510' ———————————————

Sandstone, buff, silty, very fine quartz grains, cross bedded, glauconitic.

1580' ———————————————

Concealed.

1645' ———————————————

Shale, dark grey, weathers medium grey, fissile.
Sandstone, white to buff, quartzose, slightly glauconitic, medium grained, becomes conglomeratic at base.

1715' ——— DEVONIAN ———

Imperial Formation

Interbedded silty shale and argillaceous siltstone, green and medium grey color, fossil to platy.

1770' ———————————————

Concealed.

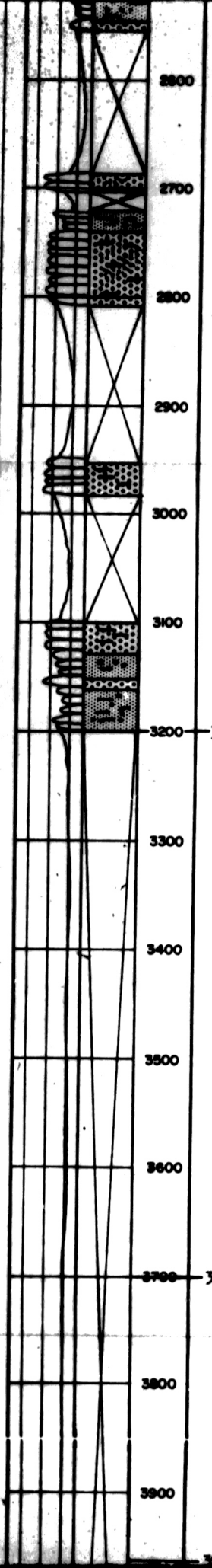
2055' ———————————————

Interbedded shale, sandstone and siltstone.
This interval represents cyclical deposition, shales at the base of each cycle increase in sand and silt content towards the top of the cycle. The cycle ends with a calcareous quartz sandstone and/or conglomerate. Shales are fissile and sandstones are massive and are sharply overlain by shale.

Massive inaccessible sandstone at 2400'.

302

Sandstone, with interbedded siltstone and shales.



Sandstone, with interbedded siltstone and shales.

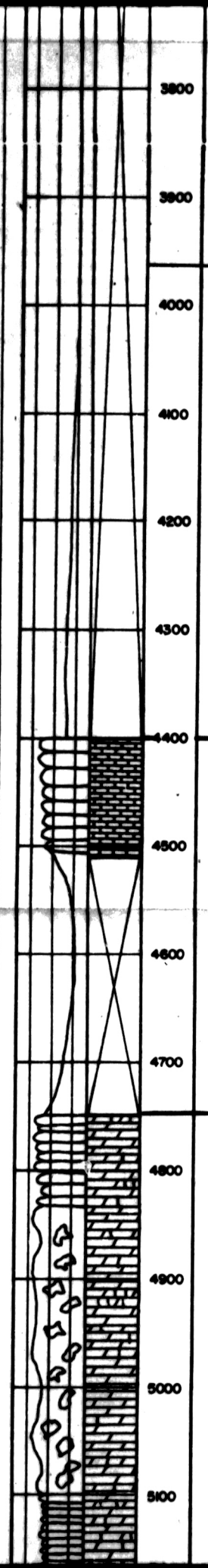
3200'

This covered interval represents the strata lying between the top of the Hume Formation and the base of the exposed Imperial Formation. The distance was calculated from aerial photographs and field observed strikes and dips.

Concealed.

3700'

Estimated thickness only.



Estimated thickness only.

3975'

10 miles southeast the Hare Indian Formation was calculated to be 400' ±50' thick..

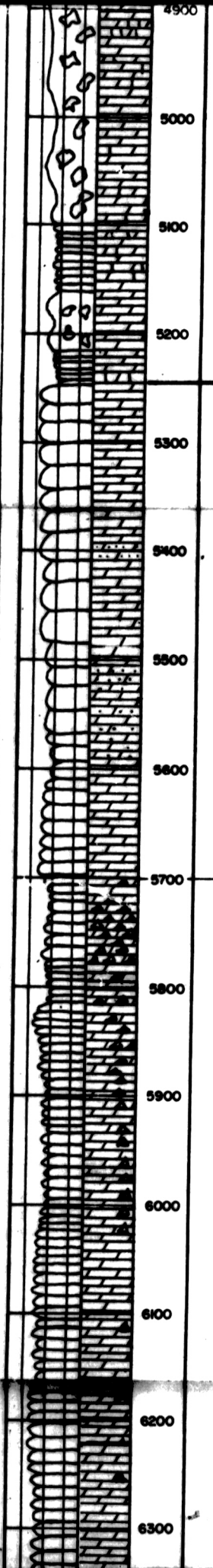
4400' **Hume Formation**

Limestone, microcrystalline, abundant clear calcite veining and inclusions, massive, scattered corals.

150

4750' **Bear Rock Formation**

Dolomite, breccia, fragments from 2" - 3' of angular to rounded dolomite and some limestone in a calcareous dolomitic matrix, some vague bedding at top.



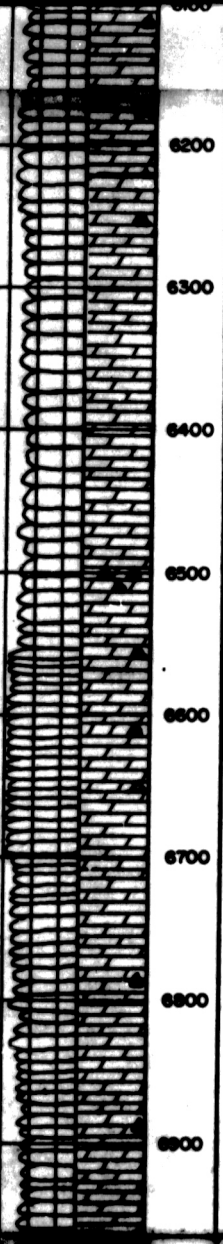
5250' — **SILURIAN - ORDOVICIAN**
Ronning Formation

Dolomite, microcrystalline, some very fine crystalline, massive bedding, characteristic block and yellow banded weathering, sandy at 1250'.

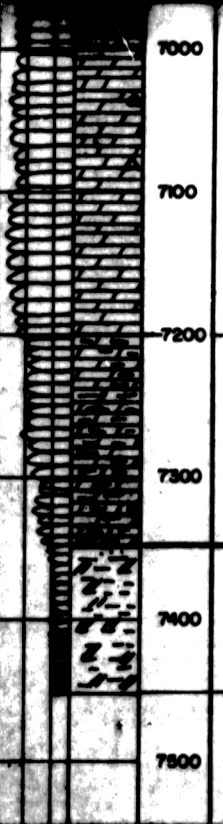
5700' —

Dolomite, crystalline, interbedded with massive white chert.

Dolomite, very fine to coarsely microcrystalline in part, slightly to very slightly siliceous, massive with 6" - 10" beds, blocky weathering, trace intercrystalline and vuggy porosity, scattered glauconite grains.



Dolomite, microcrystalline, as above.



7 of

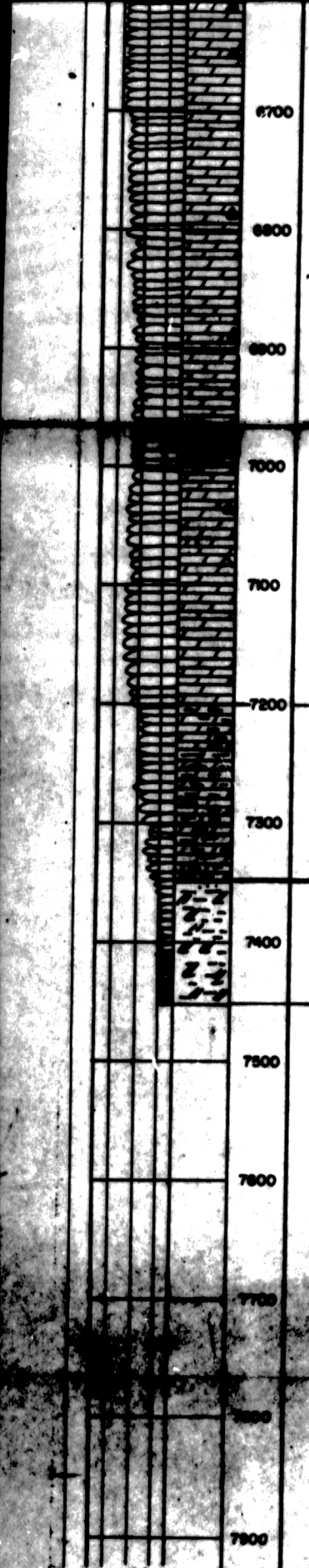
7200' —

Dolomite, microcrystalline, argillaceous with platy shale partings, some interbeds of algal dolomite.

7350' — CAMBRIAN - PRECAMBRIAN

Shale, varigated, maroon and green, platy to slaty, satinspar gypsum occurs in cleavage and fracture planes, may all be Cambrian?

7450' — Base of Outcrop



Dolomite, microcrystalline, as above.

7200' —

Dolomite, microcrystalline, argillaceous with platy shale partings, some interbeds of algal dolomite.

7350' — CAMBRIAN - PRECAMBRIAN

Shale, varigated, maroon and green, platy to slaty, satinspar gypsum occurs in cleavage and fracture planes, may all be Cambrian?

7450' — Base of Outcrop

8 of 8

LOG OF OUTCROP SECTION

STATION NO. 1

GAMBILL RANGE

LOCATION: LSD. SEC. TWP. RGE. W. M.
UNIT ZONE N.T.S.
SEC. A-31 LAT 64°40' LONG. 126°15'

Description of location: Measured on West and East side of Little Bear River at the Gambill Range.

ELEVATION MEASURED: June, 1961
METHOD: Tape and Brunton

FORMATIONS

DEVONIAN	1710'+
Imperial Formation	110'+
FORT CREEK GROUP	340'
Hume Formation	380'
Bear Rock Formation	810'
SILURIAN - ORDOVICIAN	1420'+
Roaring Formation	1420'+

TO ACCOMPANY REPORT

Surface Geology of the Peel Plateau Area.

BY: Imperial Oil Limited
DATE: 1961

DESCRIBED

BY: DATE:

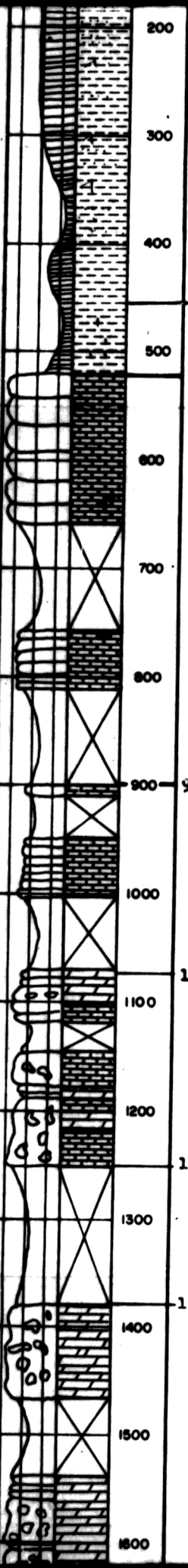
LEGEND

Coal | Salt | Anhydrite | Dolomite | Limestone | Massive Chert | Conglomerate | Sandstone | Siltstone | Shale

IMPERIAL OIL LIMITED EXPLORATION DEPARTMENT PEACE RIVER DISTRICT

1 of 7

Res.	Lith.	Footage	Description
		0	0' DEVONIAN
			Imperial Formation
			Shale, medium to dark grey, weathers brown and grey, fissile, occasional thin siltstone bed.
		100	
			110' FORT CREEK GROUP
			Shale, black, orange, and yellow, fissile to platy, slightly silty, siliceous.
		200	
		300	
		400	



458'

Shale, black, white, papery to platy bedding, some selenite crystals, bituminous, Tentaculites.

520' — Hume Formation

Limestone, medium to dark grey, weathers medium grey with some buff, top very massive, microcrystalline to bioclastic in part, fossiliferous.

2 of

900' — Bear Rock Formation

Limestone, dark grey brown, weathers light grey and buff, microcrystalline, pelletal in part, rubbly thin beds.

1070'

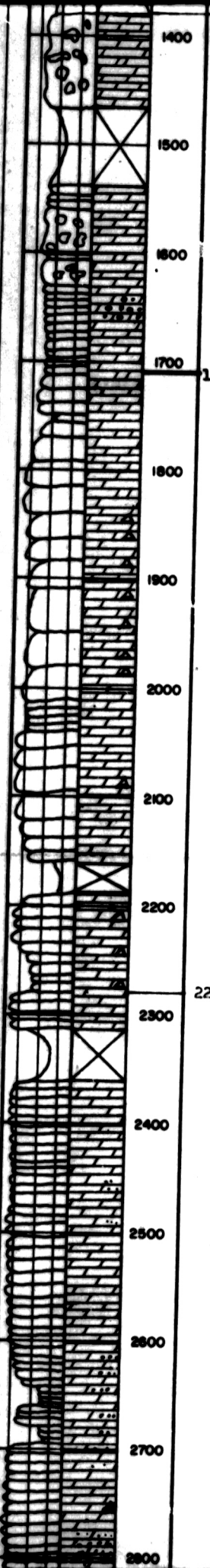
Limestone, breccia, light and medium grey, weathers light grey and buff, massive, unbedded, rubbly blocks of microcrystalline limestone and fine crystalline dolomite. Some intercrystalline and vuggy porosity.

1260'

Concealed.

1380'

Dolomite, grey brown, weathers medium grey, breccia, massive, complete gradation in size of fragments, fragments show some rounding, hoodoo type weathering, becomes bedded at base.



1380'

Dolomite, grey brown, weathers medium grey, breccia, massive, complete gradation in size of fragments, fragments show some rounding, hoodoo type weathering, becomes bedded at base.

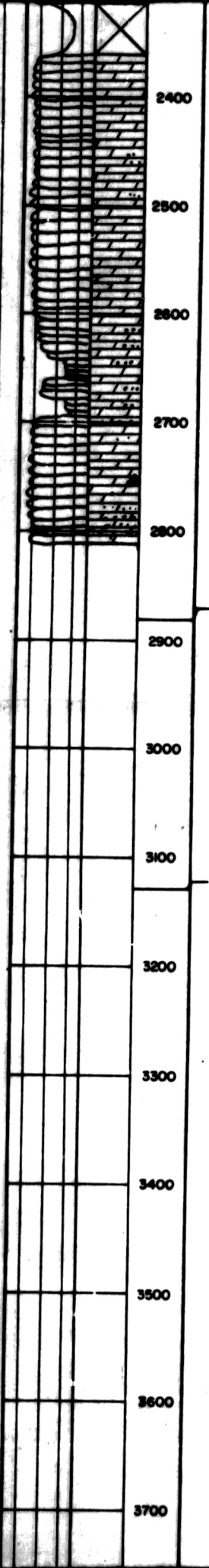
1710' — SILURIAN - ORDOVICIAN
Ronning Formation

Dolomite, light to grey, weathers same, microcrystalline to medium crystalline, very massive bedding, some stringers and nodules of white chert, silicified corals in part, traces vuggy porosity.

30

2280'

Dolomite, light and medium grey, buff, cream and grey weathering, microcrystalline to dense, slightly silty and argillaceous in part, traces sand, thin to thick bedded, some relict bioclastic beds?



Dolomite, light and medium grey, buff, cream and grey weathering, microcrystalline to dense, slightly silty and argillaceous in part, traces sand, thin to thick bedded, some relict bioclastic beds?

2880'

Dolomite, light to medium grey, cream and buff weathering, microcrystalline, very hard, slightly silty, thin to thick bedded, oolite bed at 3000 feet.

3130' Base of Outcrop

LOG OF OUTCROP SECTION

STATION NO. 4

TWO BIT CREEK

LOCATION: LSD.. SEC. TWP. RGE. W. M.
UNIT ZONE N.T.S.
SEC-34 LAT 64°40' LONG. 129°15'

Description of location: The section was measured along a northwest flowing tributary of the Mountain River.

ELEVATION MEASURED
METHOD

FORMATIONS

DEVONIAN	1400'+
Hume Formation	330'
Bear Rock Formation	1070'
SILURIAN/ORDOVICIAN	870'
Running Formation	870'
CAMBRIAN/PRECAMBRIAN	4730'+

TO ACCOMPANY REPORT

Surface Geology of the Peel Plateau Area.

BY: Imperial Oil Limited

DATE: 1961

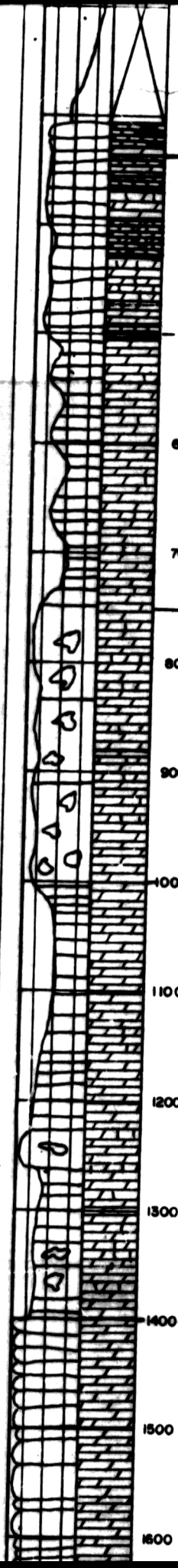
LEGEND

Coal | Salt | Anhydrite | Dolomite | Limestone | Massive Chert | Conglomerate | Sandstone | Siltstone | Shale

IMPERIAL OIL LIMITED EXPLORATION DEPARTMENT PEACE RIVER DISTRICT

Res.	Lith.	Footage	Description
		0	0' — DEVONIAN
			Hume Formation
			Limestone, light and medium grey brown, weathers light grey, microcrystalline, occasional colonial coral, thick bedded to massive, fractured in part, some infilling of fractures with white calcite.
		100	
		200	
		300	
			330' — Bear Rock Formation
			Dolomite, grey brown, weathers light and medium grey with some buff staining, fine to microcrystalline thin to medium bedded, interbedded with: Limestone, dark grey light grey and buff weathering, microcrystalline, pelletal in part, rubbly, argillaceous, fractured.
		400	

107



330' — **Bear Rock Formation**

Dolomite, grey brown, weathers light and medium grey with some buff staining, fine to microcrystalline thin to medium bedded, interbedded with:
Limestone, dark grey light grey and buff weathering, microcrystalline, pelletal in part, rubbly, argillaceous, fractured.

500'

Dolomite, light and medium grey brown, weathers grey, microcrystalline, vague pelletal in part, thin to thick bedded, fractures infilled with white calcite.

750'

Dolomite, medium grey and dark grey, weathers dark grey, breccia, fine to coarse, the dolomite is microcrystalline becomes more brecciated towards base, some white calcite cement.

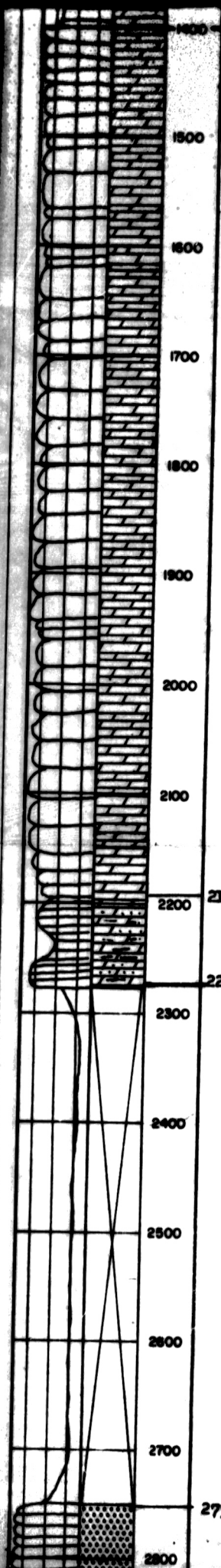
2 of.

1000'

Dolomite, light and medium grey, weathers medium grey with some yellow orange, microcrystalline, thin to thick bedded, brecciated in part, poorly exposed.

1400' — **SILURIAN/ORDOVICIAN**
Running Formation

Dolomite, light grey to light grey brown, weathers medium grey with some buff, microcrystalline, some medium to coarse crystalline, thin to massive bedded.



1400'

SILURIAN/ORDOVICIAN

Ronaldson Formation

Dolomite, light grey to light grey brown, weathers medium grey with some buff, microcrystalline, some medium to coarse crystalline, thin to massive bedded.

2195'

Dolomite, medium grey, weathers orange buff, fissile to thin-bedded, silty and argillaceous, very poorly exposed.

2270'

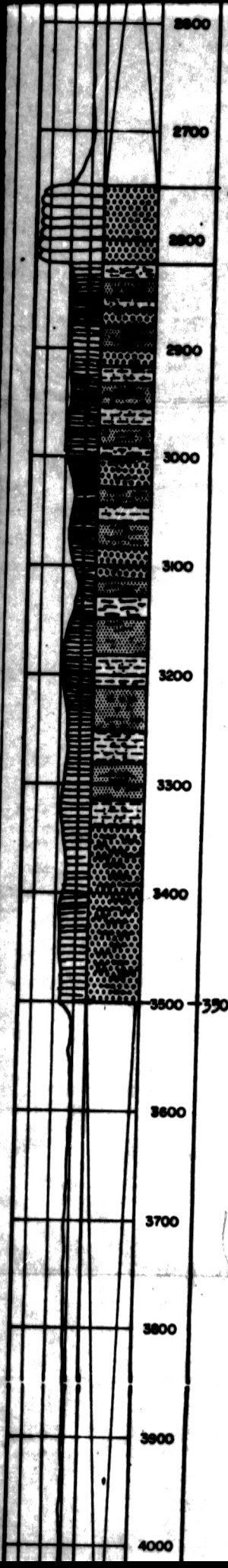
CAMBRIAN/ PRECAMBRIAN

302

Covered.

2790'

Quartzite, light grey, buff weathering.



Covered.

2790' ——————————

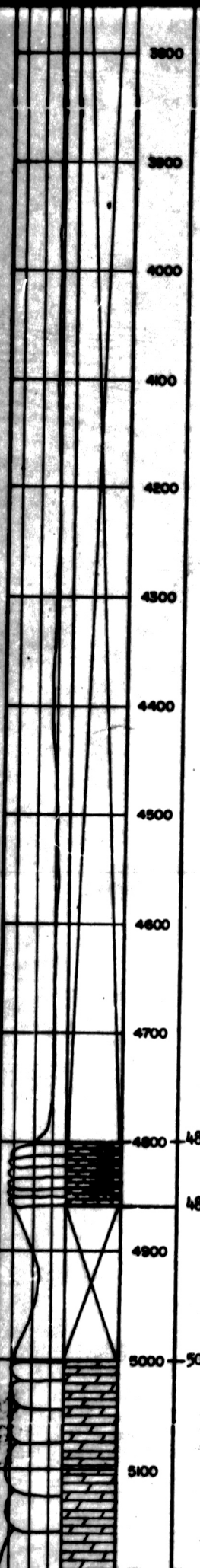
Quartzite, light grey, buff weathering.

2820' ——————————

Interbedded green colored and weathered siltstone, shales and minor sandstone and conglomerates, flaggy to thick bedded, covered in part.

3500 3500' ——————————

4 of



Concealed.

4800' ———————————————

Limestone, fine crystalline, dark grey, argillaceous platy.

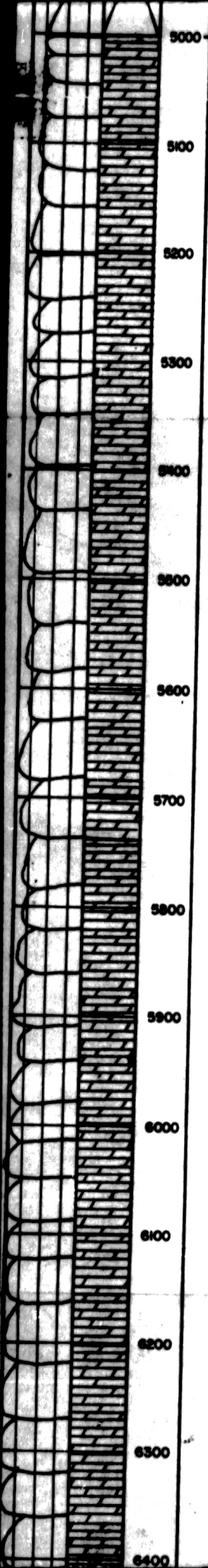
4850' ———————————————

Concealed.

5000' ———————————————

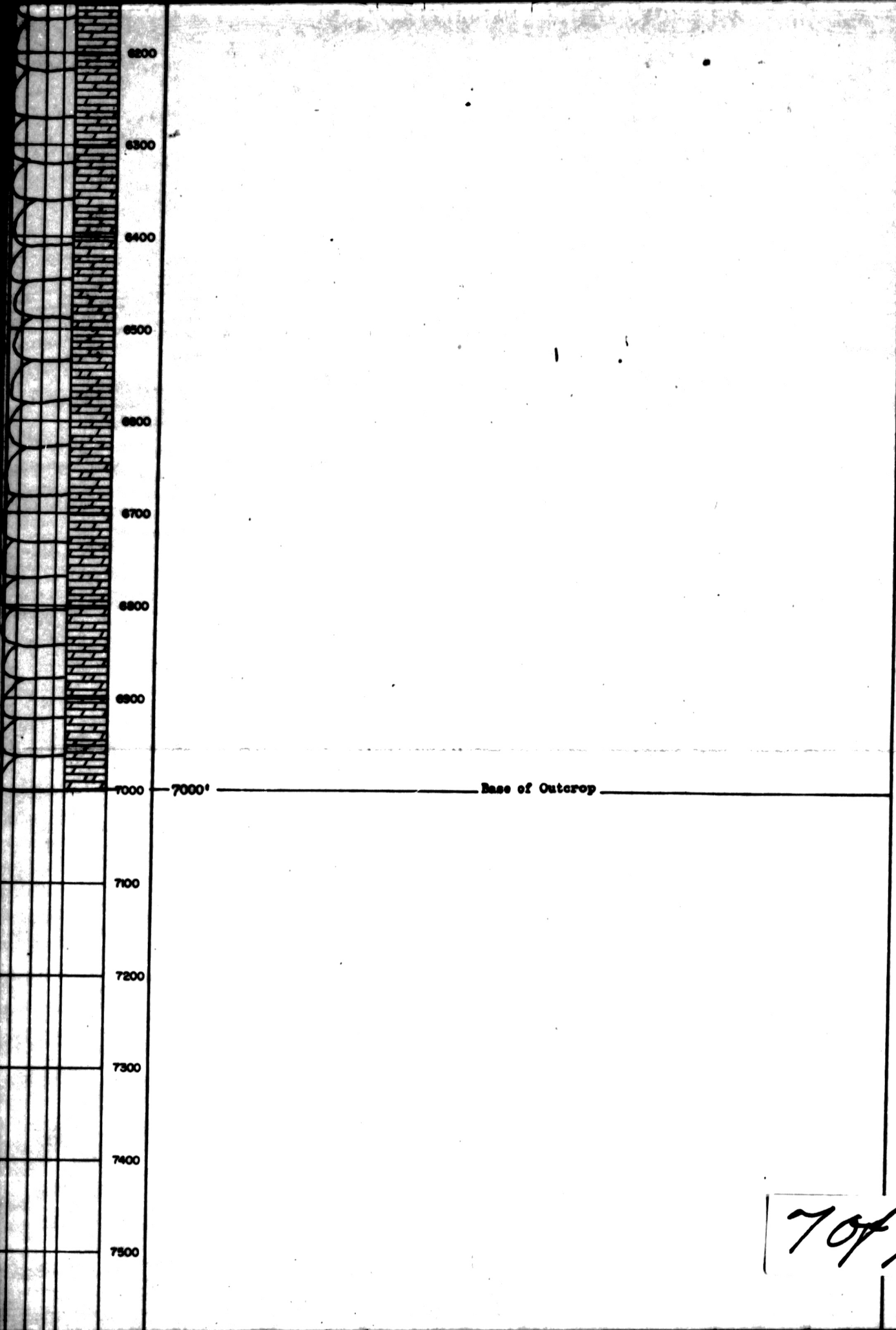
Dolomite, orange weathering, [illegible], brecciated and conglomeratic in part, highly contorted laminations, massive.

15 of



5000' _____

Dolomite, orange weathering, dense, brecciated and conglomeratic in part, highly contorted laminations, massive.


6200
6300
6400
6500
6600
6700
6800
6900
7000
7000'
Base of Outcrop
7100
7200
7300
7400
7500

7047

LOG OF OUTCROP SECTION

STATION NO. 5

DOG CREEK

LOCATION: LSD.. SEC. TWP. RGE. W. M.
UNIT ZONE N.T.S.
SECR-19 LAT 64°50' ... LONG. 130°00'

Description of location: Measured along a creek which flows into the Mountain River from the south.

ELEVATION:

MEASURED: July, 1961
METHOD: Tape and Brunton

FORMATIONS

DEVONIAN	2080'+
Imperial Formation	565'+
FORT CREEK GROUP	198'
Hume Formation	457'
Bear Rock Formation	860'
SILURIAN/ORDOVICIAN	2045'
Ronning Formation	2045'
CAMBRIAN/PRECAMBRIAN	30'+

TO ACCOMPANY REPORT

Surface Geology of the Peel Plateau Area.

BY: Imperial Oil Limited

DATE: 1961

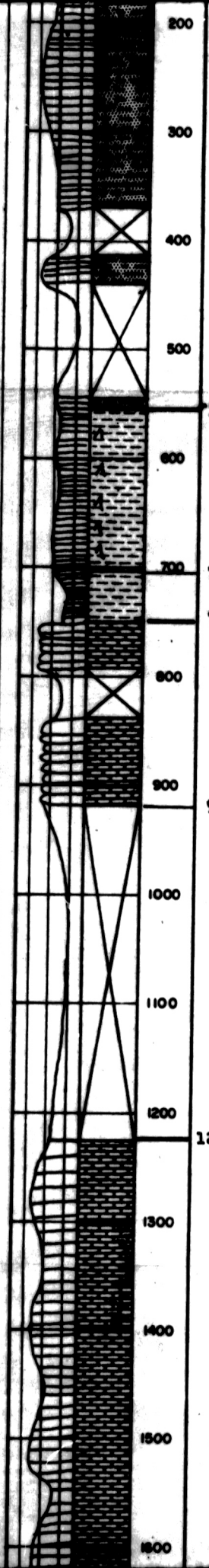
LEGEND

Coal | Salt | Anhydrite | Dolomite | Limestone | Massive Chert | Conglomerate | Sandstone | Siltstone | Shale

IMPERIAL OIL LIMITED EXPLORATION DEPARTMENT PEACE RIVER DISTRICT

Res.	Lith.	Footage	Description
		0	0' DEVONIAN Imperial Formation Siltstone, grey to black, weathers rusty grey, platy to slabby bedding.
		100	
		200	
		300	
		400	

1 of



365' — FORT CREEK GROUP

Shale, black, weathers dark grey, fissile to blocky, siliceous in part.

705' —

Shale, black, fissile.

763' — Hume Formation

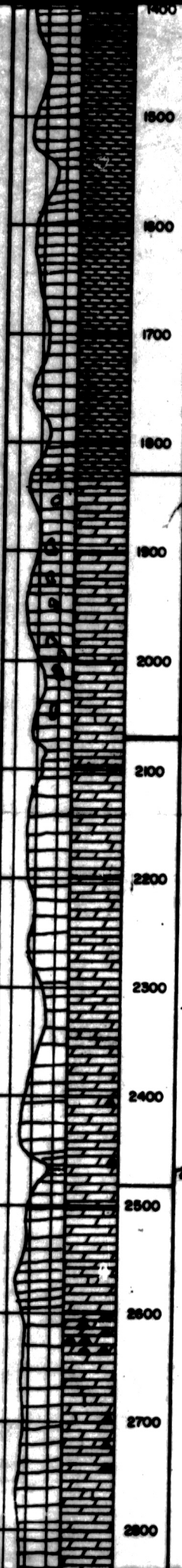
Limestone, dark grey brown, weathers buff, microcrystalline, minor bioclastic, fossiliferous, flaggy to slabby bedding.

915' —

Concealed.

1220' — Bear Rock Formation

Limestone, microcrystalline, minor pelletal, light to medium brown gray, weathers grey, fetid odor, slabby to massive bedding.



Limestone, microcrystalline, minor pelletal, light to medium brown gray, weathers grey, fetid odor, slabby to massive bedding.

1830'

Dolomite, light to dark brown, weathers brown grey, fine to microcrystalline, some breccia, slabby to platy, mainly slabby, laminated in part.

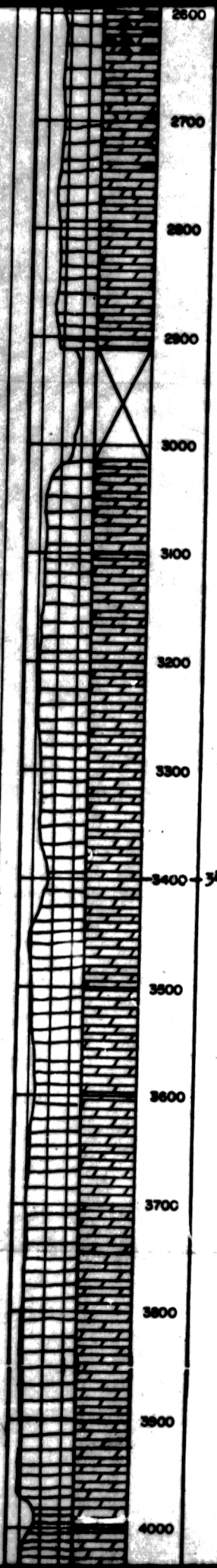
2080' SILURIAN/ORDOVICIAN

Roaring Formation

Dolomite, light grey brown to dark brown, weathers grey, fine to coarse crystalline, slabby to blocky bedding, some vuggy porosity.

30

Dolomite, fine to microcrystalline, medium brown, weathers grey brown, slabby bedding, some thin interbeds and nodules of chert, chain corals below 2700'.

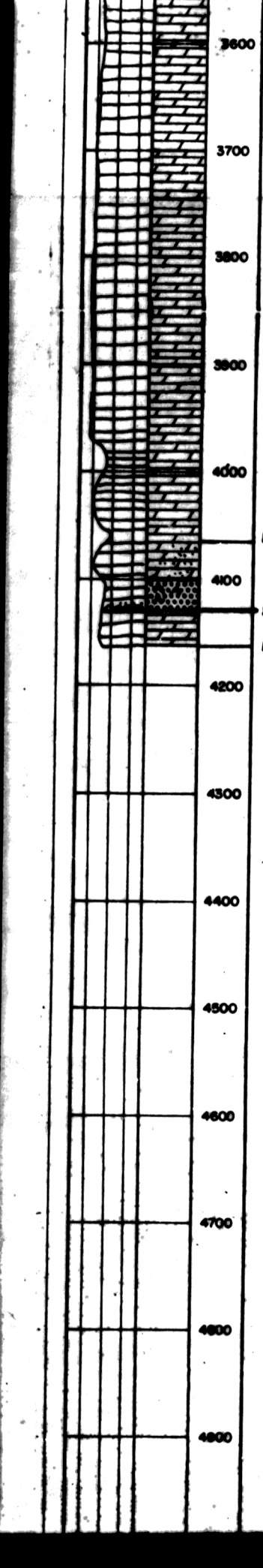


Dolomite, fine to microcrystalline, medium brown, weathers grey brown, slabby bedding, some thin interbeds and nodules of chert, chain corals below 2700'.

3400' ——————————————————————

140

Dolomite, light brown grey, some pink grey bands at top, weathered grey, slabby to blocky bedding, fine to microcrystalline.



Dolomite, light brown grey, some pink grey bands at top, weathered grey, slabby to blocky bedding, fine to microcrystalline.

4070'

Unit grades from dolomite to sandstone at base, weathers maroon, flaggy to massive, bedding, maybe Cambrian.

4125' CAMBRIAN/PRECAMBRIAN

Dolomite, pinkish grey, weathers maroon, microcrystalline, platy weathering.

4155' Base of Section

5 of 5

LOG OF OUTCROP SECTION

STATION NO. 6

BLACK ROCK LAKE

LOCATION: LSD.. SEC.. TWP.. RGE.. W. M.
UNIT ZONE N.T.S.
SEC. E-73 LAT 65°10' LONG. 129°00'

Description of location: Section located on a south flowing creek on the southwest limb of an anticline.

ELEVATION: MEASURED: June, 1961
METHOD: Tape and Brunton

FORMATIONS

DEVONIAN	3730'+
Imperial Formation	1740'+
FORT CREEK GROUP	745'
Hume Formation	380'
Bear Rock Formation	865'
SILURIAN - ORDOVICIAN	2520'
Ronning Formation	2520'
CAMBRIAN - PRECAMBRIAN	150'+

TO ACCOMPANY REPORT

Surface Geology of the Peel Plateau Area.

BY: Imperial Oil Limited

DATE: 1961

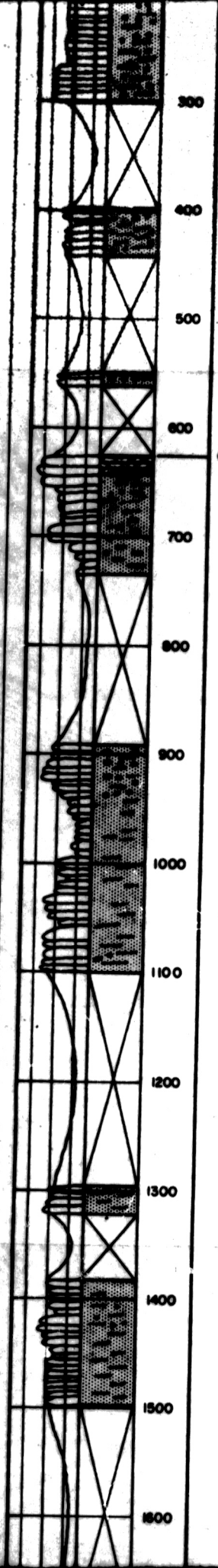
LEGEND

Coal | Salt | Anhydrite | Dolomite | Limestone | Massive Chert | Conglomerate | Sandstone | Siltstone | Shale

IMPERIAL OIL LIMITED EXPLORATION DEPARTMENT PEACE RIVER DISTRICT

1 of

Res.	Lith.	Footage	Description
		0	0' DEVONIAN Imperial Formation Siltstone, greenish gray colour and weathering, platy to flaggy, argillaceous sandy, calcareous in part, interbedded with Shale, greenish gray colour and weathering, silty, occasional interbed of sandstone, scattered fossils.
		100	
		200	
		300	
		400	The covered intervals probably represent shalier strata.



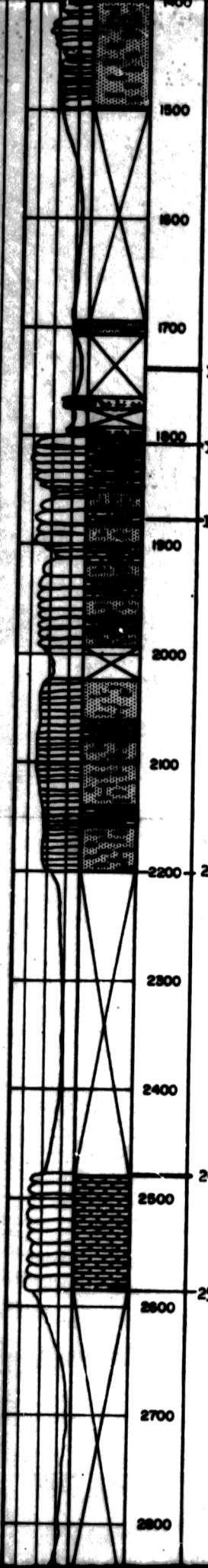
The covered intervals probably represent shalier strata.

625'

Top 20 - 25' Limestone, medium grey, weathers buff, bioclastic, sandy, silty, cemented with clear calcite, irregular bedding.
Siltstone, green gray and medium grey, weathers green grey, sandy, argillaceous, platy to thin bedded.

2 of

The many covered intervals in this unit probably represent shalier strata.



1740' — **FORT CREEK GROUP**

Shale, black, weathers yellow, platy siliceous.

1805' —

Limestone, medium gray brown, weathers light grey and buff, bioclastic with some microgranular, very fossiliferous, corals branche, thin to thick bedded, silty interbeds in part.

1850' —

Interbedded calcareous siltstone and silty limestone with a few black shale partings, bituminous, pyritic, flaggy to medium bedded.

2200' —

Concealed, probably shale.

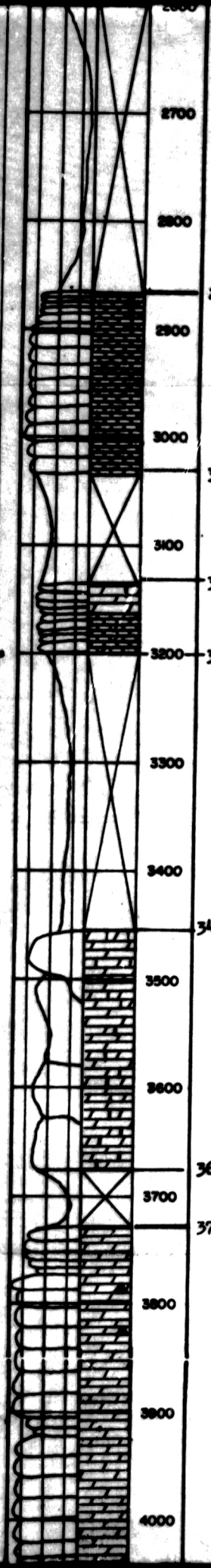
302

2485' — **Hume Formation**

Limestone, light and medium gray, weathers light grey and buff, microcrystalline, occasional bioclastic bed, slightly pyritic, massive bedding, slightly fractured with fractures infilled with white crystalline calcite.

2585' —

Concealed.



Concealed.

2865' — Bear Rock Formation

Limestone, dark grey, weathers buff, microcrystalline, some beds are composed of pellets and lumps, rubbly in part, massive bedded.

3030'

Concealed.

3130'

Dolomite, medium brown, weathers buff, microcrystalline and limestone, medium grey brown, weathers buff, microcrystalline and pelletal - thin to medium bedded.

3200'

Concealed.

4 of

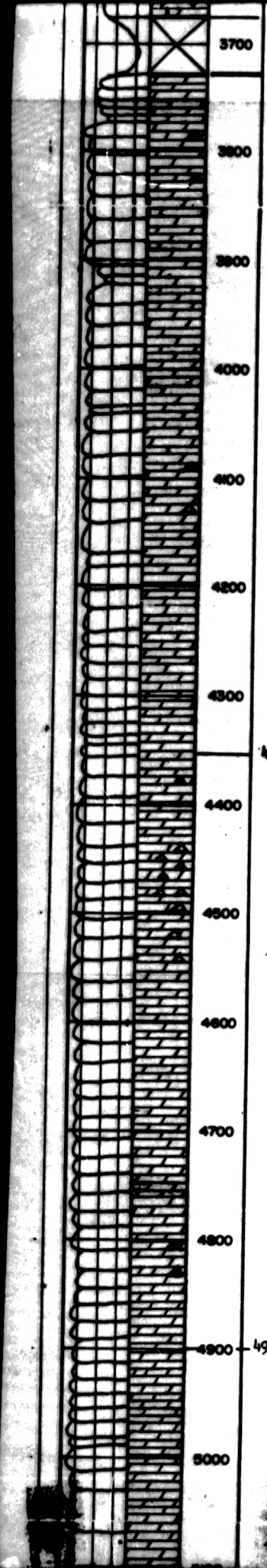
3450'

Breccia, medium grey brown, some light brown grey, weathers light grey to buff, extremely massive, unbedded, cavernous, block of dolomite up to 6' across, good vuggy porosity, calcareous in part.

3675'

3730' — SILURIAN - ORDOVICIAN
Bonning Formation

Dolomite, light to medium grey, weathers medium grey and buff, microcrystalline to fine crystalline, some scattered chert nodules and stringers, silicified colonial corals, thin to thick bedded, some vuggy porosity.



3675'

3730' — SILURIAN - ORDOVICIAN
Manning Formation

Dolomite, light to medium grey, weathers medium grey and buff, microcrystalline to fine crystalline, some scattered chert nodules and stringers, silicified colonial corals, thin to thick bedded, some vuggy porosity.

4350'

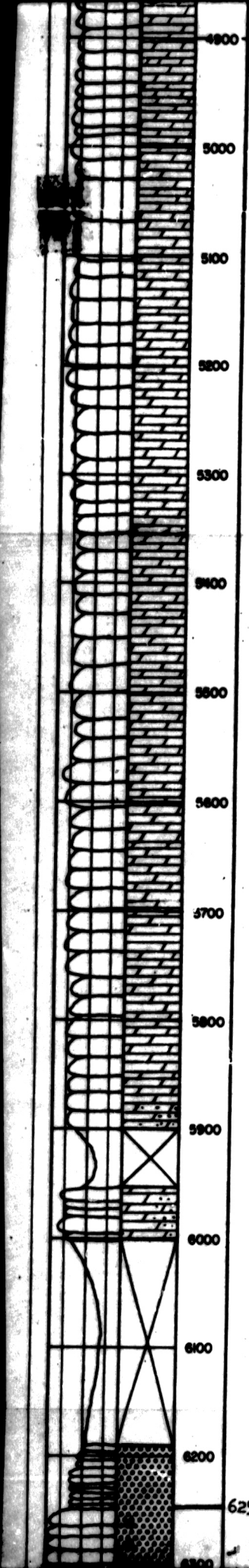
Dolomite, light grey and cream, weathers medium grey and buff, microcrystalline to extremely dense, some white chert nodules and stringers, thin to thick bedded, some white calcite infill of vugs, some porosity.

Small normal fault at 4600', repeated section omitted from log.

4900'

Dolomite, light and medium grey, weathers medium grey and buff, microcrystalline to cryptocrystalline, flaggy to massive bedding, traces silt in part, trace vuggy porosity.

5 of

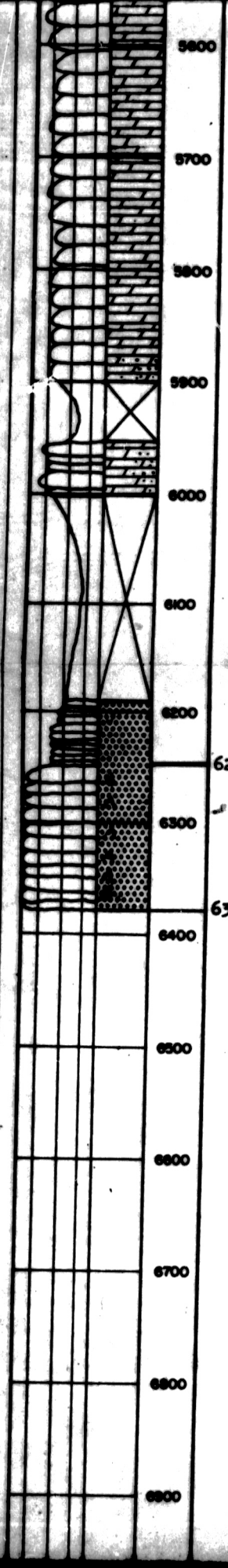


4900'

Dolomite, light and medium grey, weathers medium grey and buff, microcrystalline to cryptocrystalline, flaggy to massive bedding, traces silt in part, trace vuggy porosity.

16

6250' CAMBRIAN - PRECAMBRIAN



6250' CAMBRIAN - PRECAMBRIAN

Sandstone, red, green, cream, weathers same, hematitic, quartzitic, fine to coarse, rounded quartz grains, cross-bedded?, medium bedded, many brown flecks of iron stain throughout, some red and green shale partings.

6380' Base of Exposure

7047

LOG OF OUTCROP SECTION

STATION NO. 7

CHARLIE CREEK

LOCATION: LSD.. SEC.. TWP. RGE. W. M.
UNIT ZONE N.T.S.
SEC. B-58 LAT 65°20' LONG. 129°00'

Description of location: Measured along Charlie Creek.

ELEVATION: MEASURED: June, 1961
METHOD: Plane table, tape and Brunton

FORMATIONS

CRETACEOUS	800'+
DEVONIAN	2640'
Imperial Formation	2210'
FORT CREEK GROUP	430'

TO ACCOMPANY REPORT

Surface Geology of the Peel Plateau Area

BY: Imperial Oil Limited
DATE: 1961

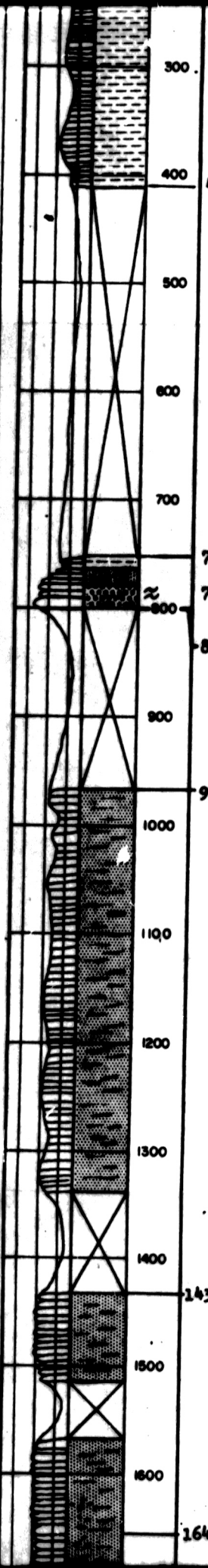
LEGEND

Coal | Salt | Anhydrite | Dolomite | Limestone | Massive Chert | Conglomerate | Sandstone | Siltstone | Shale

IMPERIAL OIL LIMITED EXPLORATION DEPARTMENT PEACE RIVER DISTRICT

1 of

Res.	Lith.	Footage	Description
		0	0' — CRETACEOUS
			The outcrop from 0' - 200' was not accessible but appeared to be the same as the shale described at 200'
		100	
		200	200'
			Shale, dark grey, weathers grey, fissile, large concretions up to 2' in diameter.
		300	
		400	410'



410'

Concealed, probably shale as above.

750'

Shale, as above.

760'

Sandstone, light grey brown, weathers buff, glauconitic, cross-bedded, very fine to medium grained, top 10-15' mainly siltstone.

800' — DEVONIAN

Imperial Formation

Concealed.

970'

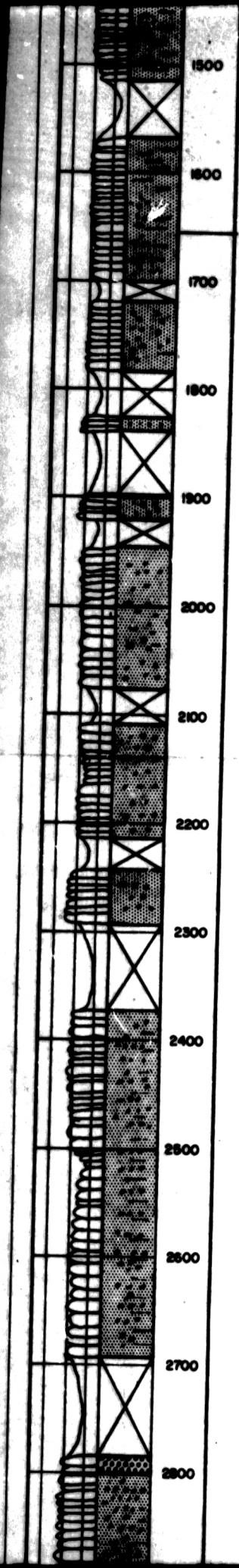
Siltstone, medium to dark grey, slightly argillaceous flaggy bedding, some very argillaceous with some interbedded shales.

27

1430'

Siltstone, medium to dark green grey, grey buff to green-grey weathering, rusty in part, laminated, occasional thin calcareous siltstone bed with brachiopods, slightly argillaceous, flaggy to slabby bedding.

1640'

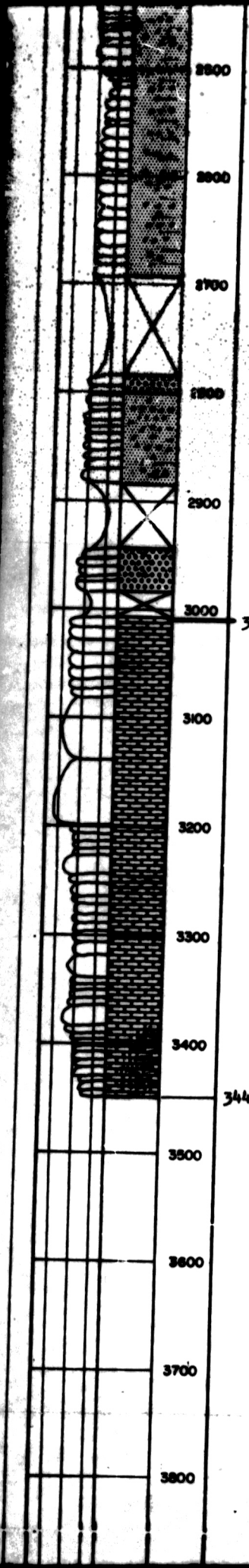


Siltstone, medium to dark green grey, grey buff to green-grey weathering, rusty in part, laminated, occasional thin calcareous siltstone bed with brachiopods, slightly argillaceous, flaggy to slabby bedding.

1640'

Siltstone, dark grey, grey rusty weathering, flaggy bedding, slightly argillaceous to argillaceous, grades to very fine grained sandstone in part, laminated, becomes more sandy towards base.

30



3010' — FORT CREEK GROUP

Limestone, grey to grey brown, weathers same, bioclastic with some microcrystalline and pelletal, very fossiliferous in part, stringcephalus at 3407', massive weathering very fossiliferous in part.

3440' — Base of Measured section

LOG OF OUTCROP SECTION

STATION NO. 8

RAMPARTS EAST

LOCATION: LSD. SEC. TWP. RGE. W. M.
UNIT ZONE N.T.S.
SEC. 45 LAT 66°29' LONG. 128°30'

Description of location: The Ramparts, measured at lower end of canyon on the east side of the Mackenzie River.

ELEVATION:

MEASURED: June, 1961
METHOD: 5 feet stick

FORMATIONS

FORT CREEK GROUP 320'+

TO ACCOMPANY REPORT

Surface Geology of the Peel Plateau Area.

BY: Imperial Oil Limited

DATE: 1961

LEGEND

Coal | Salt | Anhydrite | Dolomite | Limestone | Massive Chert | Conglomerate | Sandstone | Siltstone | Shale

IMPERIAL OIL LIMITED EXPLORATION DEPARTMENT PEACE RIVER DISTRICT

Res.	Lith.	Footage	Description
		0 — 0'	FORT CREEK GROUP
			Limestone, grey brown, weathers light grey and buff, bioclastic to bioclastic microcrystalline, thin to thick bedded, very fossiliferous, stringocephalus at base.
		100	
		145'	
			Shale, green, fissile, calcareous with top 50'± interbedded with microcrystalline limestone, thin bedded.
		200	
		300	
		320'	Base of Outcrop
		400	

LOG OF OUTCROP SECTION

STATION NO. 9

HUME RIVER

LOCATION: LSD.... SEC.... TWP.... RGE.... W. M.
UNIT ZONE N.T.S.
SECF-61 LAT 65°30' ---- LONG.129°45'

Description of location: Section measured from N.E. to S.W. along creek to 3300', thereafter along ridge.

ELEVATION: MEASURED: June, 1961
METHOD: Tape and Brunton

FORMATIONS

CRETACEOUS	110'+
DEVONIAN	
Imperial Formation & Older	2840'
DEVONIAN & OLDER CARBONATE UNIT	4840'
CAMBRIAN - PRECAMBRIAN	270'+

TO ACCOMPANY REPORT

Surface Geology of the Peel Plateau Area.

BY: Imperial Oil Limited

DATE: 1961

DESCRIBED

BY: PR 2 DATE: 1961

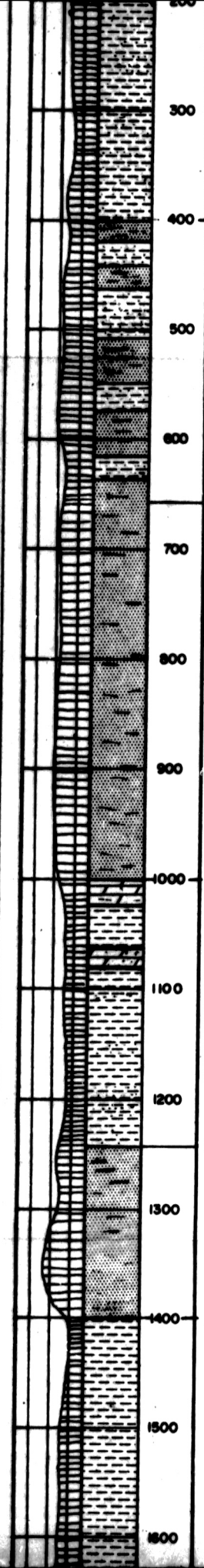
LEGEND

Coal | Salt | Anhydrite | Dolomite | Limestone | Massive Chert | Conglomerate | Sandstone | Siltstone | Shale

IMPERIAL OIL LIMITED EXPLORATION DEPARTMENT PEACE RIVER DISTRICT

1 of 7

Res.	Lith.	Footage	Description
		0	0' — CRETACEOUS Sandstone, pale yellow brown, weathers olive grey, fine to medium quartz grains, siliceous cement.
		100	110' — DEVONIAN Imperial Formation & Older ? Shale, light olive grey to medium olive grey, weathers same, blocky to flaggy bedding, very slightly calcareous, silty.
		200	
		300	
		400	400' Shale, as above, interbedded with: Siltstone, olive grey, weathers pale brown to light olive grey, very slightly



400'

Shale, as above, interbedded with:
Siltstone, olive grey, weathers pale brown to light olive grey, very slightly calcareous, 1 cm. to 2 foot interbeds.

660'

Siltstone, olive grey, weathers pale brown to olive grey, as above, weathers platy, thick to platy bedding.

2 of

1000'

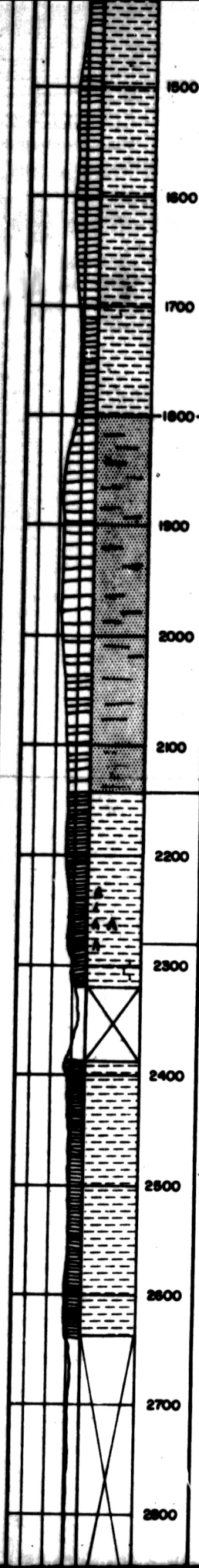
Shale, silty, as laminations and interbands to 4", olive grey in color, interbedded with: Dolomite, green grey, weather pale brown, very fine crystalline, thick bedded, weathers platy.

1240'

Mainly siltstone, as above.

1400'

Shale, olive grey, reddish brown to olive grey weathering scattered ironstone nodules, abundant Fe stain, platy to blocky weathering.



Shale, olive grey, reddish brown to olive grey weathering scattered ironstone nodules, abundant Fe stain, platy to blocky weathering.

1800'

Siltstone, olive grey, weathers pale yellow brown to reddish brown, slightly argillaceous mainly as partings, trace calcareous, thin platy bedding.

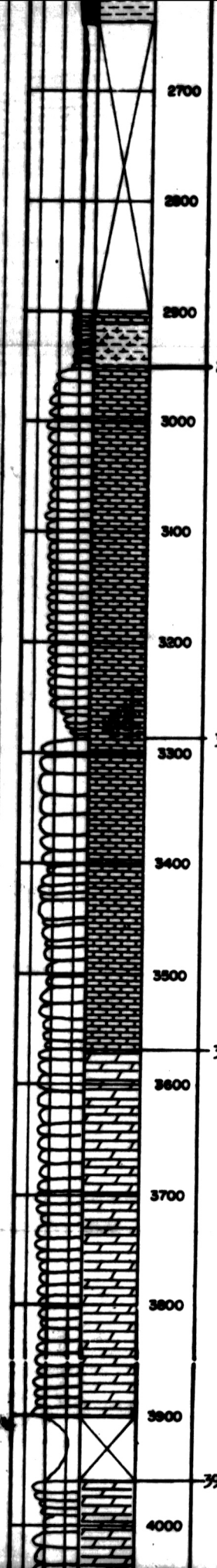
2140'

Shale, dark grey to black, greenish grey weathering, siliceous at base, platy to fissile, poorly exposed.

2280'

Shale, light olive grey to buff, weathers pale yellow brown, trace silty, trace calcareous, soft, poorly exposed.

30



2950' — DEVONIAN & OLDER CARBONATE UNIT

Limestone, medium grey to dark grey, weathers pale yellow brown, microcrystalline to microcrystalline bioclastic, fossiliferous in part, slightly argillaceous, becomes very argillaceous at base.

3290' —

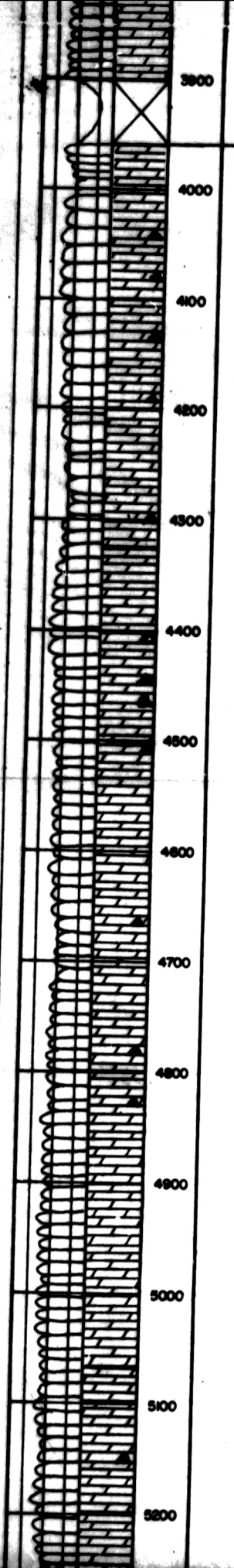
Limestone, pale yellow brown, weathers light grey to yellow-grey, microcrystalline, pelletal near top, medium bedded to massive, few interbeds of dolomite.

3575' —

Dolomite, pale yellow brown, weathers light grey to pale yellow brown, very fine crystalline, thick to massive bedding.

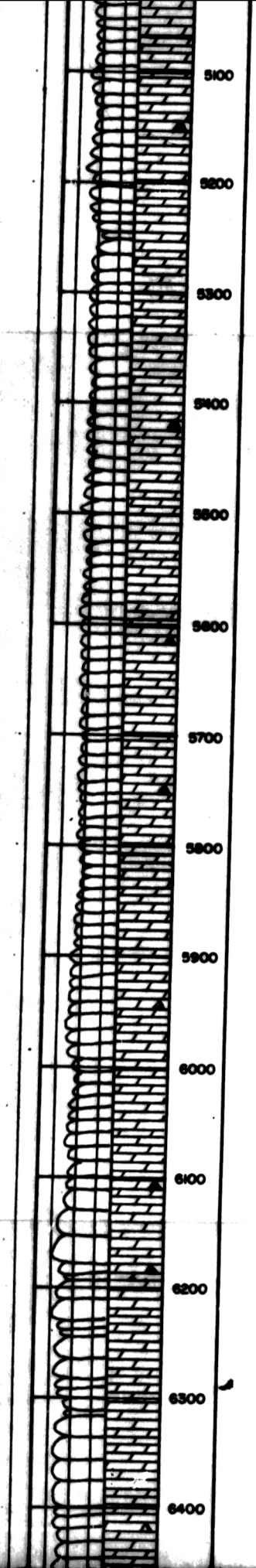
3960' —

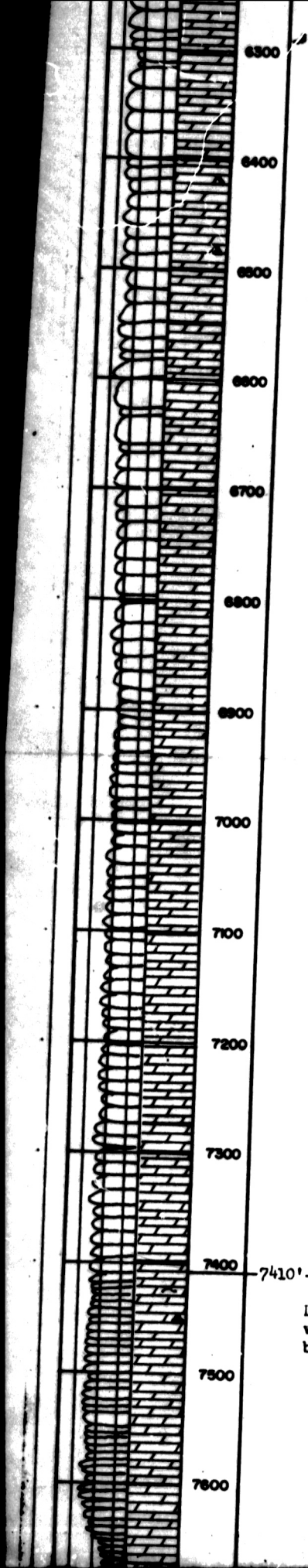
Dolomite, pale yellow brown to buff, weathers light grey to pale yellow brown,



Dolomite, pale yellow brown to buff, weathers light grey to pale yellow brown, fine to very fine crystalline, some dark grey chert nodules and stringers, some silicified corals, slight bituminous odor in part, thick bedded, trace vuggy porosity.

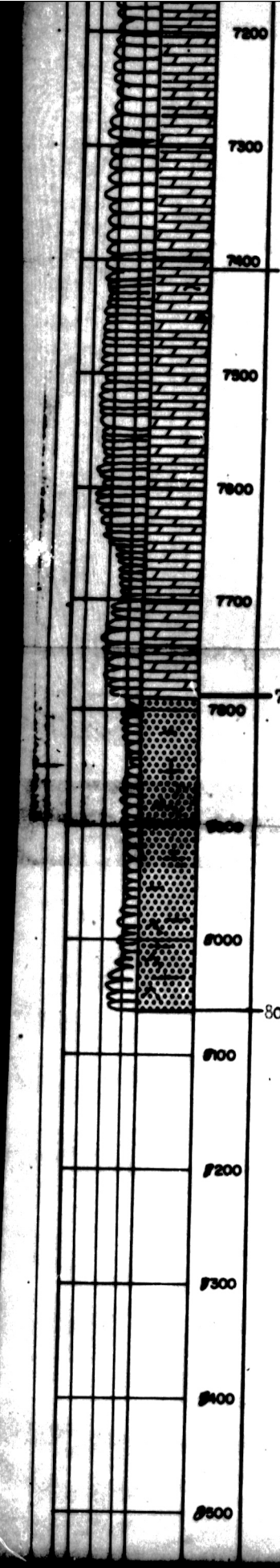
15 of


5100
5200
5300
5400
5500
5600
5700
5800
5900
6000
6100
6200
6300
6400



7410'

Dolomite, pale yellow brown to buff, weathers buff to tan, microcrystalline, very slightly silty, thick bedded, some silicified algal masses? weathers thin bedded and platy.



7410'

Dolomite, pale yellow brown to buff, weathers buff to tan, microcrystalline, very slightly silty, thick bedded, some silicified algal masses? weathers thin bedded and platy.

7790' — CAMBRIAN - PRECAMBRIAN

Quartzite, dark reddish brown, weathers same, fine grained, slightly calcareous and/or dolomitic at top, becoming thicker bedded and more resistant in basal 40 feet.

8060' — Base of Section

8 of 8

LOG OF OUTCROP SECTION

STATION NO. 10

BEAVER CREEK

LOCATION: LSD.. SEC.. TWP. RGE. W. M.
UNIT ZONE N.T.S.
SEC P-4 LAT 69°32' LONG. 130°45'

Description of location: Measured along a north flowing tributary of the Arctic Red River.

ELEVATION

MEASURED: August, 1961
METHOD: Plane table, Tape & Brunton

FORMATIONS

CRETACEOUS	60'+
DEVONIAN Imperial Formation & Older	3200'
DEVONIAN & OLDER CARBONATE UNIT	90'+

TO ACCOMPANY REPORT

Surface Geology of the Peel Plateau Area.

BY: Imperial Oil Limited
DATE: 1961

DESCRIBED

BY: PR 2 DATE: 1961

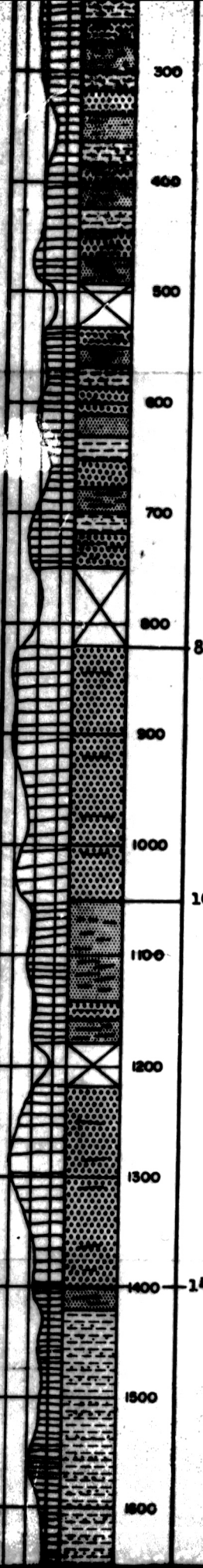
LEGEND

Coal | Salt | Anhydrite | Dolomite | Limestone | Massive Chert | Conglomerate | Sandstone | Siltstone | Shale

IMPERIAL OIL LIMITED EXPLORATION DEPARTMENT PEACE RIVER DISTRICT

10

Res.	Lith.	Footage	Description
		0 — 0'	CRETACEOUS
			Sandstone, grey buff and buff in color, weathers buff, grades from very fine to conglomeratic in part, quartzose, flaggy to thick bedded, trace glauconitic.
		60'	DEVONIAN?
			Imperial Formation & Older ?
		100	Interbedded sandstone, siltstone with some shale. Sandstone, very fine grained, slightly argillaceous, silty, flaggy to thin bedded, slightly calcareous in part, occasional thin bioclastic, sandy limestone bed.
			Siltstone, sandy, argillaceous, platy to flaggy.
		200	Shale, fissile, silty.
		300	
		400	



820'

Sandstone, light grey and grey buff colour, weathers orange, buff, very fine to fine grained, slightly silty, thick bedded, weathers flaggy.

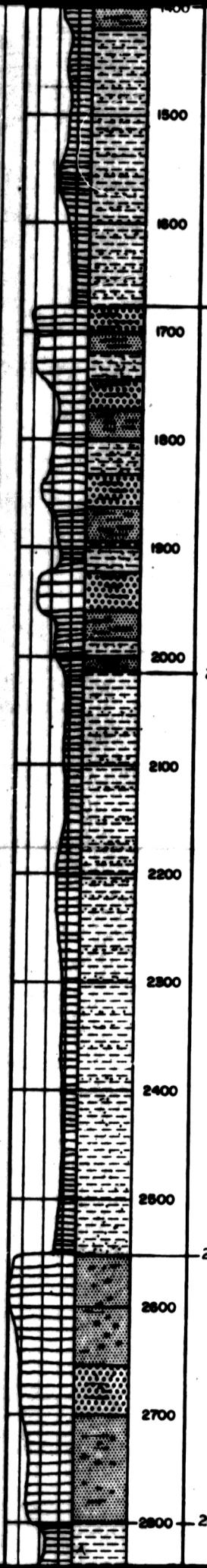
1050'

Interbedded sandstone, siltstone, with some shale, cyclic deposition, as above.

1400'

Shale, medium grey, weather light to medium grey, fissile, silty.

2 of



Shale, medium grey, weather light to medium grey, fissile, silty.

1680' ———————————————————

Interbedded cyclical beds of sandstone, siltstone, and shale, similar to 1050' to 1400' interval.

2010' ———————————————————

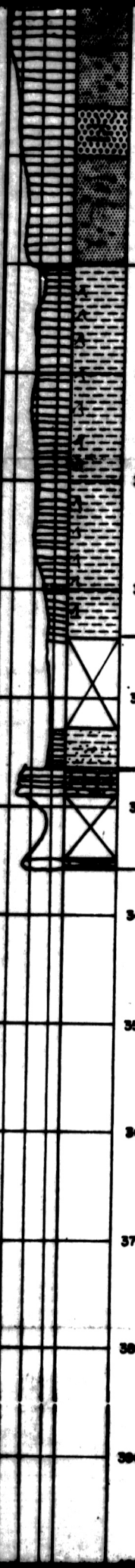
Shale, medium grey and olive grey colour, weathers medium grey, slightly silty to silty, fissile, iron stained in part.

2550' ———————————————————

Siltstone, dark grey to dark grey brown, weathers buff, resistant unit, thin bedded, grades to sandstone in part, many orange specks throughout.

2800' ———————————————————

Shale, black, weathers some, slightly silty in part, siliceous.



2600

Siltstone, dark grey to dark grey brown, weathers buff, resistant unit, thin bedded, grades to sandstone in part, many orange specks throughout.

2700

2800

2800' ——————————————————————

Shale, black, weathers same, slightly silty in part, siliceous.

2900

3000

3100

3140' ——————————————————————

Shale, black, very papery, slightly silty, selenite along bedding planes.

3200

3260' —— DEVONIAN & OLDER CARBONATE UNIT ——————————

Limestone, dark grey, weathers same with some buff, microcrystalline to bioclastic, argillaceous, rubbly, flaggy to thin bedded, very fossiliferous.

3300

3350' —— Base of Measured Section ——————————

Limestone, similar to above, slightly less bioclastic content, trace dolomitic.

3400

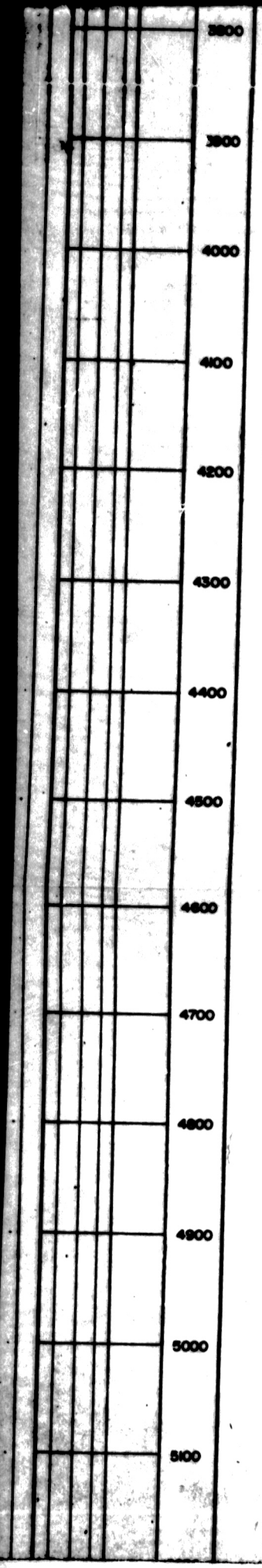
3500

3600

3700

3800

3900


3800
3900
4000
4100
4200
4300
4400
4500
4600
4700
4800
4900
5000
5100

LOG OF OUTCROP SECTION

STATION NO. 11

SHELDON RIDGE

LOCATION: LSD.. SEC.. TWP.. RGE.. W. M.
UNIT ZONE N.T.S.
SEC. B-63 LAT 69°10'... LONG. 131°15'

Description of location: Measured from south to north across Skeleton ridge.

ELEVATION:

MEASURED: July, 1961
METHOD: Tape & Brunton

FORMATIONS

DEVONIAN	2490'+
[illegible] Formation	10'±
Hume Formation	830'
Bear Rock Formation	1650'
SILURIAN - ORDOVICIAN	2450'
Ronning Formation	2450'
CAMBRIAN - PRECAMBRIAN	100'+

TO ACCOMPANY REPORT

Surface Geology of the Peel Plateau Area.

BY: Imperial Oil Limited

DATE: 1961

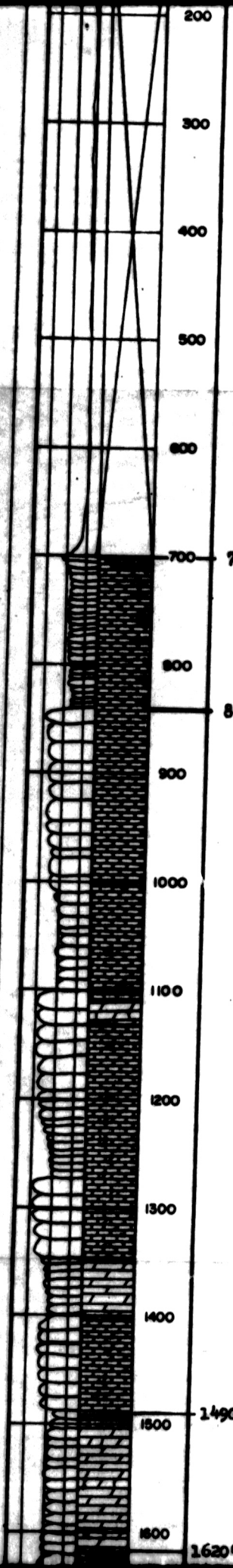
LEGEND

Coal | Salt | Anhydrite | Dolomite | Limestone | Massive Chert | Conglomerate | Sandstone | Siltstone | Shale

IMPERIAL OIL LIMITED EXPLORATION DEPARTMENT PEACE RIVER DISTRICT

107

Res.	Lith.	Footage	Description
		0	0' DEVONIAN [illegible] Formation
			Shale, black, weathers dark grey, silty, poorly exposed.
			10' Hume Formation
		100	Limestone, microcrystalline bioclastic, medium to dark grey, weathers pale yellow-brown, thick bedded, fossiliferous.
			130'
		200	
		300	
		400	



Concealed; probable fault in covered interval ?

700' ——————————————————————

Limestone, dark grey, weathers light grey, microcrystalline bioclastic, slightly argillaceous, slightly dolomitic in part, medium to thick bedded, fossiliferous in part.

840' ——————————————————— Bear Rock Formation ———————————————————

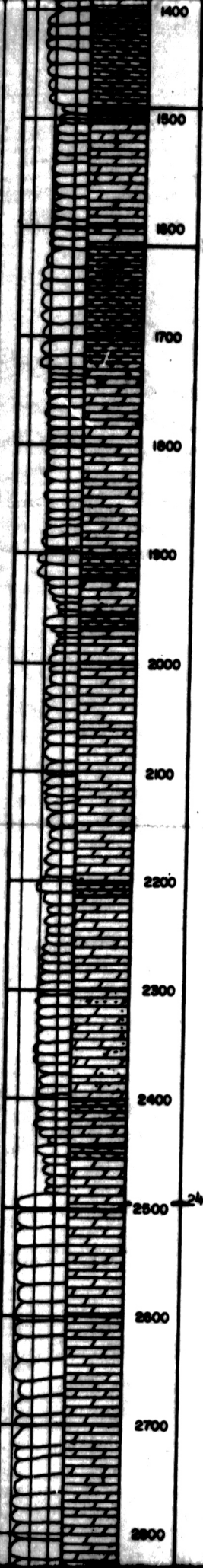
Limestone, pale brown, weathers light grey, microcrystalline, trace pelletal, thick bedded, interbedded with:
Dolomite, pale brown, weathers light grey, microcrystalline, thick bedded, laminated in part.

2 of

1490' ——————————————————————

Dolomite, dark grey, weathers pale yellow brown, microcrystalline, calcareous in part, some very poorly preserved fossils.

1620' ——————————————————————



1490'

Dolomite, dark grey, weathers pale yellow brown, microcrystalline, calcareous in part, some very poorly preserved fossils.

1620'

Limestone, dark grey, weathers pale yellow brown to light grey, microcrystalline bioclastic, abundant crinoid fragments, massive, pelletal at base.

Dolomite, pale brown to dark grey, weathers pale yellow brown, microcrystalline, slightly calcareous, highly fractured with abundant white calcite as infill, traces porosity.

30

2498'

SILURIAN - ORDOVICIAN
Manning Formation

Dolomite, pale yellow brown to yellow grey, weathers light grey, very fine crystalline, medium crystalline in part, scattered vugs, thick bedded to massive, some chert stringers at base.

massive, some chert stringers at base.

2700

2800

2900

3000

3040' _____

Dolomite, medium to light grey weathering, pale brown fresh, microcrystalline, trace calcareous, slightly silty, thick bedded.

3100

3200

3300

3400

3500

3540' _____

Limestone, olive grey, medium to light grey weathering, microcrystalline, traces bioclastic, slightly dolomitic, very slightly silty, weathers platy, thick bedded.
Dolomite at 3590' - 3635', as above.

3600

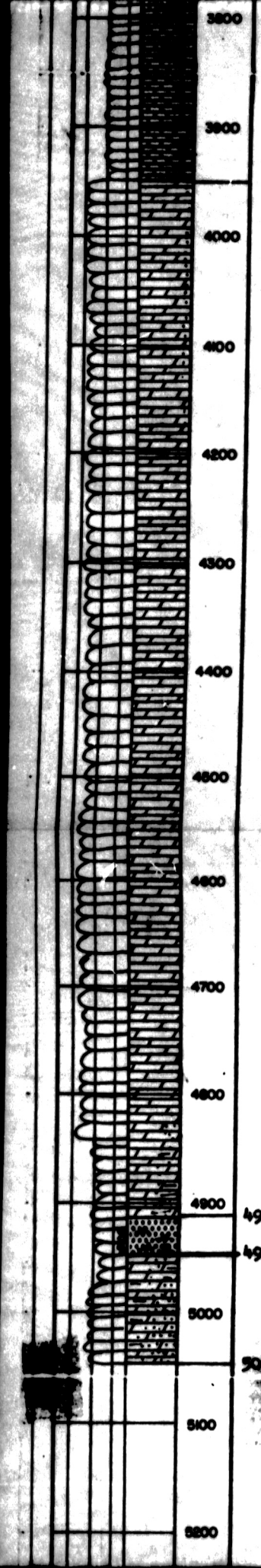
3700

3800

3900

3950' _____

4000



3950'

Dolomite, yellow grey, weathers medium to light grey, microcrystalline, very fine crystalline in part, traces silt, trace calcareous in part, massive, basal 60' traces to very slightly sandy.

4910'

Sandstone, quartzite, conglomerate at base, fine grained, dolomite cemented.

4940' CAMBRIAN - PRECAMBRIAN

Dolomite, olive grey to reddish brown, weathers same, microcrystalline, slightly sandy and silty, thin shale partings, thick bedded, more platy towards base.

5045' Base of Measured Section

1505

LOG OF OUTCROP SECTION

STATION NO. 12 & 13

HOUSTON RIVER

LOCATION: LSD.. SEC.... TWP. RGE. W. M.
UNIT ZONE N.T.S.
SEC. A-35 LAT 65°30' .... LONG. 131°15'

Description of location: Measured along the westerly tributory of Houston River and on ridge 4 miles west.

ELEVATION: MEASURED: July, 1961
METHOD: Tape & Brunton

FORMATIONS

CRETACEOUS	30'+
DEVONIAN	
Imperial Formation & Older	2300'
DEVONIAN & OLDER CARBONATE UNIT	4905'
CAMBRIAN - PRECAMBRIAN	175'+

TO ACCOMPANY REPORT

Surface Geology of the Peel Plateau Area.

BY: Imperial Oil Limited

DATE: 1961

DESCRIBED

BY: PR 2 DATE: 1961

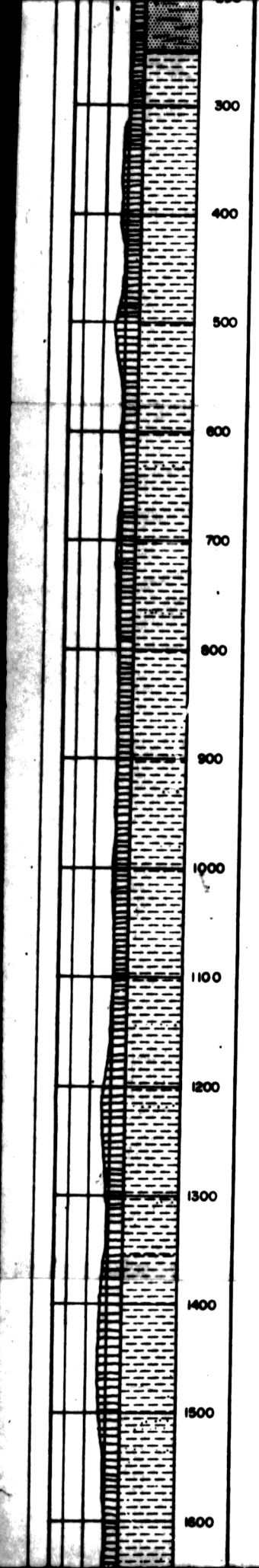
LEGEND

Coal | Salt | Anhydrite | Dolomite | Limestone | Massive Chert | Conglomerate | Sandstone | Siltstone | Shale

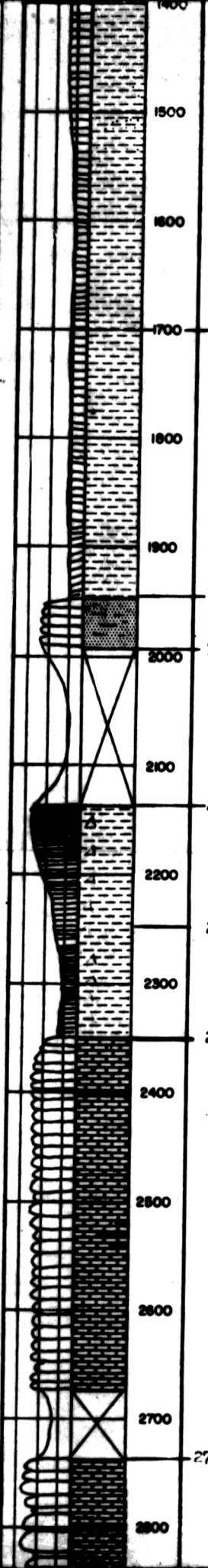
IMPERIAL OIL LIMITED EXPLORATION DEPARTMENT PEACE RIVER DISTRICT

Res.	Lith.	Footage	Description
		0	0' CRETACEOUS Sandstone, grey to buff, weathers brownish buff, lithic feldspathic and quartz grains, very fine to fine grained, thin bedded.
		100	30' DEVONIAN Imperial Formation & Older ? Siltstone, gradi g to very silty shale, weathers dull grey and rusty grey.
		200	
		300	
		400	

1 of 1



Mainly shale with some siltstone beds, occasional limestone bed. Outcrop poor, this interval was not examined to closely.



1700' —

Shale, medium grey, weathers light to medium grey, fissile, slightly silty.

1940' —

Siltstone, dark grey, weathers buff to orange, sandy, medium bedded.

1990' —

Concealed.

2130' —

Shale, black, weathers black, yellow efflorescence, siliceous, fissile to blocky.

2242' —

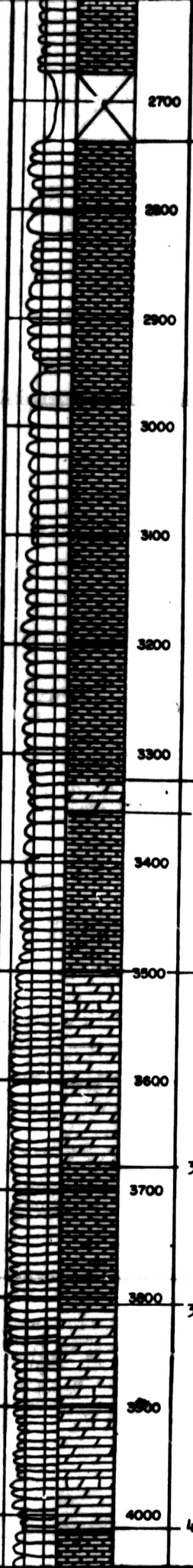
Shale, dark grey, light grey to white weathering, fissile, minor pyrite.

2350' — DEVONIAN & OLDER CARBONATE UNIT —

Limestone, dark grey brown, weathers buff grey, microcrystalline, minor bioclastic, slightly argillaceous in part, mainly slabby bedding, fossiliferous.

2730' —

Limestone, medium to dark brown, microcrystalline, some bioclastic, pelletal in part, flaggy to slabby bedding, a few interbeds of brown, microcrystalline dolomite, occasional stylolites.



2730'

Limestone, medium to dark brown, microcrystalline, some bioclastic, pelletal in part, flaggy to slabby bedding, a few interbeds of brown, microcrystalline dolomite, occasional stylolites.

3320'

Dolomite, light brown, weathers buff brown, microcrystalline.

3335'

Limestone, as above.

3500'

Dolomite, light brown and dark brown, weathers buff and brown, microcrystalline, calcareous, flaggy bedding, minor calcite as blebs and in veins.

3680'

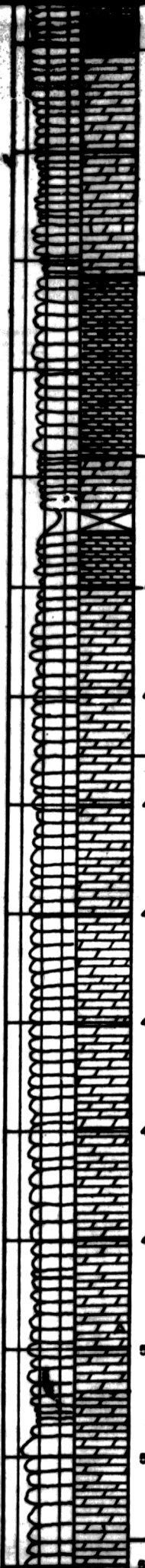
Limestone, dark brown to dark brown black, weathers grey and grey brown, argillaceous, slightly dolomitic, slabby bedding.

3803'

Dolomite, medium to dark brown, weathers brown, fine to microcrystalline, calcareous, slabby bedding, a few interbeds of microcrystalline limestone.

4010'

Limestone, light to dark brown, weathers grey, microcrystalline, slabby to blocky bedding, minor coarse crystalline dark brown dolomite.



3803'

Dolomite, medium to dark brown, weathers brown, fine to microcrystalline, calcareous, slabby bedding, a few interbeds of microcrystalline limestone.

4010'

Limestone, light to dark brown, weathers grey, microcrystalline, slabby to blocky bedding, minor coarse crystalline dark brown dolomite.

4185'

Limestone and dolomite, as above.

4300'

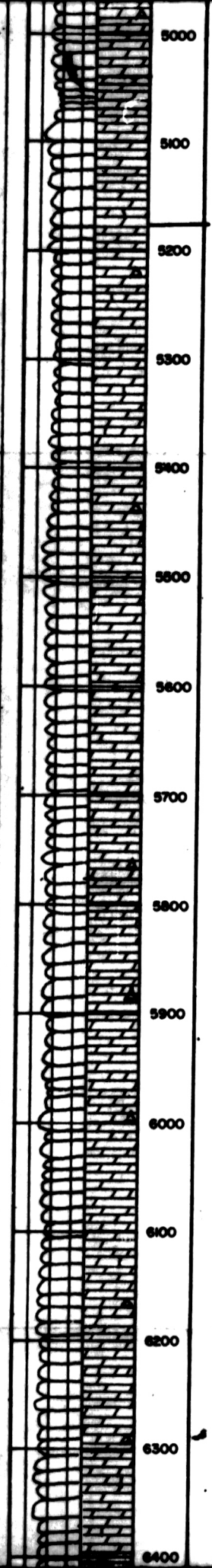
Dolomite, light grey brown, weathers grey-buff to orange, flaggy bedding, slightly silty.

4465'

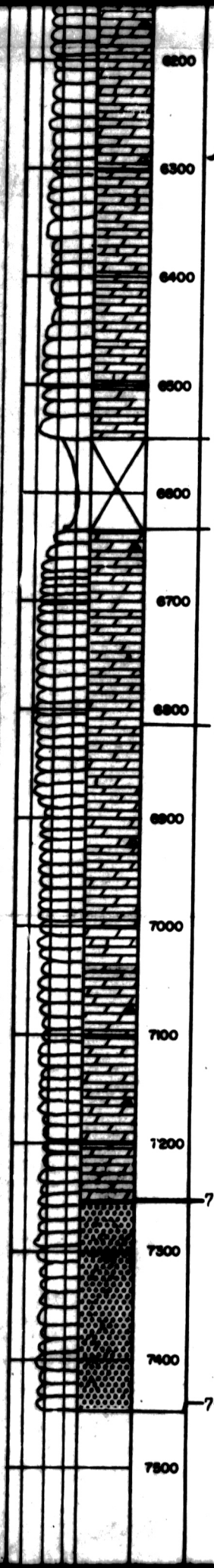
Dolomite, light to medium grey brown, grey to brownish grey weathering, microcrystalline to fine crystalline, some coarser crystalline, occasional beds with chert stringers and nodules, thin to massive slabby bedding, fossiliferous in part, <u>some vuggy porosity.</u>

5170'

151



Dolomite, as above.



6550' ——————————

Concealed.

6635' ——————————

Dolomite, light grey, grey weathering, micrite coarse crystalline, trace calcareous, trace calcareous, slabby to block bedded, traces vuggy porosity, traces bitumen.

6810' ——————————

Dolomite, grey and light to dark grey brown, weathers buff grey and grey to grey brown, microcrystalline to fine crystalline, slabby to blocky bedding, chert nodules and stringers, partly mottled.

7255' —————— CAMBRIAN - PRECAMBRIAN ——————

Sandstone, white, grey, red, maroon, grey-black to red black weathering, silty, fine to medium quartz grains, ferruginous, laminated.

7430' —————— Base of Section ——————

7 of 7

LOG OF OUTCROP SECTION

STATION NO. 14

TARFU CREEK

LOCATION: LSD. SEC. TWP. RGE. W. M.
UNIT ZONE N.T.S.
SECO-36 LAT 65°10' LONG.132°00'

Description of location: Measured along small creek.

ELEVATION

MEASURED: July, 1961
METHOD: Tape & Brunton

FORMATIONS

DEVONIAN
Imperial Formation & Older 885'+

DEVONIAN & OLDER CARBONATE UNIT 2515'+

TO ACCOMPANY REPORT

Surface Geology of the Peel Plateau Area.

BY: Imperial Oil Limited

DATE: 1961

DESCRIBED

BY: PR 2 DATE: 1961

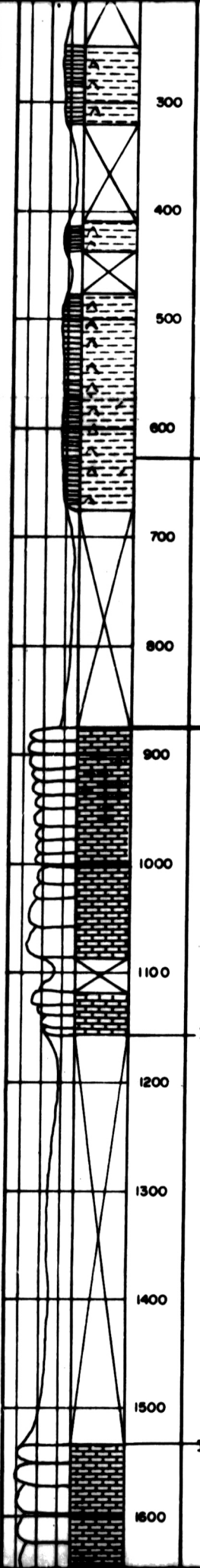
LEGEND

Coal | Salt | Anhydrite | Dolomite | Limestone | Massive Chert | Conglomerate | Sandstone | Siltstone | Shale

IMPERIAL OIL LIMITED EXPLORATION DEPARTMENT PEACE RIVER DISTRICT

Res.	Lith.	Footage	Description
		0	0' DEVONIAN Imperial Formation & Older Shale, black, weathers rusty black, platy to fissile siliceous, minor silty dolomite concretions and beds.
		100	
		200	
		300	
		400	

1 of



625'

Shale, black, weathers rust-black, fissile, minor slightly dolomitic shale.

885' DEVONIAN & OLDER CARBONATE UNIT

Limestone, light to dark brown, some black microcrystalline, minor bioclastic and pelletal, abundant chert at 915' to 980'. May be fault?

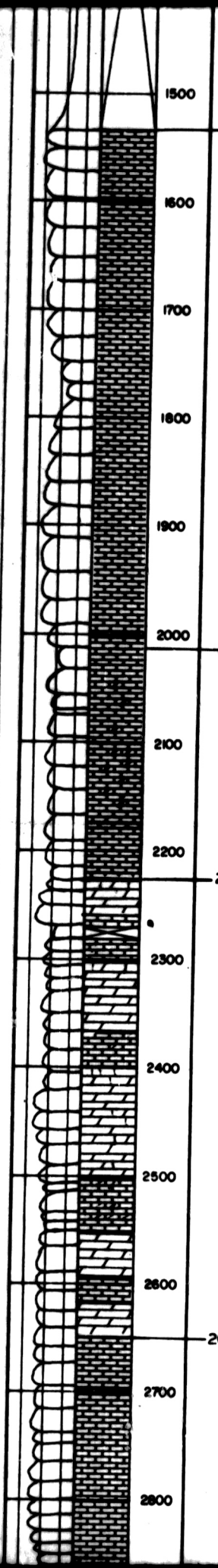
1155'

Concealed.

Limestone, weathers rust buff?

1535'

Limestone, light brown to brown, weathers grey, microcrystalline, pelletal in part, slabby to massive, mainly blocky weathering.



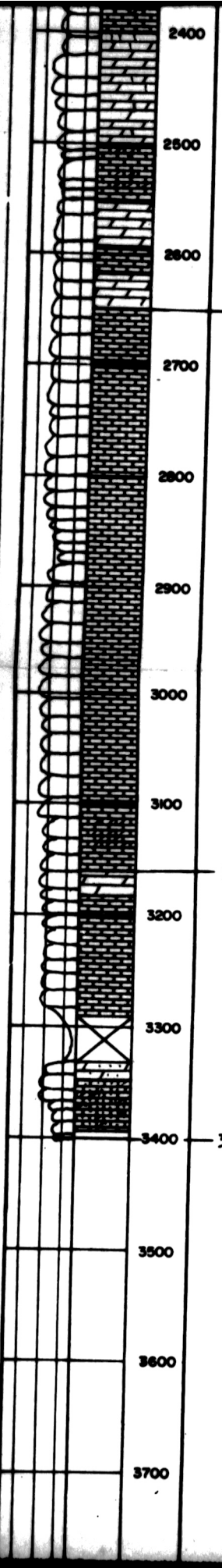
Limestone, light brown to brown, weathers grey, microcrystalline, pelletal in part, slabby to massive, mainly blocky weathering.

Interbedded dolomitic limestone and calcareous dolomite.

Dolomite, light grey to light and dark brown, weathers grey, very fine crystalline, abundant relict pelletal textures, slabby to blocky, calcareous, with interbedded limestones; as above.

30

Limestone, medium to dark brown, weathers grey, microcrystalline, minor pelletal, minor bioclastic, slabby to blocky dolomitic in part, some large crinoid stems.



Limestone, medium to dark brown, weathers grey, microcrystalline, minor pelletal, minor bioclastic, slabby to blocky dolomitic in part, some large crinoid stems.

Interbedded dolomitic limestones and calcareous dolomites, as above, lower part of the unit has a grey and brown mottled weathering, slightly silty and sandy towards base, some rust buff weathering at 3290'.

Base of Outcrop

LOG OF OUTCROP SECTION

STATION NO. 15.

CATHEDRAL RIDGE

LOCATION: LSD.... SEC.... TWP.... RGE.... W. M.
UNIT ZONE N.T.S.
SEC. J-22 LAT 65°20'..... LONG. 132°45'

Description of location: Measured along a ridge along the Yukon N.W.T. border on a tributory of the Snake River in the Back Bone Ranges.

ELEVATION: MEASURED: August, 1961
METHOD: Tape and Brunton

FORMATIONS

DEVONIAN & OLDER CARBONATE UNIT 2650'+
CAMBRIAN - PRECAMBRIAN

TO ACCOMPANY REPORT

Surface Geology of the Peel Plateau Area.

BY: Imperial Oil Limited
DATE: 1961

DESCRIBED

BY: [illegible] DATE: 1961

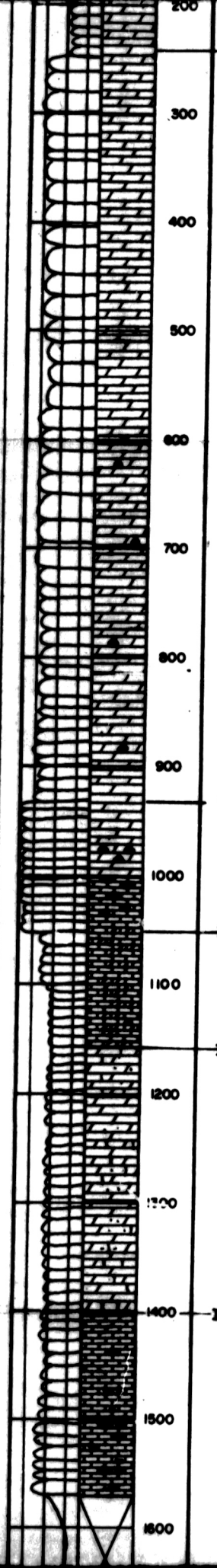
LEGEND

Coal · Salt · Anhydrite · Dolomite · Limestone · Massive Chert · Conglomerate · Sandstone · Siltstone · Shale

IMPERIAL OIL LIMITED EXPLORATION DEPARTMENT PEACE RIVER DISTRICT

Res.	Lith.	Footage	Description
		0	0' — DEVONIAN & OLDER CARBONATE UNIT
			Dolomite, light brown to dark grey, microcrystalline, some fine crystalline, calcareous in part, slabby to flaggy.
		100	
		200	
			245'
		300	Dolomite, light to dark brown, weathers light grey to light brown grey, fine to medium crystalline, fossiliferous, some block chert.
		400	

1 of 1



245'

Dolomite, light to dark brown, weathers light grey to light brown grey, fine to medium crystalline, fossiliferous, some block chert.

925'

Interbedded dolomite and black chert, changes to limestone and chert towards base of the interval.

1050'

Limestone, dark grey brown to black, weathers brown grey, microcrystalline, minor bioclastic, silty, some block chert nodules, dolomitic, fossiliferous.

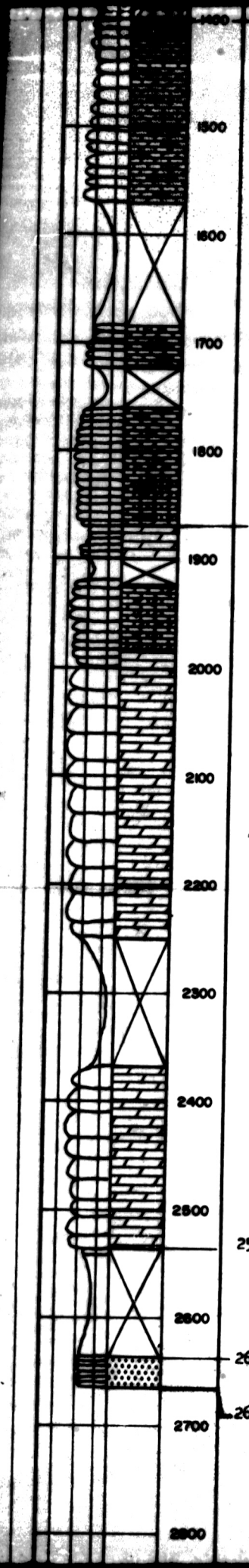
1150'

Dolomite, dark brown to black, weathers brown grey, microcrystalline to fine crystalline, calcareous, silty, slabby to flaggy.

1400'

Limestone, dark brown grey to black, weathers rust grey, microcrystalline, minor pelletal, slabby to flaggy, argillaceous, graptolites, minor block chert, minor shale interbeds, Paraconglomerate at base.

2 of



1400'

Limestone, dark brown grey to black, weathers rust grey, microcrystalline, minor pelletal, slabby to flaggy, argillaceous, graptolites, minor block chert, minor shale interbeds, Paraconglomerate at base.

1875'

Dolomite, light to dark grey, weathers buff grey, fine to microcrystalline, slabby to massive, scattered fossils, fetid, some interbedded limestones at top.

2535'

Concealed, talus indicates, dolomite, blue grey microcrystalline.

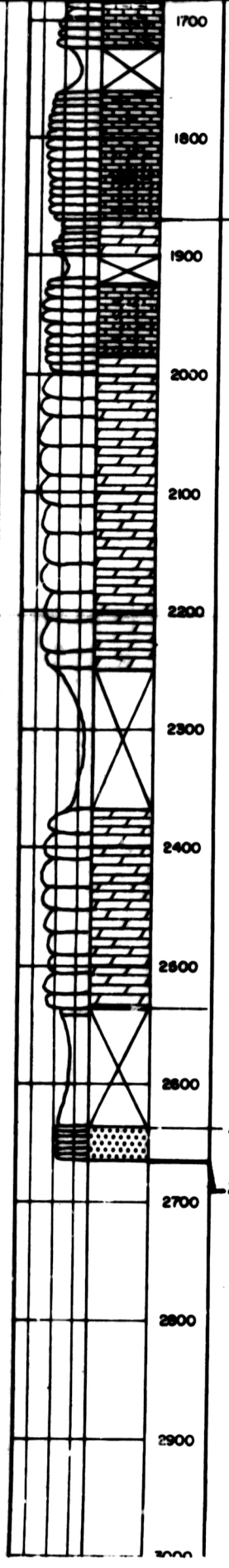
2630'

Sandstone, quartzose, maroon to rust grey, slightly conglomeratic, mainly medium grained, slabby.

2650' CAMBRIAN - PRECAMBRIAN

Below the sandstone there is a very thick unit of feldspathic sandstone, angular unconformity.

30



1875'

Dolomite, light to dark grey, weathers buff grey, fine to microcrystalline, slabby to massive, scattered fossils, fetid, some interbedded limestones at top.

2535'

Concealed, talus indicates, dolomite, blue grey microcrystalline.

2630'

Sandstone, quartzose, maroon to rust grey, slightly conglomeratic, mainly medium grained, slabby.

2650' CAMBRIAN - PRECAMBRIAN

Below the sandstone there is a very thick unit of feldspathic sandstone, angular unconformity.

LOG OF OUTCROP SECTION

STATION NO. 16

BALD RIDGE

LOCATION: LSD.. SEC.. TWP.. RGE.. W. M.
UNIT ZONE N.T.S.
SEC.K-21 LAT 69°40' LONG. 132°30'

Description of location: Section was measured along a north south ridge at the fount of the Mackenzie Mountains, 8.5 miles west of the Yukon border.

ELEVATION: MEASURED
METHOD

FORMATIONS

DEVONIAN & OLDER CARBONATE UNIT 5610'+
CAMBRIAN - PRECAMBRIAN 90'+

TO ACCOMPANY REPORT

Surface Geology of the Peel Plateau Area.

BY: Imperial Oil Limited

DATE: 1961

LEGEND

Coal | Salt | Anhydrite | Dolomite | Limestone | Massive Chert | Conglomerate | Sandstone | Siltstone | Shale

IMPERIAL OIL LIMITED EXPLORATION DEPARTMENT PEACE RIVER DISTRICT

Res.	Lith.	Footage	Description
		0	0' DEVONIAN & OLDER CARBONATE UNIT
		100	Limestone, medium grey brown, weathers light grey, mainly microcrystalline, bioclastic in part, many small blebs of clear calcite, some scattered fossils, medium to thick bedded.
		200	
		300	
		400	Limestone, as above, with some pelletal microcrystalline, dolomitic in part.

1 of 1

200

300

400

Limestone, as above, with some pelletal microcrystalline, dolomitic in part.

500

600

700 — 700' ———————————

Limestone, medium grey brown to brown, weathers same with some yellow buff, microcrystalline to microcrystalline bioclastic, slightly dolomitised to very dolomitic, some interbedded dolomite, medium to thick bedded, becoming slightly argillaceous towards base of interval, fossiliferous in part.

800

900

1000

1100

1200

1240' ———————————

Limestone, dark grey brown, weathers dark grey, microcrystalline, very occasional thin bioclastic band, slightly argillaceous, non resistant unit.

1300

1400

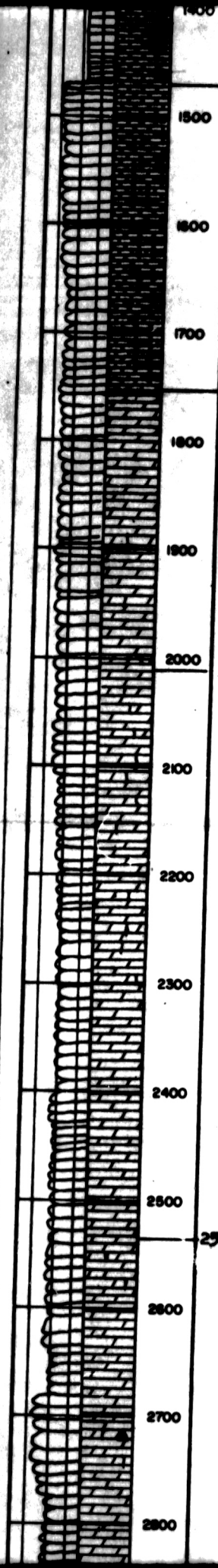
1470' ———————————

1500

Limestone, medium to dark grey brown, light and dark grey banded weathering, microcrystalline to bioclastic in part, with some very fine to fine crystalline dolomite interbeds, increasing towards base.

1600

2 of



1470'

Limestone, medium to dark grey brown, light and dark grey banded weathering, microcrystalline to bioclastic in part, with some very fine to fine crystalline dolomite interbeds, increasing towards base.

1760'

Dolomite, brown to light grey, weathers in bands of light and dark grey, very fine to fine crystalline, some calcite infilled vugs.

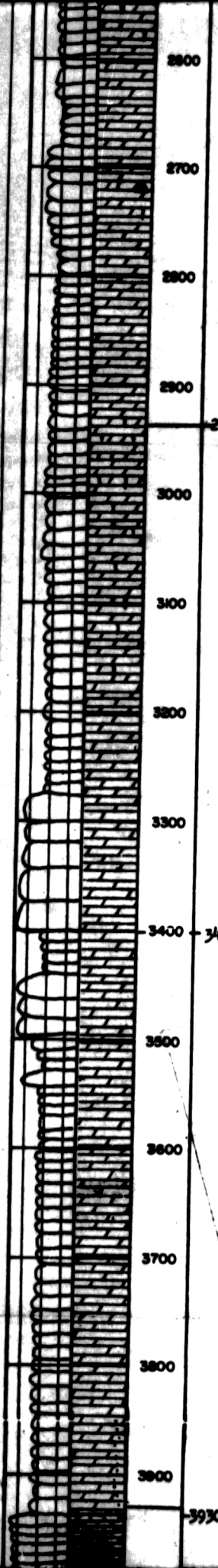
2010'

Dolomite, as above, with some medium crystalline thin to thick bedded, trace silty.

30

2530'

Dolomite, light grey, medium grey, grey buff and brown colours, weathers light to medium grey, micro to very fine crystalline, some chert stringers and nodules, flaggy to medium bedding.



2600

2700

2800

2900

2930'

Dolomite, light grey, medium grey, grey buff and brown colours, weathers light to medium grey, micro to very fine crystalline, some chert stringers and nodules, flaggy to medium bedding.

3000

3100

3200

3300

3400

3400'

Dolomite, medium to dark grey, light and medium grey weathering bands, slightly calcareous, very fine to medium crystalline, silicified colonial corals.

3500

3600

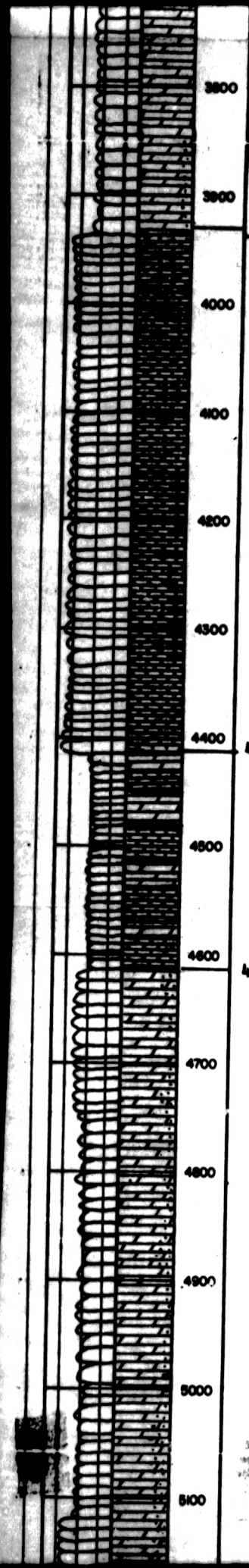
3700

3800

3900

3930'

Dolomite, medium to dark grey brown, weathers a mottled light and dark grey, very fine to fine crystalline, some coarser crystalline in part, silicified corals, occasional chert nodule, thin to thick bedded.



3930'

Limestone, medium to dark grey, weathers light grey, microcrystalline, occasionally biodlastic, slightly silty and sandy in part, few interbeds of dolomite, flaggy to medium bedded.

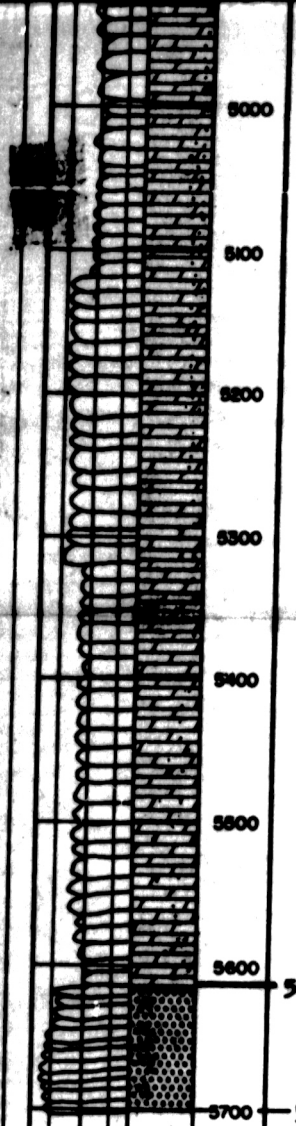
150

4410'

Limestone, as above, with interbedded dolomite, fine to very fine crystalline.

4610'

Dolomite, light to medium grey and grey buff, weathers light grey brown and light to medium grey, micro to fine crystalline, some scattered chert nodules, medium bedded, silty, becomes coarser and more massive towards base.



5000

Dolomite, light to medium grey and grey buff, weathers light grey brown and light to medium grey, micro to fine crystalline, some scattered chert nodules, medium bedded, silty, becomes coarser and more massive towards base.

5100

5200

5300

5400

5500

5600

5610' — CAMBRIAN - PRECAMBRIAN

Sandstone, quartzose, siliceous cement, silty, slightly hematitic, well rounded and sorted grains, thin to medium bedded.

5700 — 5700' — Base of Outcrop

5800

5900

6000

6100

6200

6300

1676

LOG OF OUTCROP SECTION

STATION NO. 17

PACK RAT CREEK

LOCATION: LSD. ... SEC. ... TWP. ... RGE. ... W. ... M.
UNIT ... ZONE ... N.T.S. ...
SEC. [illegible] LAT. 65° [illegible] ... LONG. 133°19'

Description of location: Section measured along Pack Rat Creek and ridge top near Pack Rat Creek.

ELEVATION:

MEASURED METHOD: Tape & Brunton, Plane table

FORMATIONS

[illegible] Imperial Formation	450'+
DEVONIAN & OLDER CARBONATE UNIT	6120'+
CAMBRIAN - PRECAMBRIAN	250'

TO ACCOMPANY REPORT

Surface Geology of the Peel Plateau Area.

BY: Imperial Oil Limited

DATE: 1961

DESCRIBED

BY: PR 2

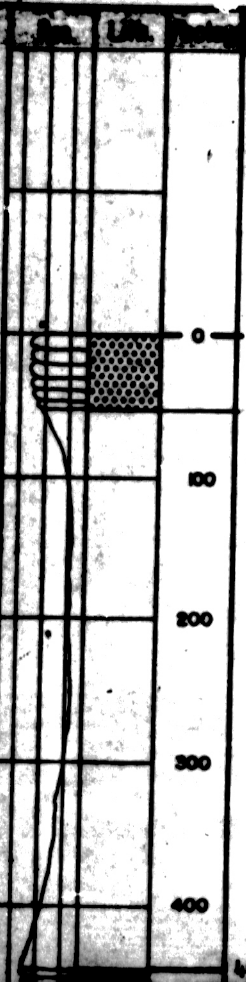
DATE: 1961

LEGEND

Coal — Salt — Anhydrite — Dolomite — Limestone — Massive Chert — Conglomerate — Sandstone — Siltstone — Shale

IMPERIAL OIL LIMITED — EXPLORATION DEPARTMENT — PEACE RIVER DISTRICT

1 of



Description

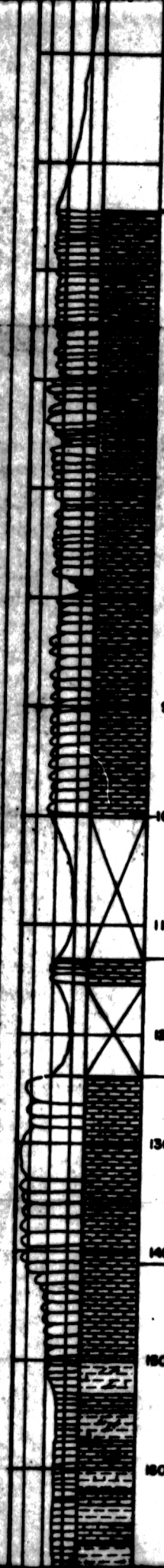
0' — DEVONIAN
Imperial Formation

± 50' of sandstone at top of this section.

50'

Covered, measured by altimeter.

450' — DEVONIAN & OLDER CARBONATE UNIT



450' — DEVONIAN & OLDER CARBONATE UNIT

Limestone, dark grey and medium grey, weathers buff, microcrystalline to bioclastic, argillaceous, slightly dolomitic, rubbly, fossiliferous, flaggy to medium bedded.

1000' — Concealed.

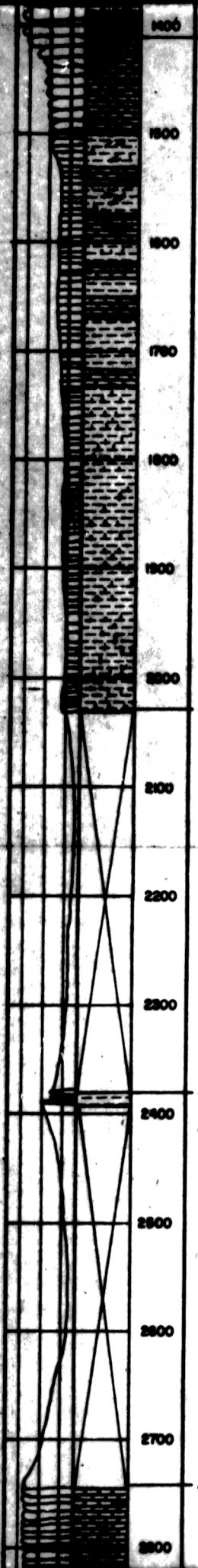
1130' — Limestone, as above.

1150' — Concealed.

1240' — Limestone, bioclastic, some microcrystalline, medium to dark grey, weathers light to medium grey with some buff, trace argillaceous and dolomitic, very fossiliferous, thick bedded, very resistant unit.

1410' — Limestone, microcrystalline, dark grey, weathers dark grey with some buff, argillaceous, rubbly in part, slightly silty, interbedded with shale, dark grey to black, weathers same with some buff, calcareous, grades to limestone in part, fissile to platy. Shale content increases towards the base of the unit.

27



1410'

Limestone, microcrystalline, dark grey, weathers dark grey with some buff, argillaceous, rubbly in part, slightly silty, interbedded with shale, dark grey to black, weathers same with some buff, calcareous, grades to limestone in part, fissile to platy. Shale content increases towards the base of the unit.

2030'

Concealed.

2380'

Shale, black, calcareous, slightly silty.

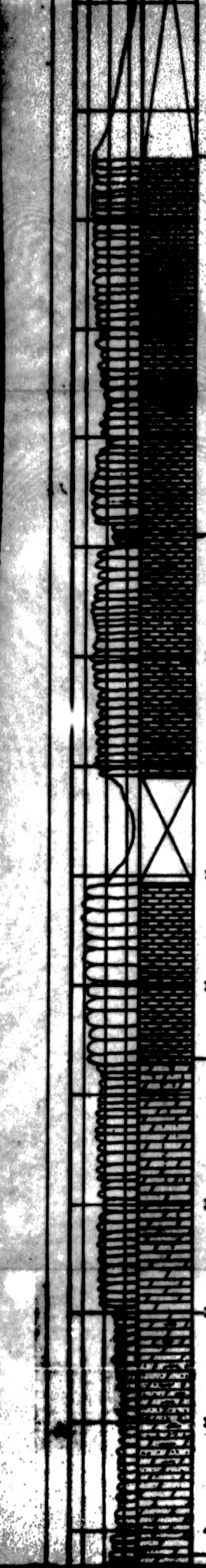
2390'

Concealed.

2740'

Limestone, dark grey, weathers dark grey, microcrystalline, some vague bioclastic, slightly argillaceous and dolomitic, some black shale as very thin interbeds, platy to thin bedded, very brittle, well fractured.

30



2740' —

Limestone, dark grey, weathers dark grey, microcrystalline, some vague bioclastic, slightly argillaceous and dolomitic, some black shale as very thin interbeds, platy to thin bedded, very brittle, well fractured.

3090' —

Limestone, as above, slightly more dolomitic towards base.

140

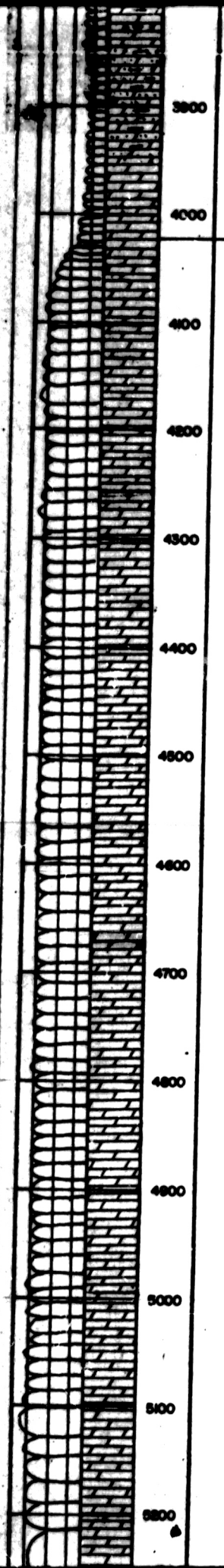
3570' —

Dolomite, light and medium grey, weathers same, very fine to fine crystalline, slightly calcareous to calcareous, thick bedded, interbedded with limestone, medium to dark grey, weathers medium grey, microcrystalline dolomitic.

3800' —

Dolomite, light grey, light greenish grey, and green and maroon, weahters orange, microcrystalline, argillaceous, silty, brittle, subconchoidal fracture, fissile to medium bedded.

4020' —

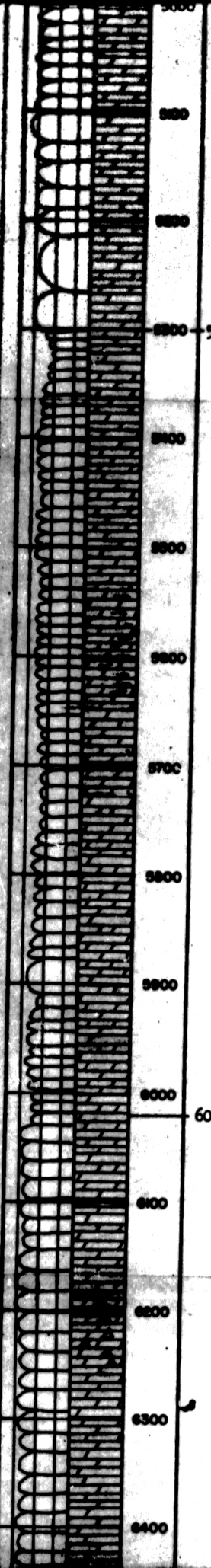


Dolomite, light grey, light greenish grey, and green and maroon, weathers orange, microcrystalline, argillaceous, silty, brittle, subconchoidal fracture, fissile to medium bedded.

4020'

Dolomite, light and medium grey, weathers light grey, microcrystalline to very dense, slightly calcareous in part, trace silty, medium to thick bedded.

15 of

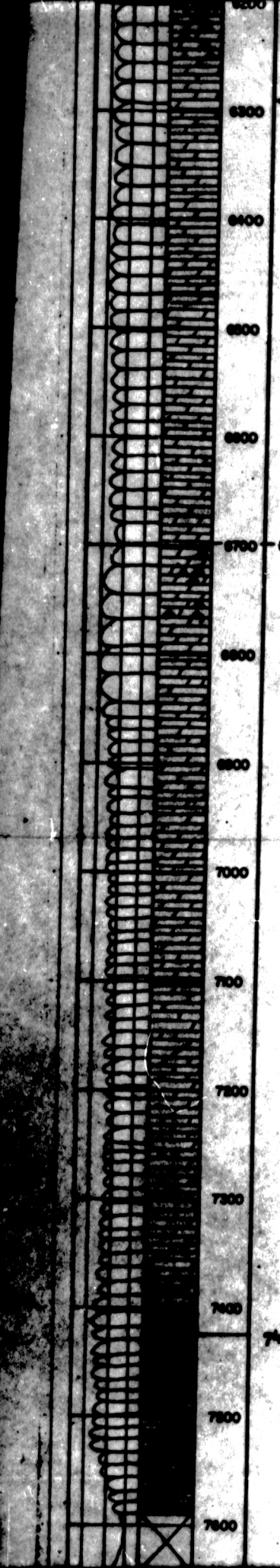


5300'

Dolomite, light to medium grey, weathers buff, microcrystalline to fine crystalline, slightly silty and argillaceous, thin to thick bedded.

6020'

Dolomite, dark grey and grey buff, weathers medium to dark grey, some buff weathering, fine crystalline, some chert as stringers and nodules, bands of grey buff and dark grey dolomite, medium to massive bedded.



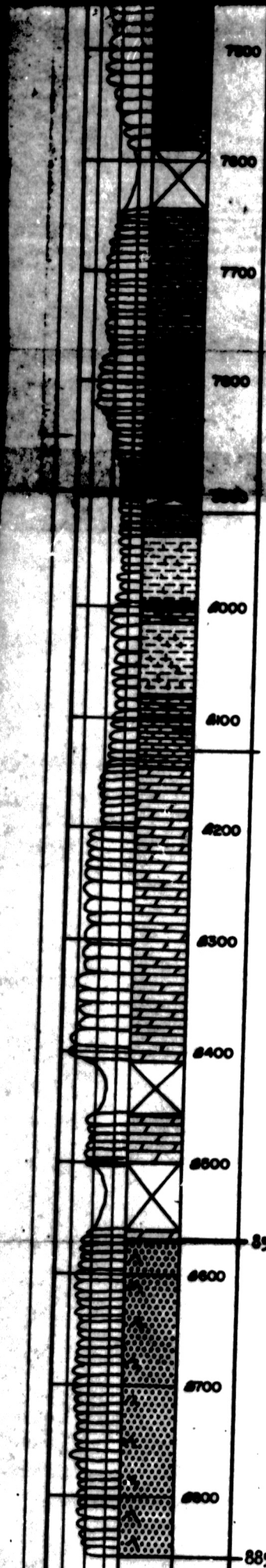
6700'

Dolomite, medium grey, weathers medium grey with some buff, very fine to coarse crystalline, some chert, trace calcareous in part, thick to massive bedded, some vuggy porosity.

7f

7420'

Limestone, dark grey brown to dark grey, light to dark grey weathering, some buff, very argillaceous in part, microcrystalline, graptolitic, covered interval appears to be shale, traces bioclastic, some interbeds of shale towards base.



Limestone, dark grey brown to dark grey, light to dark grey weathering, some buff, very argillaceous in part, microcrystalline, graptolitic, covered interval appears to be shale, traces bioclastic, some interbeds of shale towards base.

7920'

Limestone, as above, with shale, black, weathers black, calcareous, fissile, very poor exposure.

8130'

Dolomite, medium to dark grey, weathers medium grey, fine crystalline, slightly silty in part, occasional black chert stringer, flaggy to thick bedded.

8570'

CAMBRIAN - PRECAMBRIAN

Sandstone, light to medium grey, weathers light grey to medium grey, quartzose, siliceous cement, hematitic, maroon colour, slightly glauconitic and feldspathic thick bedded.

8850'

Base of Outcrop

8 of 8

LOG OF OUTCROP SECTION

STATION NO. 18

NOISY CREEK

LOCATION: LSD. SEC. TWP. RGE. W. M.
UNIT ZONE N.T.S.
SEC 0-57 LAT 65°30' LONG. 134°00'

Description of location: Measured along eastern limb and southern extension of Noisy Creek Syncline.

ELEVATION

MEASURED: August, 1961
METHOD: Plane table, tape & Brunton

FORMATIONS

DEVONIAN
Imperial Formation & Older 1245'+
DEVONIAN & OLDER CARBONATE UNIT 5025'
CAMBRIAN - PRECAMBRIAN 280'+

TO ACCOMPANY REPORT

Surface Geology of the Peel Plateau Area.

BY: Imperial Oil Limited
DATE: 1961

DESCRIBED

BY: PR 2 DATE: 1961

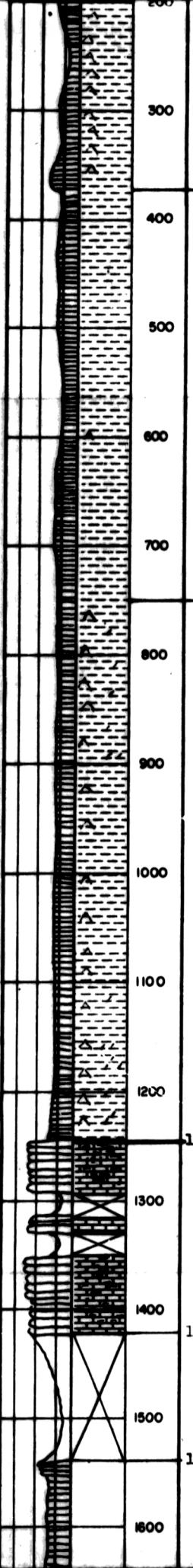
LEGEND

Coal | Salt | Anhydrite | Dolomite | Limestone | Massive Chert | Conglomerate | Sandstone | Siltstone | Shale

IMPERIAL OIL LIMITED **EXPLORATION DEPARTMENT** **PEACE RIVER DISTRICT**

1 of 1

Res.	Lith.	Footage	Description
		0	0' DEVONIAN Imperial Formation & Older
			Siltstone, medium to dark grey, rusty weathering, trace argillaceous.
			10'
			Shale, black, grey buff to olive grey weathering, siliceous, minor thin interbeds of argillaceous siltstone.
		100	
		200	
		300	
			374'
		400	Shale, black, dark grey to rusty brown, weathering, siliceous, many large nodules of silty dolomite.



374'

Shale, black, dark grey to rusty brown, weathering, siliceous, many large nodules of silty dolomite.

750'

Shale, black, dark grey to rusty brown, weathering, siliceous, many large nodules of silty dolomite.

1245' DEVONIAN & OLDER CARBONATE UNIT

Limestone, dark grey to black, weathers buff, microcrystalline, slightly silty, slightly dolomitic, argillaceous, with interbedded black shale at top.

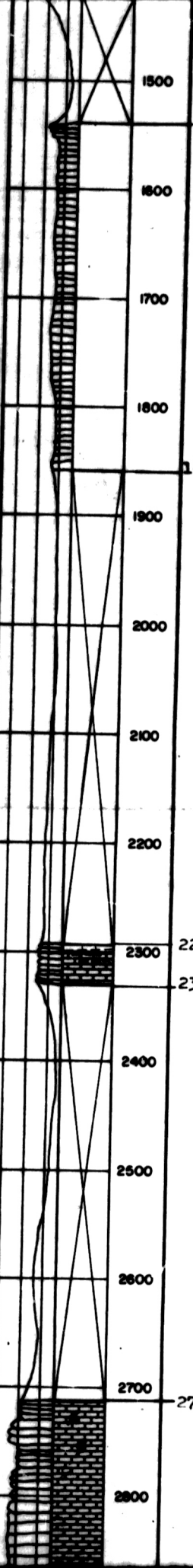
1420'

Concealed.

1535'

Shale, buff brown and medium brown to dark grey-brown, weathers buff, very calcareous.

2 of



Concealed.

1535'

Shale, buff brown and medium brown to dark grey-brown, weathers buff, very calcareous.

1865'

Concealed.

2290'

Interbedded shale and limestone, as above.

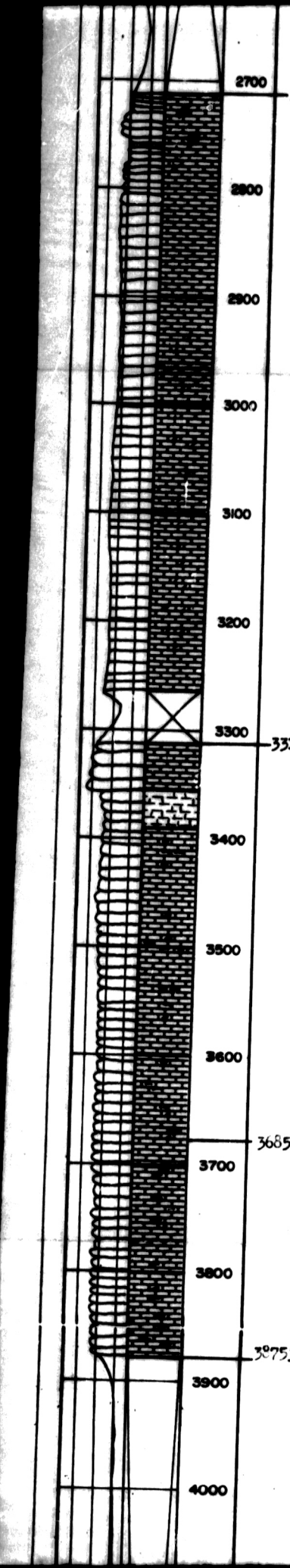
2325'

Concealed.

2710'

Limestone, dark brown to black, slightly dolomitic, slightly argillaceous,

302



2710'

Limestone, dark brown to black, slightly dolomitic, slightly argillaceous, microcrystalline, pelletal in part, traces chert nodules, some silicified corals, flaggy bedding.

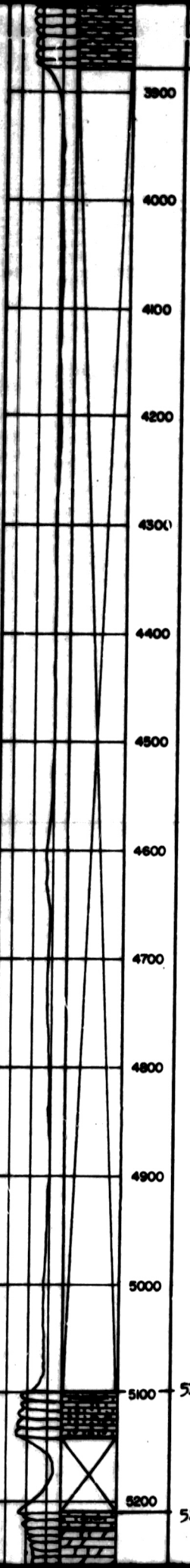
3310'

Interbedded limestone and shale.
Limestone, dark grey brown to black, weathers medium grey brown, microcrystalline, bioclastic in part, trace pyrite, very slightly to slightly silty.
Shale, black, weathers dark grey, fissile, less shale and less argillaceous towards base of interval.

3685'

Limestone, dark grey brown, buff-grey to dark grey-brown weathering, slightly argillaceous and silty, microcrystalline bioclastic, mainly crinoid debris, fossiliferous in part.

3875'



3875'

Concealed.

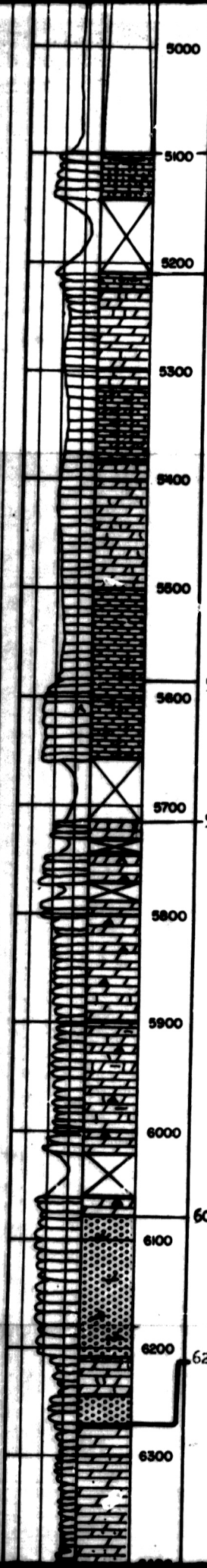
1501

5100'

Limestone, dark grey, weathers medium grey, sandy, slightly argillaceous, microcrystalline, blocky.

5210'

Interbeds limestones and dolomites.



5100'

Limestone, dark grey, weathers medium grey, sandy, slightly argillaceous, microcrystalline, blocky.

5210'

Interbeds limestones and dolomites.
Limestone, dark grey, microcrystalline, traces bioclastic, some silicified fossils.
Dolomite, dark grey brown, weathers grey buff, microcrystalline, calcareous.

5590'

Limestone, as above.

5715'

Dolomite, medium to dark grey, weathers grey buff to brown grey, microcrystalline, slightly silty in part, few chert stringers, calcareous in part.

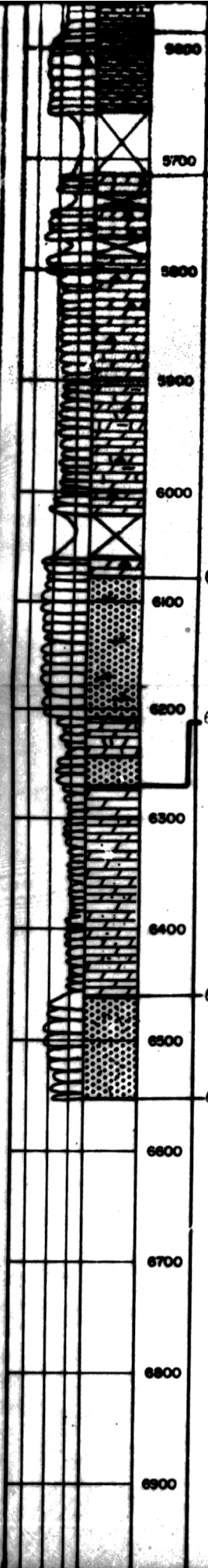
6070'

Probable fault?
Quartzite, white to buff, weathers same, very fine grained, lichen covered, traces dolomite.

6270'

CAMBRIAN-PRECAMBRIAN?

Dolomite, light grey and grey pink, microcrystalline, slightly silty, thin green shale interbeds towards base, trace sandy with sandstone near top, Ordovician-Silurian faulted back on Cambrian-Precambrian?



5590'

Limestone, as above.

5715'

Dolomite, medium to dark grey, weathers grey buff to brown grey, microcrystalline, slightly silty in part, few chert stringers, calcareous in part.

6070'

Probable fault?
Quartzite, white to buff, weathers same, very fine grained, lichen covered, traces dolomite.

6270' CAMBRIAN-PRECAMBRIAN?

Dolomite, light grey and grey pink, microcrystalline, slightly silty, thin green shale interbeds towards base, trace sandy with sandstone near top, Ordovician-Silurian faulted back on Cambrian-Precambrian?

6465'

Quartzite, light grey, lichen covered, slightly silty, thick to massive bedding.

6550' Base of Section

7047

LOG OF OUTCROP SECTION

STATION NO. 19

PROWSE CREEK

LOCATION: LSD. SEC. TWP. RGE. W M.
UNIT ZONE N.T.S.
SEC. 1-58 LAT 69°20' LONG. 135°30'

Description of location: Measured along Prowse Creek.

ELEVATION MEASURED
METHOD

FORMATIONS

DEVONIAN ?
Imperial Formation & Older 9750'+
DEVONIAN & OLDER CARBONATE UNIT 2460'+

TO ACCOMPANY REPORT

Surface Geology of the Pool Plateau Area

BY: Imperial Oil Limited
DATE: 1961

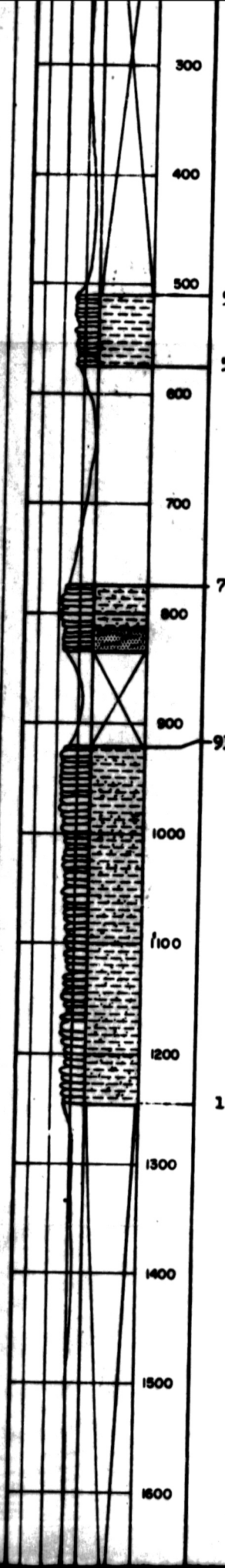
LEGEND

Coal | Salt | Anhydrite | Dolomite | Limestone | Massive Chert | Conglomerate | Sandstone | Siltstone | Shale

IMPERIAL OIL LIMITED EXPLORATION DEPARTMENT PEACE RIVER DISTRICT

1 of 7

Res.	Lith.	Footage	Description
		0	0' DEVONIAN ?
			Imperial Formation & Older
			Sandstone, light grey brown, weathers buff to tan, fine grained, siliceous cement, thick bedded, interbedded with shale, black, fissile, slightly silty.
			60'
		100	
		200	
		300	
			Concealed, probably shale.
		400	



Concealed, probably shale.

510' ——————————

Shale, very slightly silty, olive grey, fissile.

570' ——————————

Concealed, probably shale as above.

770' ——————————

Shale, dark grey, weathers dark olive grey, slightly silty, interbedded with siltstone, olive grey.

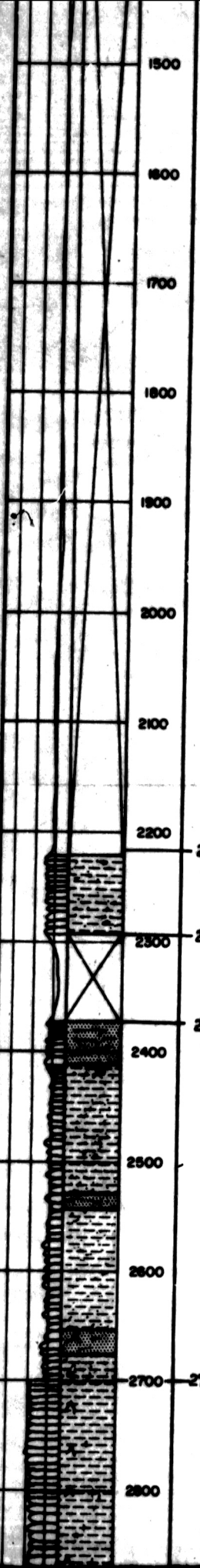
930' ——————————

Shale, as above.

1250' ——————————

Concealed, probably all shale as above.

2 of



Concealed, probably all shale as above.

2220' ——————————

Shale, as above.

2290' ——————————

Concealed.

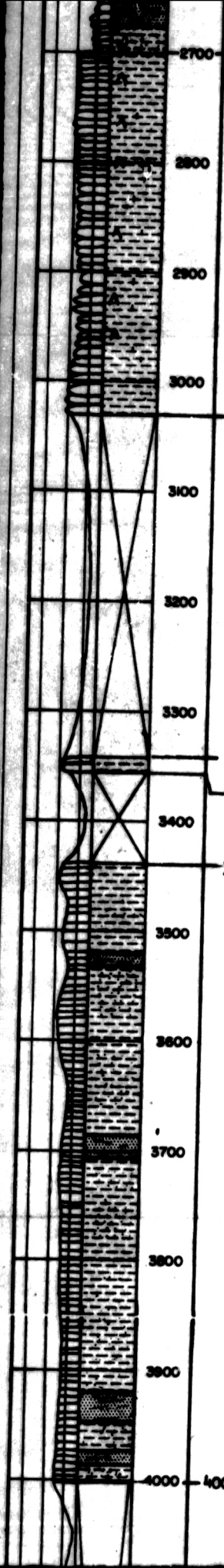
2370' ——————————

Shale, dark grey, weathers dark brown grey, silty, fissile to platy, interbedded with siltstone, dark grey, weathers dark brown, slightly argillaceous, laminated.

2700' ——————————

Shale, black, weathers tan to dark red brown, scattered limestone nodules very slightly siliceous.

30



2700' ———————————————————

Shale, black, weathers tan to dark red brown, scattered limestone nodules very slightly siliceous.

3030' ———————————————————

Concealed, shale as above ?

3340' ———————————————————

Shale, as above.

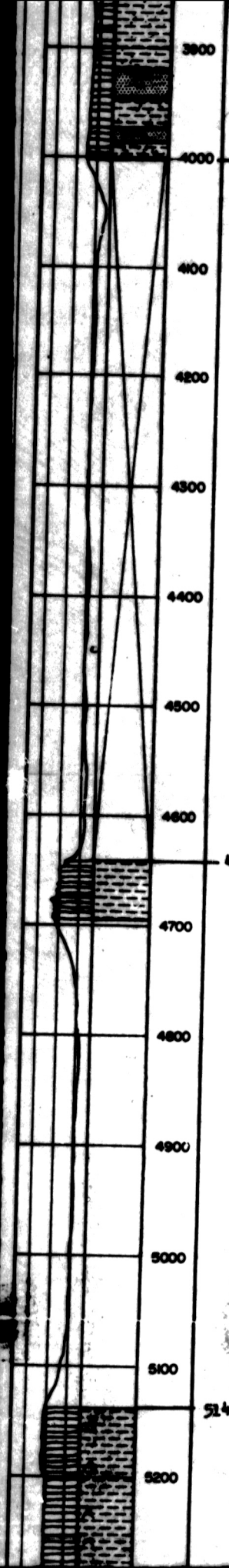
3390' ———————————————————

Concealed.

3440' ———————————————————

Shale, dark grey to olive grey, tan to red brown weathering, fissile, interbedded with siltstone, dark grey, weathers tan to grey-brown, laminated.

4000' ———————————————————



4000'

Concealed, probably mainly shale.

4640'

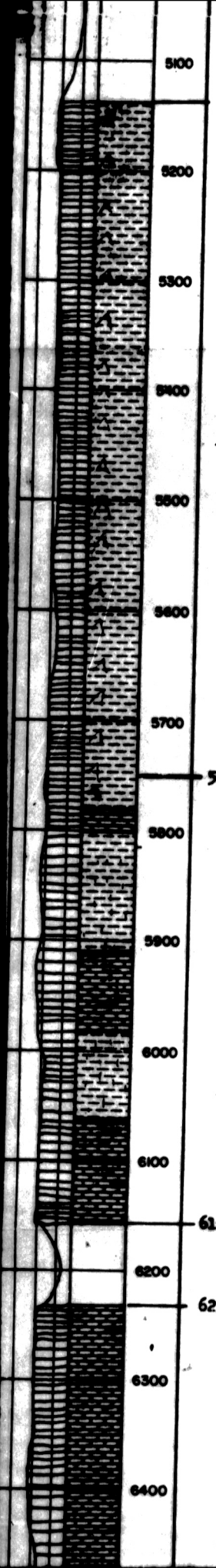
Shale, dark grey, olive grey to dark rust-brown, weathering, nodular to fissile, poorly exposed.

Concealed.

5140'

Shale, black, weathers rusty-brown to yellow, siliceous, platy to thin bedded.

150



5140'

Shale, black, weathers rusty-brown to yellow, siliceous, platy to thin bedded.

5750' — DEVONIAN & OLDER CARBONATE UNIT

Shale, black, weathers dark grey, platy to fissile, interbedded with limestone, black, weathers dark grey, microcrystalline argillaceous platy to medium bedded.

6150'

Concealed.

6230'

Limestone, black, weathers, dark grey brown, microcrystalline, some bioclastic?, some black chert as nodules and stringers, very highly fractured, thick bedded.

6 of

Limestone, black, weathers, dark grey brown, microcrystalline, some bioclastic?, some black chert as nodules and stringers, very highly fractured, thick bedded.

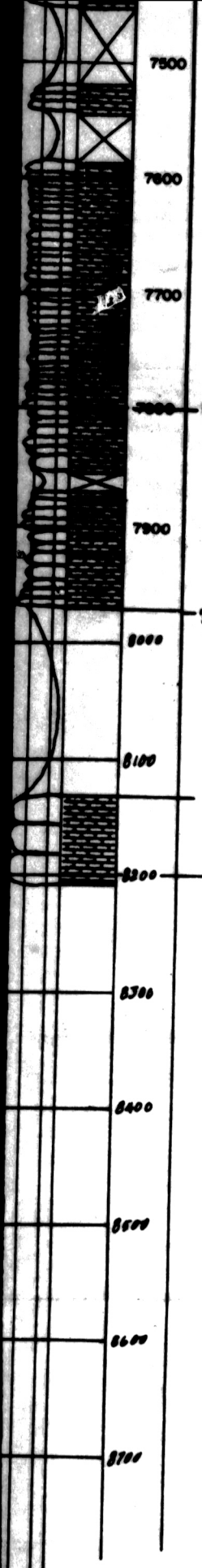
6560' ———————————

Concealed.

7190' ———————————

7 of

Limestone, black, weathers dark grey, microcrystalline bioclastic, slightly argillaceous, fragments mainly coarse grained, angular, some thin interbeds of black shale.



7800' ———————————————————

Limestone and shale, as above.

7970' ———————————————————

Concealed.

8130' ———————————————————

Massive, limestone, not examined.

8210' ——————— End of measured section. ———————

LOG OF OUTCROP SECTION

STATION NO. 20

SNAKE RIVER

LOCATION: LSD. ... SEC. ... TWP. ... RGE. ... W. M.
UNIT ZONE N.T.
SEC. O-66 LAT 65°40' ... LONG. 133°15'

Description of location: Section measured along the Snake River on the plains just north of the mountain front.

ELEVATION: MEASURED: August, 1961
METHOD: Tape, Brunton, Plane table

FORMATIONS

CRETACEOUS	12'+
DEVONIAN	
Imperial Formation & Older	2843'
Bane Formation	15'+

TO ACCOMPANY REPORT

Surface Geology of the Peel Plateau Area.

BY: Imperial Oil Limited

DATE: 1961

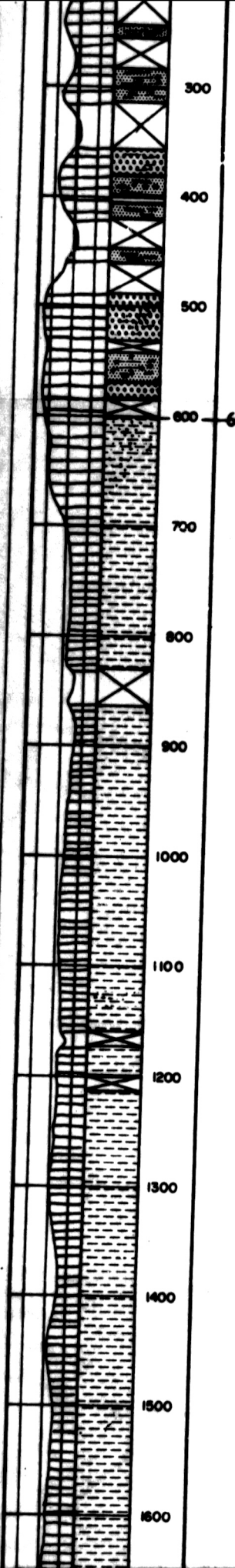
LEGEND

Coal | Salt | Anhydrite | Dolomite | Limestone | Massive Chert | Conglomerate | Sandstone | Siltstone | Shale

IMPERIAL OIL LIMITED EXPLORATION DEPARTMENT PEACE RIVER DISTRICT

Res.	Lith.	Footage	Description
		0	0' CRETACEOUS
			Interbedded sandstone and siltstone, quartzose sandstone, dark grey black, rusty weathering, slabby. Siltstone, black, weathers medium grey, flaggy.
		12'	DEVONIAN
			Imperial Formation & Older
		100	Interbedded, sandstone, siltstone and shale, cyclic, gradational, tracks, trails and ripple marks, minor cross-bedding. Shale, black, fissile to platy.
		200	
		300	
		400	

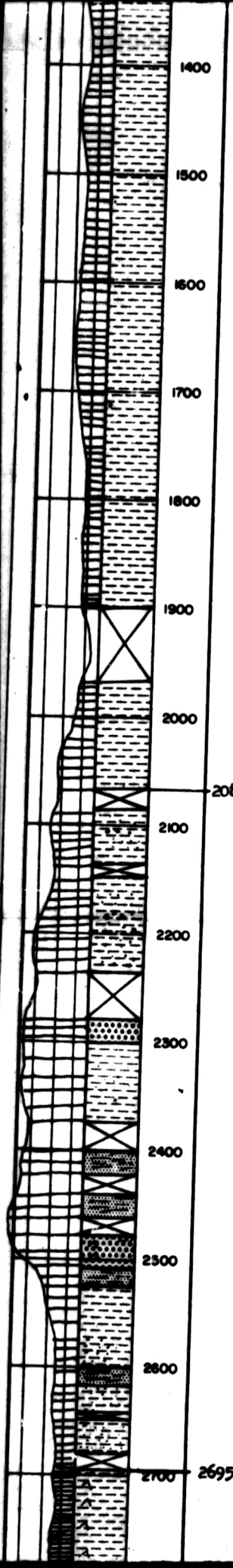
107



600'

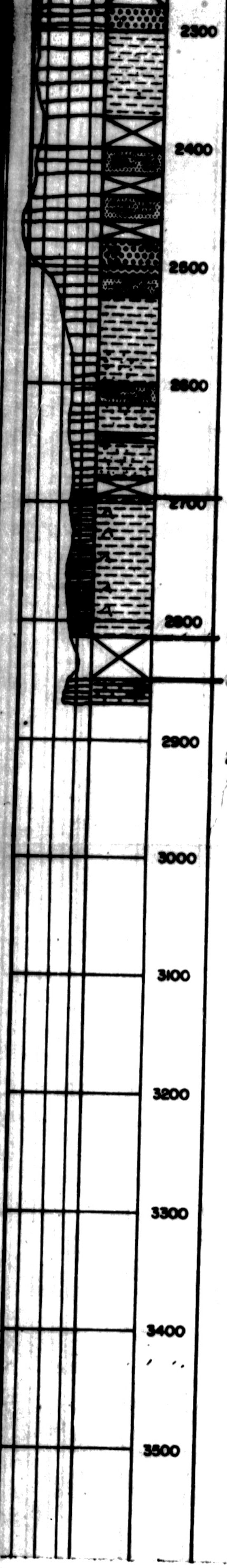
Shale, black, weathers rust black to maroon black, fissile to platy, minor siltstone, sandy in part.

29



Interbedded sandstone, siltstone and shale. Sandstone, fine grained, argillaceous and silty, medium brown to medium grey, slabby to blocky.
Siltstone, grades to sandstone in part, laminated.
Shale, black, platy to fissile, sandy and silty in part.

Shale, siliceous, black, weathers rust black, fissile to platy.



2695'

Shale, siliceous, black, weathers rust black, fissile to platy.

2815'

Concealed.

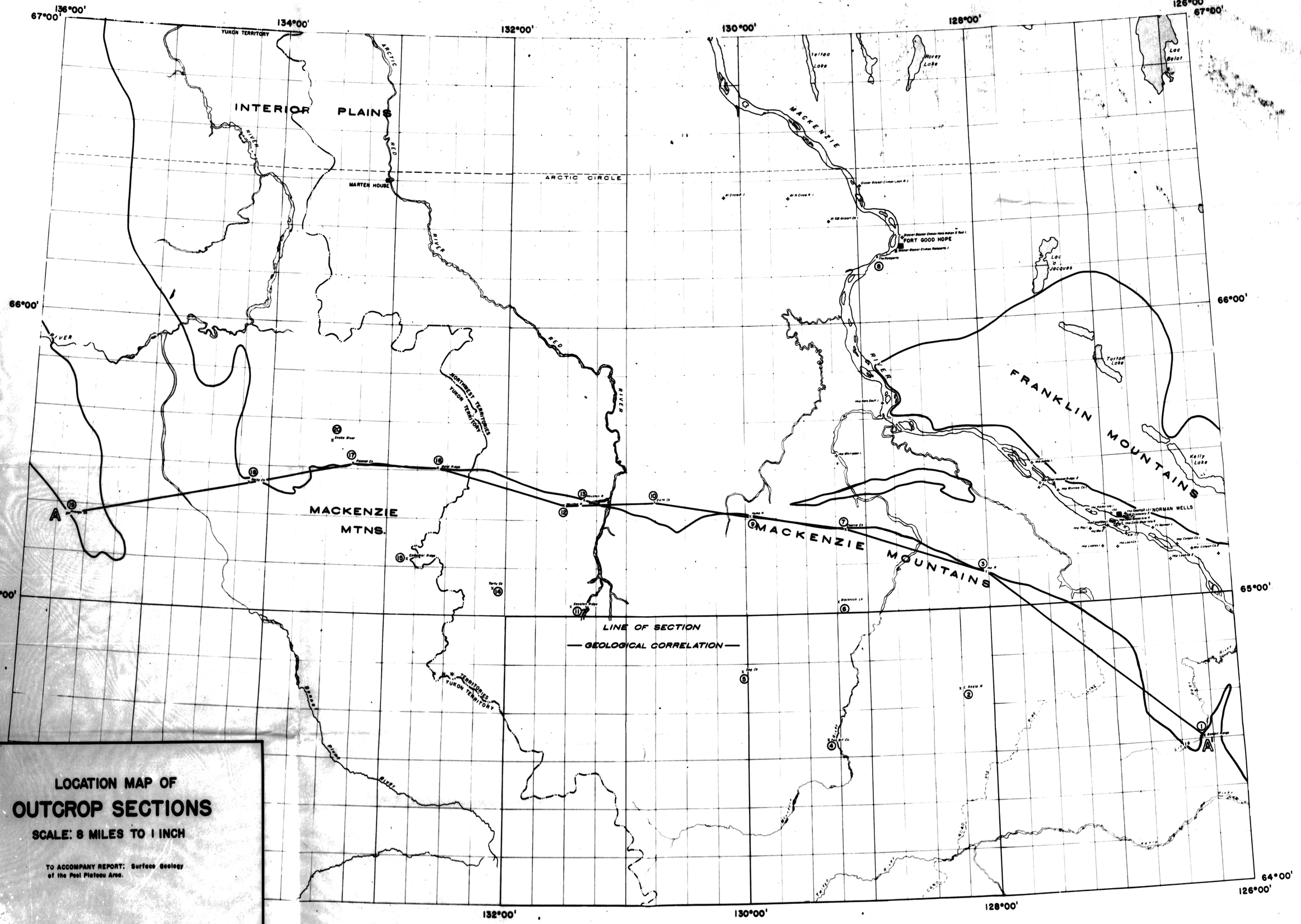
2835'

Hume Formation

Limestone, dark brown to black, weathers medium grey, microcrystalline, minor bioclastic, argillaceous, slabby to flaggy bedding, rubbly.

2870'

Base of Section



LOCATION MAP OF
OUTCROP SECTIONS

SCALE: 8 MILES TO 1 INCH

TO ACCOMPANY REPORT: Surface Geology of the Peel Plateau Area.

IMPERIAL OIL LTD. — 1961

GEOLOGICAL MAP

ISOPACH

BASE OF CRETACEOUS TO TOP OF HUME FORMATION

(TOP OF FIRST CARBONATE WEST OF 130°)

ISOPACH INTERVAL - 1000 FT.

FEBRUARY 28, 1962

TO ACCOMPANY REPORT: Surface Geology of the Peel Plateau Area

IMPERIAL OIL LTD. — 1961

GEOLOGICAL MAP

ISOPACH

TOP OF HUME FORMATION

(TOP OF FIRST CARBONATE WEST OF 130°)

TO TOP OF CAMBRIAN- -PRE-CAMBRIAN UNIT

ISOPACH INTERVAL - 1000 FT.

FEBRUARY 28, 1962

TO ACCOMPANY REPORT: Surface Geology of the Peel Plateau Area

IMPERIAL OIL LTD. — 1961

WEST
A

EAST
A'

PRONGS CREEK
SECTION 19

NOISY CREEK
SECTION 18

PACK RAT CREEK
SECTION 17

BALD RIDGE
SECTION 16

HOUSTON RIVER
SECTION 12 & 13

EDITH CREEK
SECTION 10

HUME RIVER
SECTION 9

CHARLIE CREEK
SECTION 7

IMPERIAL RIVER
SECTION 3

GASKILL RANGE
SECTION 1

IMPERIAL FM.
& OLDER ?

CRETACEOUS

IMPERIAL FM.

FORT CREEK
GROUP

HUME FM.

BEAR ROCK FM.

SILURIAN – ORDOVICIAN

RONNING FM.

DATUM TOP OF CARBONATE

DATUM CHANGE

DATUM TOP OF HUME

DEVONIAN &
OLDER
CARBONATE
UNIT

DEVONIAN &
OLDER
CARBONATE
UNIT

CAMBRIAN – PRECAMBRIAN

EAST — WEST
GEOLOGICAL CORRELATION SECTION
HORIZONTAL SCALE: 1 INCH TO 8 MILES
VERTICAL SCALE: 1 INCH TO 500 FEET