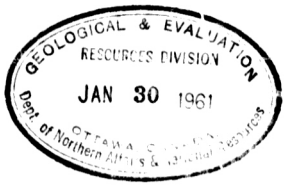
SURFACE GEOLOGY OF THE WRIGLEY AREA

Imperial Oil Limited - 1960


GEOLOGICAL & EVALUATION
RESOURCES DIVISION
JAN 30 1961
Dept. of Northern Affairs & National Resources

SURFACE GEOLOGY OF THE WRIGLEY AREA

Imperial Oil Limited

1960

TABLE OF CONTENTS

E N C L O S U R E S

Location Map Norman Wells Area

Location Map of Outcrop Sections

Geological Correlation Sections I and II

Logs of Outcrop Sections - 22

SURFACE GEOLOGY OF THE WRIGLEY AREA

I N T R O D U C T I O N

PRESENT STUDY

Area Covered

The Wrigley area is located between Latitudes 62° and 65° North. It extends for about 200 miles along the Mackenzie River from Camsell Bend in the south to Fort Norman in the north. Laterally, the area is a strip approximately 100 miles wide. It includes the Mackenzie River lowland, the McConnell Range of the Franklin Mountains to the east, and the first few ranges of the Mackenzie Mountains to the west. Thus, the area covered in the 1960 field season comprises some 20,000 square miles.

Accessibility

The report area is readily accessible by air and water. Wrigley Airport, located on the east bank of the Mackenzie River, has a 7500 foot dirt and grass runway, which is maintained by the Department of Transport. The strip is satisfactory for aircraft up to the size of a C-46. Pacific Western Airlines operates a scheduled flight to this airport once every two weeks. Aviation fuel can not be purchased at the airport and it either has to be flown in or barged in from Norman Wells or from points to the south, such as May River or Fort Nelson.

The eastern and southern part of the report area can readily be covered from this location by helicopter and for longer reconnaissance flights, by float plane, for which suitable docking facilities exist on a nearby lake. The far western and northern part of the area can be reached from Wrigley Lake. Other lakes suitable for operations within the Wrigley area are Long Lake, Iverson Lake, Carlson Lake and Blackwater Lake.

Purpose of Study

The purpose of the 1960 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 the 1959 season for the purpose of evaluating its land holdings. The enclosed index map shows the location of the Company's permits. The Devonian system was studied most extensively by means of measured stratigraphic sections. A few pre-Devonian and Cretaceous sections were measured as well.

Method of Study

Crew - A seven man geological crew spent 110 days in the field between May 16 and September 2. Support aircraft included a Bell G-2 helicopter, a Cessna 180 and occasionally the Company's Otter and DC-3. The crew consisted of the following personnel:

R. A. Meneley	-	Party Chief
B. J. G. Patsch	-	Assistant Party Chief
F. G. Rayer	-	Senior Geologist May 16 - July 6.
H. R. Balkwill	-	Senior Geologist June 21 - Sept. 2.
D. B. McKennitt	-	Senior Geologist July 1 - Sept. 2.
D. G. Waylett	-	Summer Student
W. D. Simmons	-	Summer Student
F. V. Majocha	-	Summer Student
E. Steadman	-	Cook
Ed Phillips	-	Helicopter Pilot - Okanagan Helicopters Ltd.
Ed Brown	-	Helicopter Engineer - " " "
R. Page	-	Cessna Pilot - Gateway Aviation Ltd. July 24 -
D. Hanson	-	Cessna Mechanic - " " " . Sept. 2.

Base Camps - The entire project area was worked from two base camps. The first was located at Wrigley Airport, the second at Wrigley Lake, which is also known as Foran Lake. The crew, equipment and supplies for the first two weeks of the field season were flown in two DC-3 trips from Dawson Creek to Wrigley Airport. Permission was obtained from the Department of Transport to camp on the airport property and to use the airport's water supply. Aviation gasoline for the first two weeks of operation was flown in from Norman Wells by DC-3. The bulk of aviation gasoline and non-perishable supplies for the balance of the season were barged from Fort Nelson by Mr. Dick Turner of South Nahanni. Fresh food and mail was brought from Dawson Creek by the Company Otter approximately every two weeks. On July 27 the camp was moved to Wrigley Lake by Otter and a Cessna 180, the latter having joined the crew at this time and remained with the party till the end of the season. Aviation gasoline was flown in from the remaining

stock at Wrigley Airport, while the balance came from the Norman Wells refinery. Enough 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 Cessna were then made between Wrigley Lake and Norman Wells.

Communications - Communications between the field crew and the Dawson Creek District Office were maintained by a 60 watt Kaar radio powered by a Koehler 500 watt gasoline generator.

From the camp at Wrigley Airport very satisfactory communications were maintained through the Canadian National Telegraph station at Fort Nelson, and from Wrigley Lake either through Blueberry or the Imperial Oil station at Norman Wells. Magnetic storms of varying strength affected all radio communications throughout the north. During severe periods, no effective communications could be maintained. From Wrigley Airport, Department of Transport telegraph services were also available.

Ground-to-air communication was maintained with all aircraft involved in the operation. Contacts were almost always excellent, even at long ranges up to 600 miles. The high quality of ground-to-air communication 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 10 watt Spilsbury-Tilburn sets, which were powered by 12 volt heavy duty wet - batteries. Contacts were generally poor, but they were adequate to pass the necessary traffic. The use of radios saved a lot of flying time which would have been necessary had daily checks of the fly camps by helicopter been made.

Weather - Generally good weather prevailed during June and July, the two best working months of the season. The long daylight hours allowed some time to be made up for any lost due to showers and low clouds. Most "weather days" occurred in the latter part of August, and the numerous snowfalls towards the end of that month announced the end of the field season.

Out of 110 days in the field, 23 days were lost due to weather. The time lost represents 21 per cent 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, with each sub-crew composed of a senior geologist and a student assistant. These sub-crews were engaged solely with measuring stratigraphic sections. They operated mostly from fly camps and returned to base camp after each section was complete to write up the field notes and plot a log

of the outcrop section. The fly camps varied in length from five to nineteen days and averaged about nine days.

A variety of measuring techniques were used, the choice depending on the dip and the type of exposu e of the section. Plane table surveying was used to tie in various gently dipping outcrops along creek beds a l 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 pogo-stick was used to measure steep cliffs. The exposure of sections was generally quite good, ranging from mostly excellent in the Mackenzie Mountains to fair in the Franklin Mountains. Stratigraphic reconnaissance was done by the Party Chief using a helicopter. Later, after the Cessna joined the party reconnaissance was also carried out to a lesser extent by the other senior geologists.

The helicopter was unserviceable for only one day during the summer, while the Cessna was serviceable at all times during its stay with the crew. Flying hours for the helicopter totaled 414.45 hours for the season and 125.45 hours for the Cessna.

PREVIOUS INVESTIGATIONS

The discovery of oil in Norman Wells in 1920 aroused geological interest in the Mackenzie River area. The Geological Survey Memoir 108, "The Mackenzie River Basin", by Camsell and

Malcolm summarizes information as then known. The oil discovery also stimulated further work in the immediately following years 1920 to 1923, which was conducted by Kindle, Bosworth, Williams, Dowling and Hume. The data obtained from this work is published in the Geological Survey Summary Reports for these years.

Interest in the Mackenzie River region was not renewed until the outbreak of World War II. 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 cooperation of Imperial Oil and the Canadian and United States governments. The work was undertaken under great transportation difficulties and mostly took the form of traverses up the major tributaries of the Mackenzie River. Most of the work was carried out in the area to the north of the present report area. The following four Canol geologists, however, investigated parts of the Wrigley area: Bath, Hancock, Hart, and Monnett (see Bibliography). Since the end of the war, and especially in recent years, geological surface crews of the Geological Survey of Canada and of many oil companies have undertaken studies along the whole length of the Mackenzie River Basin.

S T R A T I G R A P H Y

GENERAL REMARKS

Sediments ranging in age from Precambrian to Quaternary

TABLE I

TABLE OF FORMATIONS

	System	Formation or Group		Lithology
Cenozoic	Quaternary			soil, till, alluvium
	Tertiary	1600'-3000'		poorly consolidated sediments and lignite.
Mesozoic	Cretaceous	East Fork 850'		grey shale
		Little Bear 780'		sandy series, sandstone, sandy shale with coal.
		Slater River 2150'		black, friable shale, thin beds of bentonite.
		Sans Sault -3850'		marine sandstone and shale
Palaeozoic	Upper Devonian	Imperial 6540'		greenish siltstone and silty shale.
	Middle Devonian	Canol 430'		dark grey bituminous shale
		Hare Indian 220'		dark grey, bituminous, concretionary shale
		Hume 760'		massive microcrystalline and bioclastic limestone.
	Lower Devonian	Bear Rock becomes Lone Mountain 1710' 1960'		limestone and dolomite breccia. microcrystalline dolomite.
	Silurian and Ordovician	Ronning Group 2940'	Mt. Kindle	bioclastic and microcrystalline dark grey dolomite
			Franklin Mtn.	light grey microcrystalline and cryptocrystalline dolomite.
	Middle Cambrian	Saline River 50'+		gypsiferous shale
		Mt. Cap		dark petroliferous shale
	Lower Cambrian	Mt. Clark 570'		buff and pink orthoquartzite
Proterozoic	Precambrian	6260'+		variable, sandstone, siltstone; grey, green, maroon shales; dolomite.

and making up a total thickness of nearly 25,000 feet are found in the Wrigley area. The stratigraphic column is by no means complete. Erosion and non-deposition have left great gaps in the sedimentary succession. The thicknesses and descriptions of the measured sections are recorded on strip logs which are enclosed in the report. Section locations are marked on the accompanying location map on which are also indicated the two lines of projected geological correlation sections. Table I summarizes stratigraphic terminology as used in this area.

PROTEROZOIC

Proterozoic rocks were studied in the Franklin Mountains on the east side of Mount Cap, where 6260 feet of Precambrian sediments were measured. They consist, from the base up, of a thick sequence of mostly maroon coloured, hematitic and dolomitic shales which are interbedded with thick bands of green grey, dense shales which often grade to a cryptocrystalline dolomite. Higher up in the section, coarser clastics become more prominent, and consist of light and medium grey siltstones and sandstones, the latter being fine to coarse grained orthoquartzites. The section is topped by a thick, drab, grey shale sequence with siltstone interbeds. A marked angular unconformity truncates the Precambrian strata. No other Proterozoic outcrops were studied, their presence was, however, noted on the Keel River some 50 miles west of the Mackenzie River, and again, along the ranges west of the Tigonankweine Range in the Mackenzie Mountains.

CAMBRIAN

Cambrian strata are exposed to a considerable extent in the various ranges of the Mackenzie Mountains. They also outcrop in the Franklin Mountains in the structurally high area between Mount Clark and Mount Cap. The McDuff Creek and Mount Cap exposures were studied. The lowermost Cambrian rocks are orthoquartzites of the Mount Clark formation. On Mount Cap the massive, heavily jointed, large, blocky weathering, orthoquartzites form the westward dipping backslope of the mountain. The rock itself is a rather clean, light grey to pink, laminated and cross-bedded, well sorted, subangular, often friable quartzose sandstone, with siliceous and some hematitic cement. In the lower part, this sand weathers in peculiar closely and regularly spaced cylindrical rods which are formed perpendicular to the bedding. Some workers (see Hume, 1954, pg. 11, and Bell, 1959 pg. 11) seem to have tentatively identified these as Scolithus, a fossil worm burrow. This, however, seems unlikely due to the perfect regularity of the columns, and rather suggests a cause due to expansion and contraction similar to the columnar jointing found in some basalts.

Middle Cambrian strata of the Mount Cap formation were studied in the McDuff Creek section west of Blackwater Lake. Here, between large covered intervals, occur light olive coloured, buff to olive brown weathering, platy shales, with light coloured orthoquartzites, and, towards the top, some minor bioclastic limestones.

The Upper Cambrian of the area is represented by the Saline River formation. It is seldom exposed. One poor outcrop of the formation was found on the east side, at the base of Mount Kindle, where an approximately 50 foot covered interval exists with numerous solutions slump holes and irregular light coloured highly gypsiferous scree, which is often covered by numerous large selenite crystals. Bell (1959 pg. 6) describes the formation as consisting of highly gypsiferous shales which are overlain by a small thickness of dolomite and dolomitic shale.

ORDOVICIAN AND SILURIAN

Sediments deposited without any apparent interruption from Ordovician to the end of Silurian time are included in the Ronning group. This rock unit outcrops extensively in both the Franklin and Mackenzie Mountains. The McDuff Creek section contains a complete Ronning sequence totalling 2940 feet. Other measured Ronning sections were thinner, and especially in the Mackenzie Mountains, incomplete. In the Franklin Mountains, the Ronning group can be divided into two formations. The lower Franklin Mountain formation is a light coloured, thick bedded, microcrystalline, and cryptocrystalline, silty dolomite which is usually unfossiliferous. The overlying Mount Kindle formation is a medium to dark grey, thick bedded, microcrystalline and fine crystalline dolomite with irregular chert nodules, scattered solitary corals and some dark, bituminous reefal zones containing silicified

chain and massive colonial corals. The Ronning was subjected to erosion during pre-Devonian time.

DEVONIAN

Serious miscorrelations of Devonian stratigraphy have been made by early workers in the Norman Wells area. A great deal of confusion surrounded the terms Ramparts and Beavertail. For this reason, Bassett (1960) recommended at the first International Symposium on Arctic Geology that the use of these names be discontinued, and proposed the formation names Bear Rock, Hume, Hare Indian, Kee Scarp, Canol, and Imperial be adopted for an ascending sequence of Devoni stratigraphic units. These names are now in general use and can be applied to the Wrigley area. The Bear Rock formation however, is not recognized in the southern part of the area, but it may be correlated either entirely or in part to the Lone Mountain formation (Kindle 1920) which occupies a similar stratigraphic position between the overlying Hume formation and the underlying Ronning group. The transition takes place in the southern part of the Franklin Mountains where the relationship is obscured by poor outcrops.

Bear Rock and Lone Mountain Formations

The type section of the Bear Rock formation is at Bear Rock just north of Fort Norman at the junction of the Great Bear and Mackenzie Rivers. Here the formation consists of brecciated limestones and dolomites with some minor amounts of gypsum and

anhydrite. The formation can be recognized over most of the Wrigley area. It rapidly increases in thickness from only several hundred feet at its type section to many times this thickness in the southwestern part of the report area. Bassett (1960) reports a thickness of 6500 feet at the upper Redstone River. Two distinct facies can be recognized in the sediments deposited at this time. An evaporitic shelf facies correlative (?) to the Chinchaga formation of the Interior Plains occurs to the east of the Franklin Mountains and in subsurface in the Norman Wells area, where it has been reported from wells drilled as part of the Canol Project. Here the Bear Rock consists to a large extent of evaporites, which are mostly grey, massive anhydrite, with minor interbeds of dolomite. In the area coinciding with the McConnell Range and the first ranges of the Mackenzie Mountains down to the approximate vicinity of the Root River, that is, the area of brecciated carbonates, a maximum amount of interbedding of evaporite and carbonate must have occurred. To the southwest, in the deeper basinal area south of the Root River, the formation becomes essentially a well bedded, alternating light and dark grey dolomite sequence. This thick carbonate sequence can be correlated to strata on Lone Mountain near Camsell Bend, which Kindle (1920) has called the Lone Mountain formation.

In this report, Lone Mountain formation is the name given to the bedded carbonate facies, while the equivalent unbedded,

brecciated carbonates to the north are called Bear Rock formation. Lithologically, the Bear Rock formation consists of a carbonate breccia in a matrix of microbreccia. In places there is abundant calcite cement and some minor amounts of gypsum and anhydrite have been reported from areas near the type section. Whenever limestone breccia is found, it usually occurs in the upper part of the section. The fragments are a microcrystalline grey limestone or fine grained to microcrystalline and laminated grey dolomite. The breccia fragments range in size from gravel to large angular blocks several feet across. The Bear Rock formation outcrops in the Franklin Mountains and the Mackenzie Mountains generally north of the Root River, forming a characteristically recessive topography which is marked by hoodoo weathering and sink holes. In contrast, the equivalent Lone Mountain formation is massive, resistant and cliff forming.

The origin of brecciation has been variously explained. Some Canol geologists considered it to be a primary breccia either of tectonic origin or a fanglomerate. Another explanation is that brecciation resulted from the expansion of anhydrite during the process of hydration to gypsum. It is now thought that the Bear Rock formation was deposited as an interbedded evaporite and carbonate sequence, and that subsequent leaching of the evaporites caused the collapse and brecciation of the carbonate interbeds.

The Bear Rock formation was deposited on an eroded surface of the Ronning. In several outcrops this contact is sharp and

channelling is evident. The upper contact with the overlying Hume formation is more difficult to place, especially in areas where the upper beds of the Bear Rock are bedded limestones. In Carcajou Canyon (Hume, 1954) brecciation of the Bear Rock carbonate has extended by a process of stoping into the overlying Hume limestones, where the breccia grades laterally into well bedded limestones. Some geologists have mistaken this as an unconformity between the two formations. This example helps in placing the time for the brecciation of the Bear Rock and it suggests that the brecciation is at least post-Hume in age. The Bear Rock formation is now generally considered to be of Lower Devonian age. In the past some writers had considered it to be of Silurian age. Bassett (1960) reports of a western section from the deeper basinal area on the upper Redstone River where the lower 2000 feet of a 6500 foot bedded limestone and dolomite sequence contained a Keyserian or Helderbergian fauna. This fauna is considered to be a transitional fauna of either uppermost Silurian or lowermost Devonian age. Little or no break in sedimentation may have occurred between Silurian or Devonian in this deeper basinal part of the area. From this, the lowermost fossiliferous beds of the Bear Rock could at most represent the oldest Silurian, and thus would place the greater barren part of the formation into Lower Devonian time. Lower Devonian age is further implied by the unconformable Bear Rock - Ronning contact which has been observed in some localities, and further by the gradational contact with the overlying Hume formation of

definitely Middle Devonian age.

The brecciated part of the Bear Rock formation is a potential reservoir over much of the Mackenzie River area. Often considerable vuggy porosity exists, the vugs at times reaching cavernous size. In places there is considerable bituminous material in the vugs, and the rock emits a strong petroliferous odour. All this, plus the fact, that in places the Bear Rock formation is covered by a shaly Hume limestone make this a favourable prospect in the drilling for hydrocarbons in the Mackenzie River area.

Hume Formation

The Hume formation, as defined by Bassett (1960), is a succession of fossiliferous Middle Devonian limestones and, in places shales, which overlie the Bear Rock formation and underlie the shales of the Hare Indian formation. The type section is on the east fork of the Hume River, at the front of the Mackenzie Mountains. The Hume is an extensive shelf carbonate which is found over the whole area. It is rather uniform in character and varies only gradually in thickness. It is a thick bedded, blocky to nodular weathering, medium grey coloured, microcrystalline limestone. Some pelletal beds and minor amounts of bioclastic material, mostly crinoid fragments, also occur. Stromatoporoids, colonial corals, some solitary corals and brachiopods are found, usually scattered, but at times making up the greater part of some beds. Much sparry calcite veining and infilling occur. Parts

of the section are quite argillaceous, with disseminated argillaceous material and shaly partings and interbeds. The formation often contains dolomitized zones which occur usually near the base of the formation. In outcrop, the carbonate is usually quite resistant and cliff forming. The contact with the overlying Hare Indian shale is sharp and conformable, indicating a sudden change in sedimentary conditions but no hiatus. The formation varies in thickness from about 500 feet in the northern part to over 1000 feet in the southwest part of the report area.

Hare Indian Formation

The type locality of this formation is at the downstream end of the Ramparts gorge on the Mackenzie River near the mouth of the Hare Indian River. Here the shales of the formation underlie the limestone of the Kee Scarp formation, which in turn is overlain by the shales of the Canol formation. In the Wrigley area to the south the Hare Indian formation is represented by the shales which overlie the Hume formation and underlie the shales of the Canol formation. While the lower contact is sharp the upper conformable contact with the Canol shales is somewhat indefinite and often hard to pick. Lithologically, the Hare Indian consists of dark grey, fissile, bituminous shales which in part are slightly calcareous and contain limestone concretions and thin nodular beds. There is some sulphurous efflorescence and in places numerous selenite crystals have formed along fractures and bedding planes. Within the report area the shales are usually about 100 feet thick.

Canol Formation

Bassett (1960) defined the Canol formation as the black shale unit, which at the type section on Powell Creek on the Mackenzie Mountain front, overlies the Kee Scarp formation. As already mentioned, the Kee Scarp is absent in the Wrigley area, and the Canol shales directly overlie Hare Indian shales with which the contact is more or less gradational and difficult to pick. Canol shales are dark grey to black, fissile to platy, bituminous, siliceous and often very sulphurous. They contain scattered large calcareous concretions. The platy shales have quite a slaty 'ring' and weather yellow, orange and rusty. The formation is quite widespread in its extent and can be recognized to the south as far as the Nahanni area. Thicknesses within the report area vary from 200 to slightly over 400 feet. The formation is arbitrarily considered to be at the top of the Middle Devonian series.

Imperial Formation

This formation includes all the Upper Devonian sediments of the Mackenzie River area, which overlie the Canol formation and in turn are unconformably overlain by Cretaceous strata. The formation is a sequence of clastics and includes a few minor limestone beds. Cretaceous uplift and erosion have left great variations in thickness of the Imperial formation. Thicknesses range from zero in areas where the formation has been completely eroded, as at the Ramparts in the north, to over 2000 feet in the area of the Imperial

anticline northwest of Norman Wells. It is also thin in the area of the McKay Range and then rapidly increases to 6530 feet at sections on the Redstone River. At the two measured sections on the Redstone, the formation consists of a thick sequence of green grey, mostly fissile, occasionally silty shales, with thick intervals and thin interbeds of medium grey, grey and buff weathering siltstones.

CRETACEOUS

A lengthy period of folding and erosion existed between the deposition of the Imperial formation and the major marine transgression which deposited Cretaceous strata. Little movement has taken place since Cretaceous time, as Cretaceous beds are only gently folded, while the underlying Devonian formations are more intensely folded. With the exception of a few traverse observations no Cretaceous outcrops were examined in the field.

The Cretaceous has been subdivided by Stewart (1945) and his terminology has now been adopted. The following is summarized from Hume (1954):

Sans Sault Formation

The Sans Sault formation rests disconformably on Devonian strata and includes the sequence of marine shales and sandstones up to the first bentonitic bed. The greatest thickness measured, 3850 feet, occurs in the Imperial Range where the Mountain River crosses the range.

Slater River Formation

The Slater River formation overlies the Sans Sault formation and consists of thin bedded, black, friable shale, with some sulphur and alum, and characteristically thin beds of bentonite. Bell (1959) measured a 1100 foot thick composite section of the formation.

Little Bear Formation

The Little Bear formation refers to a sandy series lying above the shales of the Slater River formation. At the type section on Little Bear River, 780 feet of sandstone, minor conglomerate, sandy shale and coal exist. Marine, brackish and fresh water fossils have been found.

East Fork Formation

The East Fork formation consists at its type section on the east fork of Little Bear River of a series of about 850 feet of well bedded, grey, conchoidal and plastic marine shales with minor sands at the base.

TERTIARY

Tertiary beds are found in the Fort Norman area. They consist of thick sands and gravels interbedded with soft clays and shale and lignite seams. The Tertiary covers Cretaceous beds with an angular unconformity. Bell (1959) reports an estimated thickness of nearly 3000 feet. These beds were not examined by Imperial Oil during the 1960 field season.

QUATERNARY

Recent sediments are found in many places on the Mackenzie Plains area. The Mackenzie River and some of its tributaries flow through unconsolidated sand, silt and gravel. Many of the islands in the Mackenzie River consists of similar recent sediments. In the mountains, Quaternary deposits occur as rock pediments along fault scarps and steep folds of the various mountain fronts, also as alluvial fans where rivers issue from the mountains, and as valley alluvium along braided stream flats.

S T R U C T U R E

The Wrigley area consists of three physiographic divisions. These correspond with structural divisions. From the east to the west they are: the Franklin Mountains, the Mackenzie Plain, and the Mackenzie Mountains.

MACKENZIE PLAIN

The Mackenzie Plain is an elongate structural basin of low elevation and subdued relief. In the southern part of the area from the North Nahanni River to approximately the Keele River it is nearly 30 miles wide, then expands to about 60 miles in the Great Bear River area to the north. It is essentially a very broad synclinal valley, which is filled with flat or gently folded Upper Devonian, Cretaceous, Tertiary and Quaternary sediments through which some Palaeozoic strata project, brought to the surface by folding and faulting. On the whole, folding and faulting are limited

within the plains area. Major exceptions are the plunging, folded and faulted anticline which produces the McKay Range in the north, and the abrupt 2000-3000 foot escarpments of the Camsell Range and Roche-qui-trempe-a-leau, which transect the Mackenzie Plain. The Mackenzie River itself flows through a broad channel broken by many islands. A low, flat plain, covered by many ponds, lakes, and meandering streams with a typical muskeg cover extends to the base of the mountains on either side. Tributaries of the Mackenzie River flow either in steep-sided valleys below the level of the plain while others like the Root, Dahadinni, Keele, Gravel and Little Bear Rivers flow mostly in broad valleys. These river beds are often broad, sand and gravel covered, flood plains. At low water the stream spreads in numerous braided channels forming a net-work of streams which surround islands of bare and wooded sand and gravel.

MACKENZIE MOUNTAINS

The gently folded strata of the Mackenzie Plains area rise sharply in the west to form the front arc of the Canyon Ranges of the Mackenzie Mountains. Folding is the major characteristic of the Mackenzie Mountains. The mountains are generally a symmetrical folds with steeper dipping limbs on the eastern side, which at times become overturned and are associated with minor faulting.

Middle Devonian limestones and Silurian-Ordovician carbonates are generally exposed in the first and second ranges of

the mountains, with Upper Devonian clastics in the structurally controlled synclinal valleys. Older Palaeozoic strata are exposed in the cores of gently plunging anticlines, like the high plateau of Cambrian quartzites which exists northwest of the wide valley containing Wrigley Lake.

FRANKLIN MOUNTAINS

To the east of the Mackenzie Plain, the McConnell Range of the Franklin Mountains rises as a southerly plunging fold at Willowlake River. To the north, the mountains become wider, higher and more complex. Twenty miles east of Wrigley the mountains are a dissected mass with several irregular ridges extending in different directions. Here the broken mountainous country reaches a height of over 5000 feet on Mount Cap. The main eastern arc of the curved range is a steep fault scarp, the whole range being part of a westward tilted fault block. Precambrian sediments outcrop in the structurally high area between Mount Cap and Mount Clark while most everywhere else the core of the mountains is formed by Ronning carbonates, which are overlain by rubbly Bear Rock breccias and topped by resistant Hume limestones. All later formations have been removed by erosion. Towards the north, the mountains narrow down to a single range at Mount St. Charles where they cross the Great Bear River.

Several rivers which cut across the mountains, drain the muskeg covered Interior Plains area to the east which contains

innumerable lakes. Many of these rivers flow through gorges which suggest former streams of much greater importance.

BJGP:rf
Jan. 1961
Dawson Creek.

B I B L I O G R A P H Y

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 Dahadinni River Area", N.W.T.; Imperial Oil Ltd., Canol Project; Assignment No. 13.

(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. Bull., January 1959.

Camsell, C., and Malcolm, W., (1921) Mackenzie River Basin; Geological Survey of Canada, Mem. 108.

Dowling, D. B., (1921) Geological Structure of the Mackenzie River Region; Geological Survey of Canada; Sum. Rept., 1921, pt. B.

Hancock, W. P., (1944) Final Geological Report on the Redstone River, N.W.T., Imperial Oil Limited, Canol Project; Assignment No. 12.

Hart, R. M., (1944) Final Geological Report on "The Gravel River and the East Fork of Little Bear River", N.W.T.; Imperial Oil Limited, Canol Project; Assignment Nos. 2 - 2A, 30 and 37.

Hume, G. S. (1921) North Nahanni and Root Rivers Area and Caribou Island, Mackenzie River District; Geological Survey of Canada, Sum. Rept., 1921, pt. B.

Hume, G. S., (1923) Mackenzie River Area, District of Mackenzie, N.W.T., Geological Survey of Canada, Sum. Rept., 1923, pt. B.

Hume, G. S., (1954) The Lower Mackenzie River Area, Northwest Territories and Yukon, Geological Survey of Canada, Mem. 273.

Monnett, V. B., (1944) Final Geological Report on the "Left Bank Mackenzie River, Wrigley and Johnson Rivers, N.W.T., Imperial Oil Ltd., Canol Project; Assignment Nos.

Williams, M. Y., (1921) Exploration East of Mackenzie River between Simpson and Wrigley; Geological Survey of Canada, Sum. Rept., 1921, pt. B.

127°00'
126°00'
125°00'
124°00
123°00'
122°00'
65°00'
64°00'

Dodo Canyon (19)
Grotto Creek (18)
MacKay Range (17)
FT. NORMAN
River
Bear
MACKAY RANGE
GAMBLE RANGE
Little
SECTION No. 2
Tate Lake
Stewart Lake
FRANKLIN MOUNTAINS
Keele River
(14)
McDuff Creek (13)
Lower Redstone Traverse Stations
(15)
(16)
Foran Lake (23)
Wrigley Lake
Blackwater Lake
Dahadinni River
MACKENZIE
MACKENZIE
MACKENZIE
Monster Creek (21)
Slide Mountain (22)
SECTION No. 1
River

1 of

MACKENZIE MOUNTAINS

MACKENZIE PLAIN

MACKENZIE MOUNTAINS

Slide Mountain (22)

Redstone River

Long Lake (20)

North Redstone (24)

Wolf Creek (7)

Twin Falls (4)

WRIGLEY

MACKENZIE RIVER

Mt Cap (3)

Mt Kindle (2)

Mt Williams (1)

Fish Lake

Greasy Lake

River Between Two Mountains (12)

63°00'

Root River

Root River

Camsell Hill (6)

CAMSELL RANGE

SECTION No 2

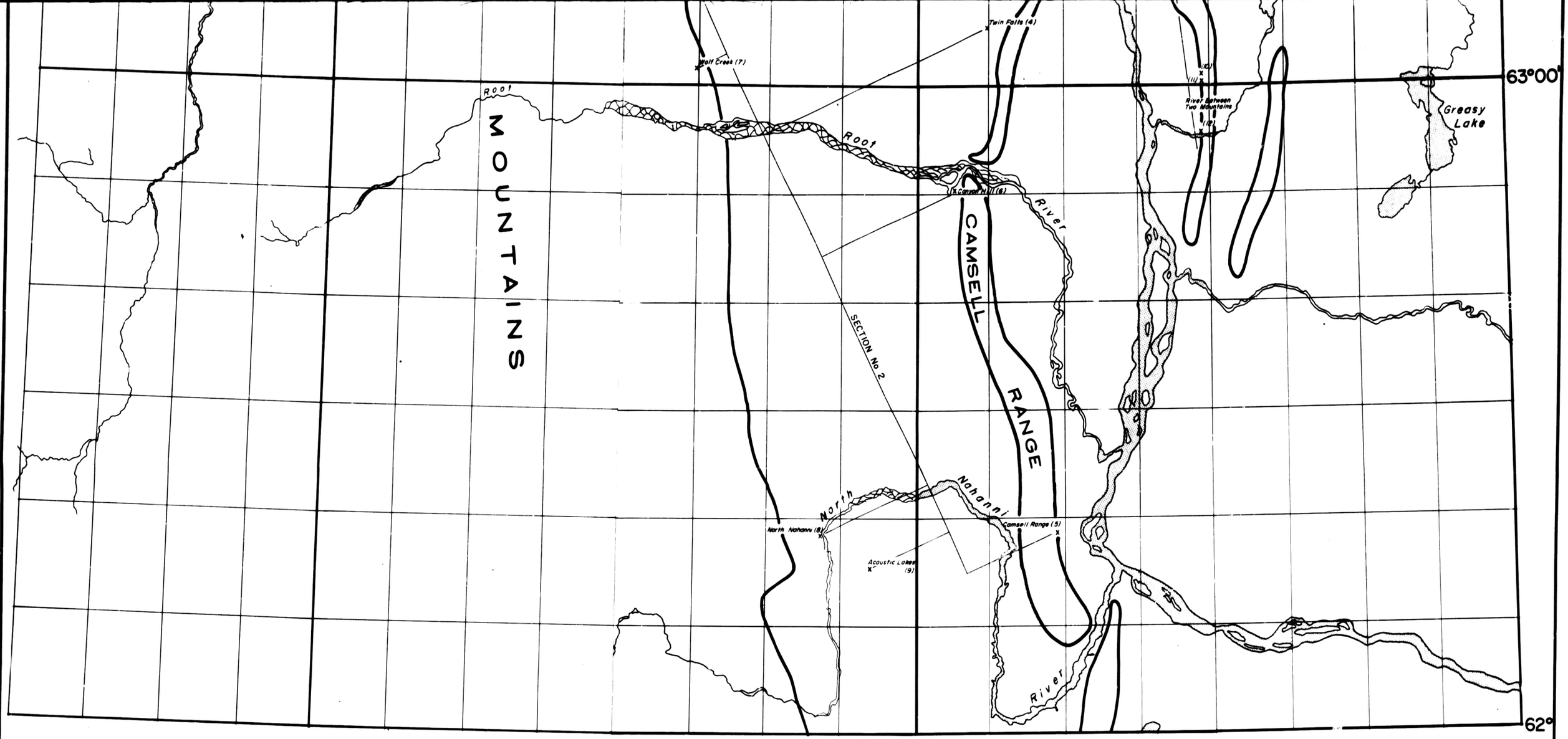
North Nahanni River

North Nahanni (8)

Camsell Range (5)

Acoustic Lakes (9)

2 of



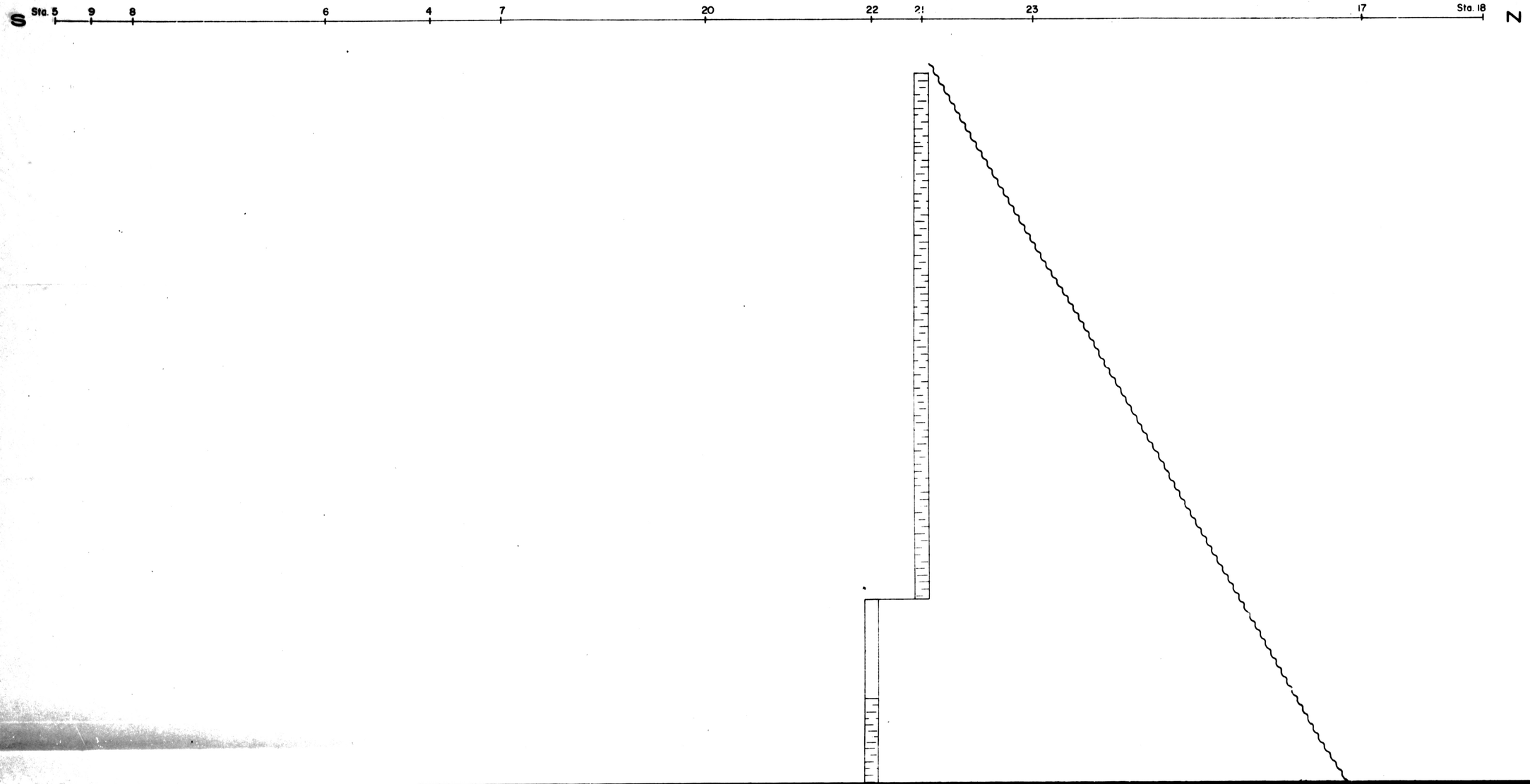
LOCATION MAP OF

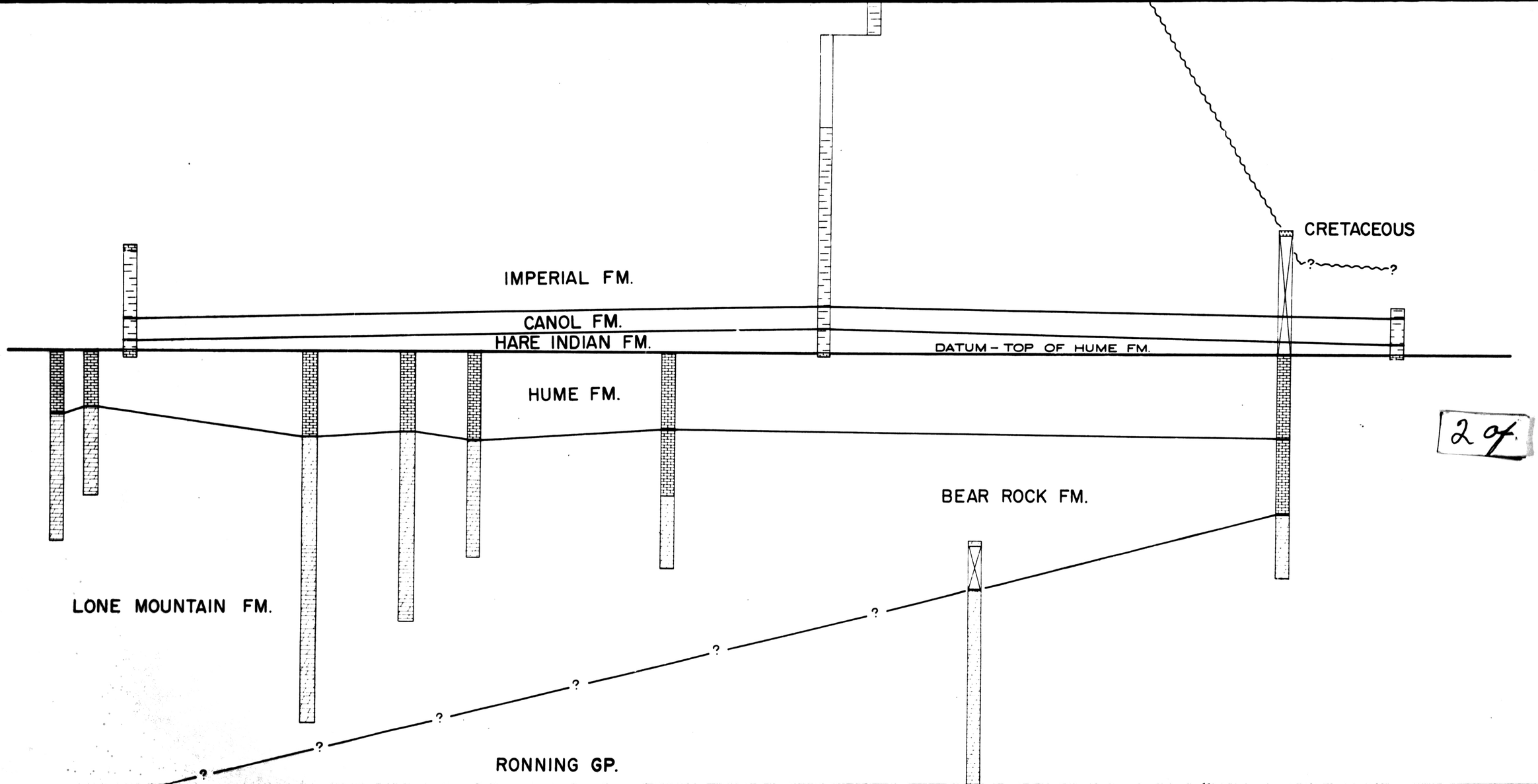
OUTCROP SECTIONS

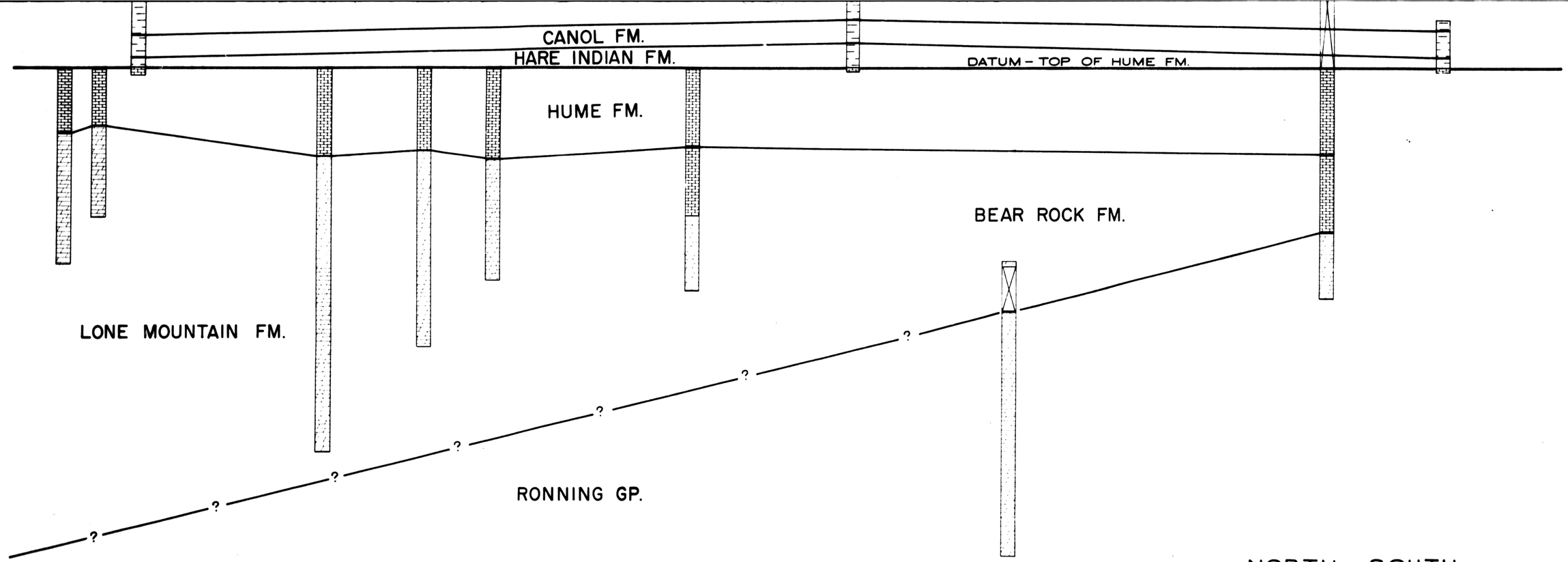
SCALE: 8 MILES TO 1 INCH

TO ACCOMPANY REPORT:
SURFACE GEOLOGY OF THE WRIGLEY AREA
IMPERIAL OIL LIMITED - 1960

3073


S
Sta. 5
9
8
6
4
7
20
22
21
23
17
Sta. 18
N


CRETACEOUS
?
?
IMPERIAL FM.
CANOL FM.
HARE INDIAN FM.
DATUM - TOP OF HUME FM.
HUME FM.
BEAR ROCK FM.
LONE MOUNTAIN FM.
?
?
?
?
?
RONNING GP.



NORTH — SOUTH

GEOLOGICAL CORRELATION SECTION NO. 2

HORIZONTAL SCALE: 1 INCH TO 8 MILES
VERTICAL SCALE: 1 INCH TO 500 FEET

TO ACCOMPANY REPORT:
SURFACE GEOLOGY OF THE WRIGLEY AREA
IMPERIAL OIL LIMITED - 1960.

3973

134° 133° 132° 131° 130° 129° 128° 127° 126° 125° 124° 123° 122° 121°

67° 66° 65° 64° 63° 62°

FRANKLIN

NORMAN RANGE

MACKENZIE MTNS

SELWYN MTNS

MTNS

McCONNELL RANGE

CAMSELL RANGE

KELLER LAKE

FT SIMPSON

2831 2487 2488 2475 2476 2489 2490 2491 2492 2478 2479 2493 2494 2495 2496 2497 2830 2831

500 MILES

YELLOWKNIFE EDMONTON CALGARY REGINA VANCOUVER

1 of

MACKENZIE MTNS.

SELWYN MTNS.

MTNS.

McCONNELL RANGE

CAMSELL RANGE

NAHANNI RANGE

LIARD RANGE

LIARD PLATEAU

FT. NORMAN

KELLER LAKE

FT SIMPSON

2830

2831

64°

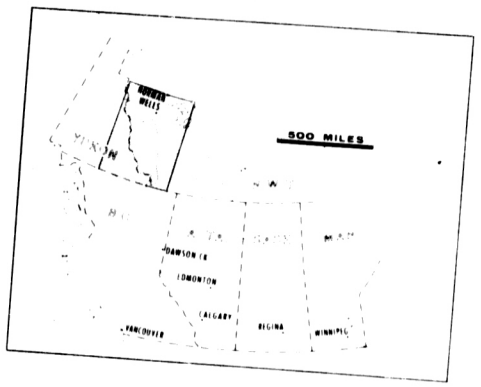
63°

62°

61°

60°

134° 133° 132° 131° 130° 129° 128° 127° 126° 125° 124° 123° 122° 121°



LOCATION MAP
NORMAN WELLS AREA
SHOWING

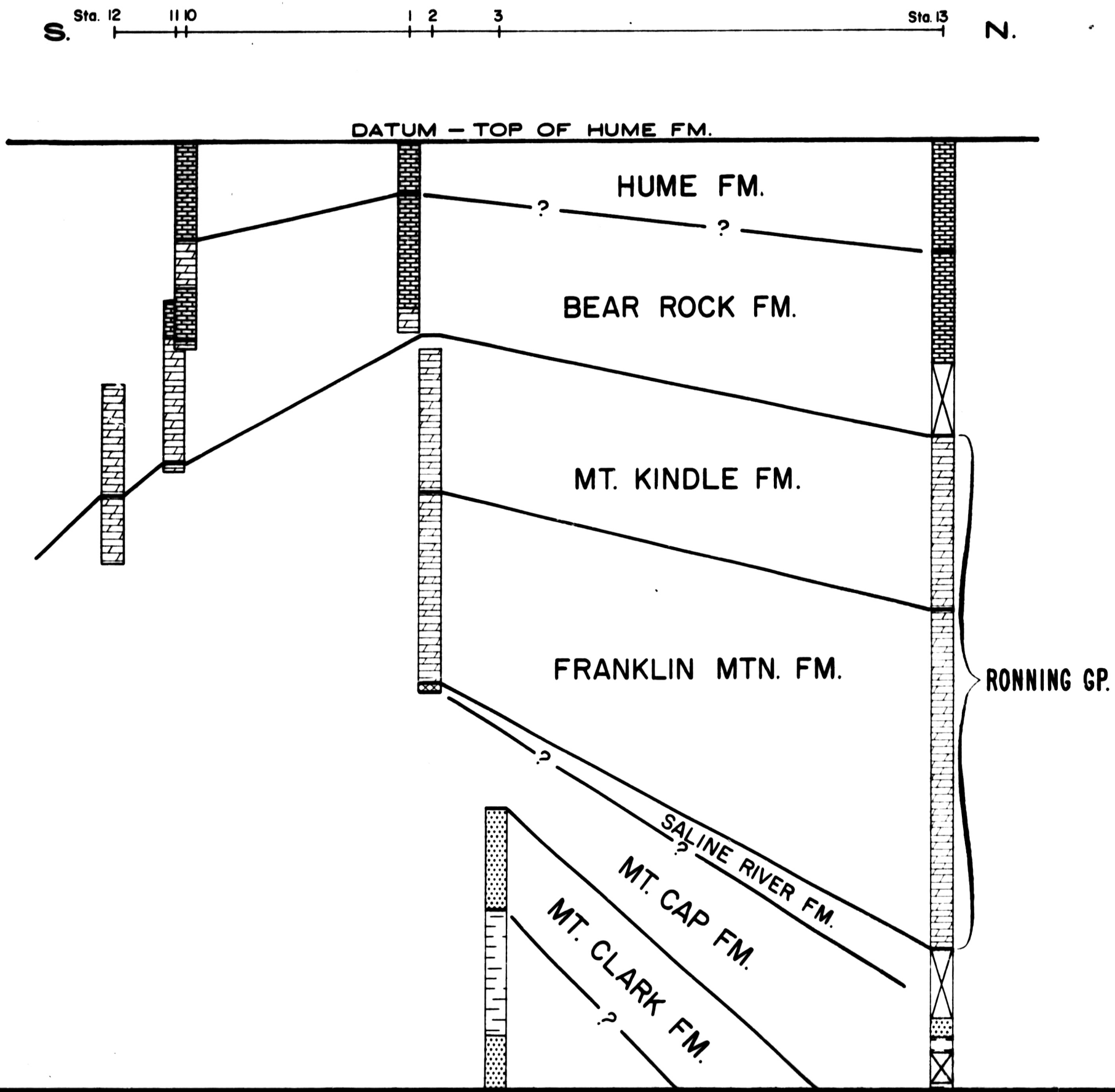
2475 IMPERIAL OIL PERMITS

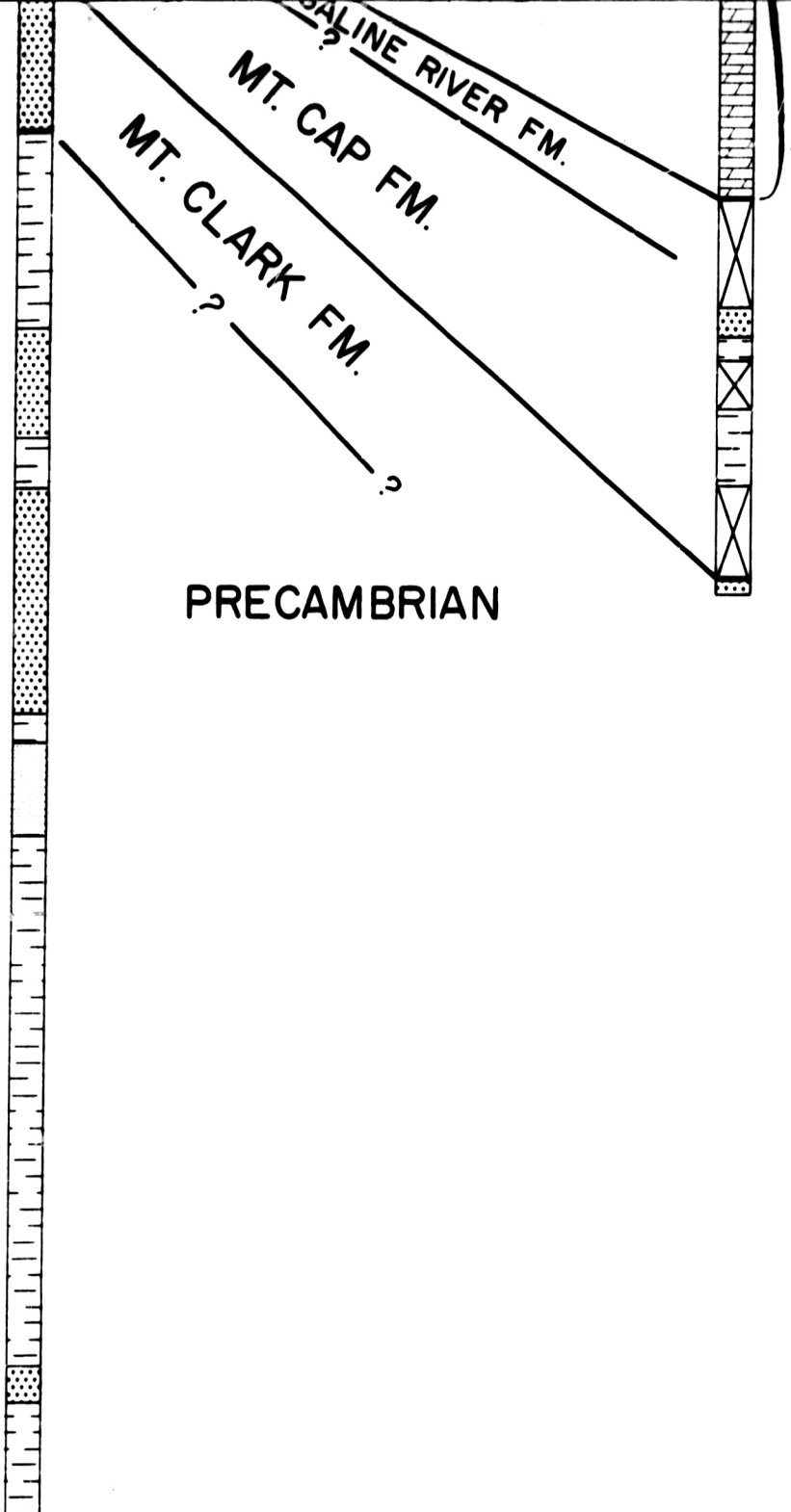
OUTLINE OF DETAIL MAP

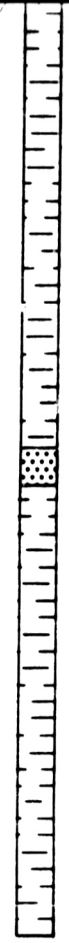
50 MILES

TO ACCOMPANY REPORT:
SURFACE GEOLOGY OF THE WRIGLEY AREA
IMPERIAL OIL LIMITED - 1960

242


S.
Sta. 12
11
10
1
2
3
Sta. 13
N.
DATUM — TOP OF HUME FM.
HUME FM.
?
?
BEAR ROCK FM.
MT. KINDLE FM.
FRANKLIN MTN. FM.
RONNING GP.
?
SALINE RIVER FM.
?
MT. CAP FM.
MT. CLARK FM.
?


SALINE RIVER FM.
?
MT. CAP FM.
MT. CLARK FM.
?
?
PRECAMBRIAN



NORTH — SOUTH

GEOLOGICAL CORRELATION SECTION NO. 1

HORIZONTAL SCALE: 1 INCH TO 8 MILES
VERTICAL SCALE: 1 INCH TO 500 FEET

TO ACCOMPANY REPORT:
SURFACE GEOLOGY OF THE WRIGLEY AREA
IMPERIAL OIL LIMITED – 1960.

LOG OF OUTCROP SECTION

STATION NO. 3

MT. CAP

LOCATION: LSD. SEC. TWP. RGE. W. M.
UNIT ZONE N.T.S
SEC G-76 LAT 63° 30' LONG 123° 00'

Description of location:
East side of Mt. Cap

ELEVATION MEASURED June, 1960
METHOD Tape and Brunton

FORMATIONS

CAMBRIAN	570'+
Mt. Clark Formation	570'
PRECAMBRIAN	6260'+

TO ACCOMPANY REPORT

Surface Geology of the Wrigley Area

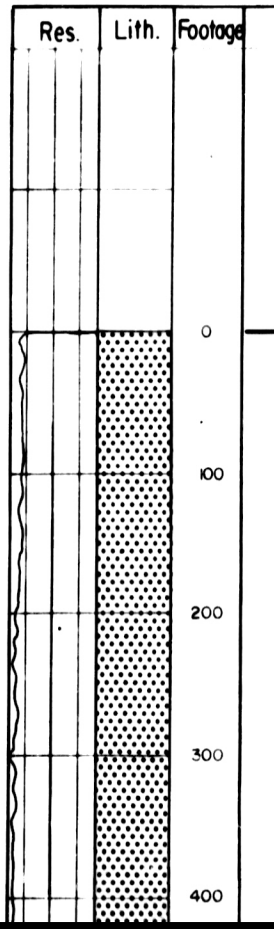
BY: IMPERIAL OIL LIMITED

DATE: 1960

LEGEND

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

IMPERIAL OIL LIMITED EXPLORATION DEPARTMENT PEACE RIVER DISTRICT

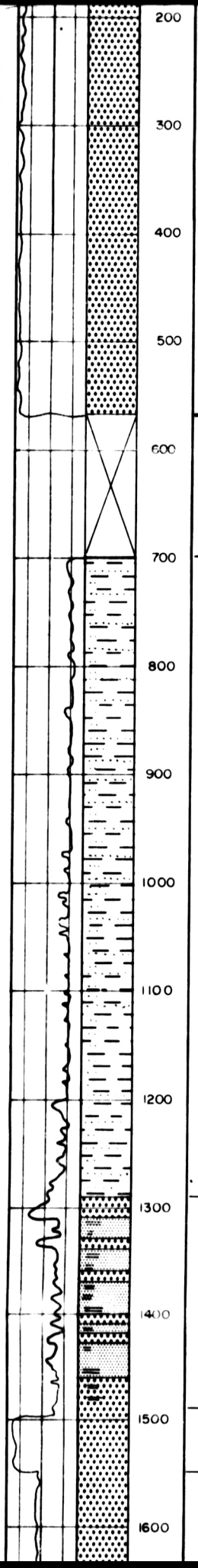


Description

0' CAMBRIAN

Mt. Clark Formation

Ss, orthoqtzt, lt gy, lt bf + rd brn (hem); m gy + gy pink wthrd; m gr, subang, w srtd, sil and in pt hem cmt, sl fri; mas, lam + x bdd in pt; lower prt wthrs into ½" diam. rods perpendicular to bdg.



560' — PRECAMBRIAN

Angular unconformity

700' —

Sh, drab m gy, plty-fis, slty; intbdd with
Sltst, m gy, m gy and sl tan wthrd, thn bdd, plty, lam, sil + arg.

1290' —

Intbdd
Orthoqtzt, lt gy, bf wthrd, thk bdd, m + f gr, sil cmt,
Sltst, gn gy, sil, arg, plty - flaggy, lam; and mnr
Sh, gn gy + dk gy, slty, sil in pt; plty - fis.

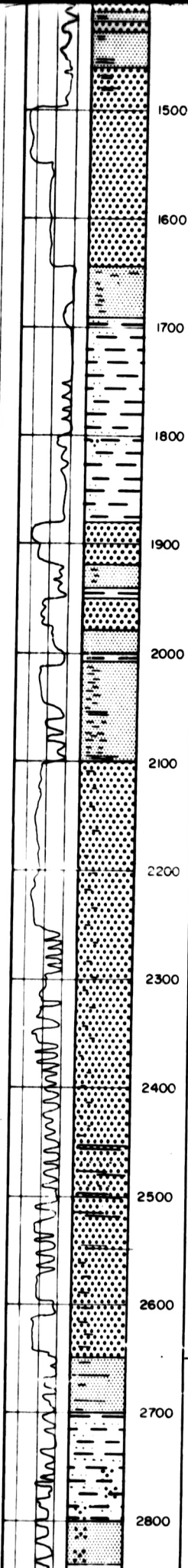
1490' —

Orthoqtzt, lt gy, lt bf + gy pink, mas; c gr, sbang, w srtd,
fri, sl hem in pt.

1550' —

Orthoqtzt, v lt bf, bf wthrd, v f gr, sil cmt, thk bdd.

2 of



—1490'

Orthoqtzt, lt gy, lt bf + gy pink, mas; c gr, sbang, w srtd, fri, sl hem in pt.

—1550'

Orthoqtzt, v lt bf, bf wthrd, v f gr, sil cmt, thk bdd.

—1645'

Sh, gn gy, mar (hem) in pt, slty, sl nod to plty; intbdd with Sltst, gn gy, sl arg + sil, plty.

—1880'

Orthoqtzt, v lt bf, bf wthrd, f-c gr, sbang, w srtd.

—1920'

Sltst, lt + m gy, also gn gy, sil, c silt in pt becoming v f Ss, thk bdd, plty, lam in pt; intbdd with gn gy, sil Sh + mar hem Sh.

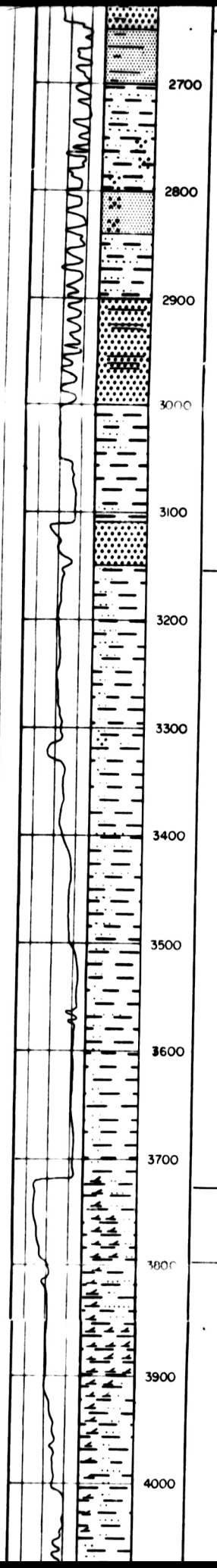
—2100'

Orthoqtzt, lt + m gy, v lt bf, gy bf + sl gy purple; bf, gn gy + gy purple wthrd; v f + f gr, sbrd, w srtd; sil + mnr hem + lmn cmt; m + thk bdd, thn interbeds of gn gy + mar Sh.

137

—2650'

Intbdd Sh, Sltst and some Ss
Sh, mar, plty + blky; slty, hem;
Sltst, gy purple, hem. sl sil, m bdd;
Ss, orthoqtzt, lt gy + gy purple, v f gr,
sl hem, sil cmt; m bdd



2650'

Intbdd Sh, Sltst and some Ss
Sh, mar, plty + blky; slty, hem;
Sltst, gy purple, hem. sl sil, m bdd;
Ss, orthoqtzt, lt gy + gy purple, v f gr,
sl hem, sil cmt; m bdd

3150'

Sh, gn gy, sil + Fe, dns, plty; intbdd with
Sh, mar, hem, slty, ireg plty, chippy + blky.

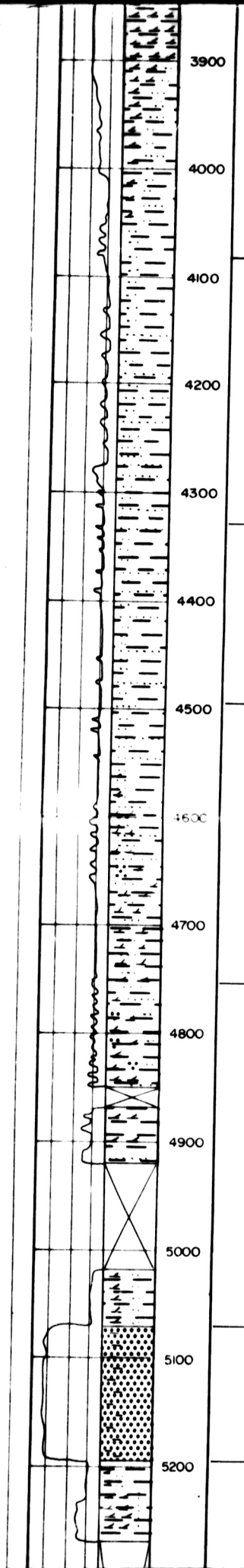
3730'

Sh, mar, as abv, more mas, blky

3790'

Sh, gn gy + mar, dol, thk bdd.

140



4080'

Sh, mar col + wthrd, mas, blky, slty + hem; also some more resistant slty Sh + f Sltst.

4330' Minor fault-

4490'

Sh, as abv, dol.

4750'

Intbdd mar Sltst + Sh

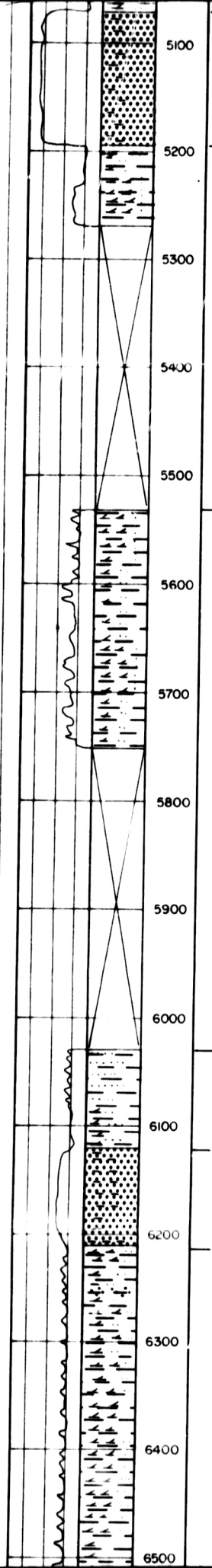
5070'

Ss, sb ark, gn gy col + wthrd, 15% altered fld as tan flecks, f + m gr, sbrd; w srtd, mas, blky + flaggy

5195'

Sh, mar + gn gy, dol, thk bdd

15 of



5070'

Ss, sb ark, gn gy col + wthrd, 15% altered fld as tan flecks, f + m gr, sbrd; w srtd, mas, blky + flaggy

5195'

Sh, mar + gn gy, dol, thk bdd

5530'

Sh, intbdd,
gn gy, dusky yel and mar, sl sil + slty, v dol when gn gy, sl dol when mar, thk intbds.

6030'

Sh, gy purple, v slty; intbdd with some Sltst, brn bf, m bdd

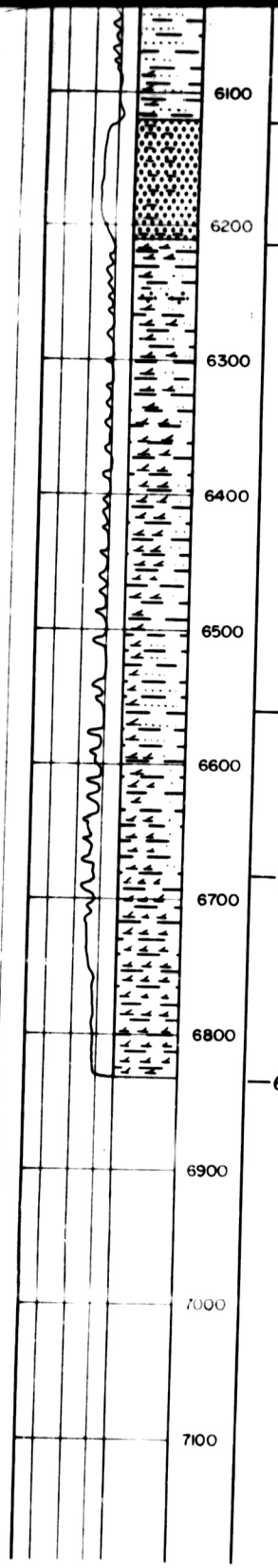
6120'

Ss, sbark, m gy + gn gy col + wthrd, mnr altered fld, m-c gr, subang, w srtd.

6210'

Intbdd mas bds of
Sh, mar col + wthrd, hem, blky, slty, sl dol; and
Sh, gn gy, dk yel bf wthrd, dns, sil, v dol, lam; mnr Sltst, gn gy, arg, thk bds.

6 of



Sh, gy purple, v slty; intbdd with some
Sltst, brn bf, m bdd

6120' ———

Ss, sbark, m gy + gn gy col + wthrd, mnr altered fld, m-c gr, subang, w srtd.

6210' ———

Intbdd mas bds of
Sh, mar col + wthrd, hem, blky, slty, sl dol; and
Sh, gn gy, dk yel bf wthrd, dns, sil, v dol, lam; mnr
Sltst, gn gy, arg, thk bds.

6560' ——folded—

6680' ———

Sh, gn gy, bf wthrd, dns, blky, sil, v dol; mnr mar, hem, Sh bands.

6830' ——————————— End of outcrop ———————————

707

LOG OF OUTCROP SECTION

STATION NO. 4

TWIN FALLS

LOCATION: LSD. UNIT | SEC. ZONE | TWP. N.T.S. | RGE. | W. M.

SEC H-6 LAT 63° 10' LONG 123° 45'

Description of location:

Creek on western slope of Camsell Range.

ELEVATION | MEASURED May, 1960
METHOD Tape, Brunton & Pace stick

FORMATIONS

DEVONIAN	2500'
Hume Formation	730'
Lone Mountain Form.	1770'+

TO ACCOMPANY REPORT

Surface Geology of the Wrigley Area

BY: IMPERIAL OIL LIMITED

DATE: 1960

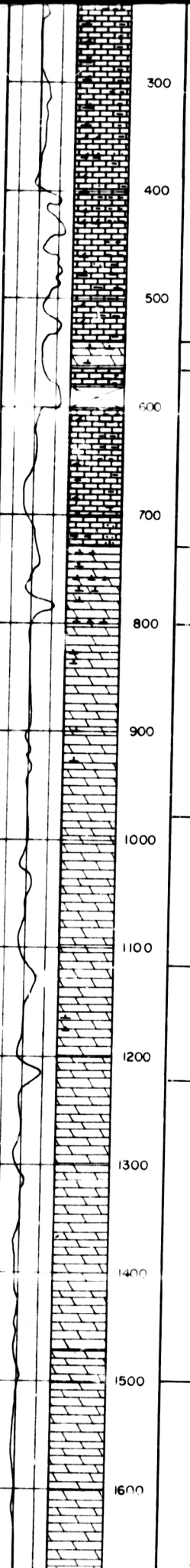
LEGEND

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 Ls, dk gy, micxl to bioclas with scat Cor, Strom and Crin frag, mnr Gast and Trilo; tr to sl dol, mas.
		100	
		200	Ls, as abv, with alternating non-resistant, dk gy-blk, bf wthrd, arg-shaly intbds; some Brac rich zones.
		300	
		400	

1 of



arg-shaly intbds; some Brac rich zones.

540'

Dol, m gy, f-c xl, anhed-sbhed, gy bf wthrd.

565'

Ls, dk gy-blk, micxl with thn lam arg ls ptgs.

730' — Lone Mountain Formation

Dol, gy-lt gy brn, crpxl - micxl, anhed, calc, gy bf nod wthrd; mnr dk gy micxl ls intbds.

800'

Dol, ireg banded with thn intlam dk gy, anhed, mic-m xl dol, and wh, sbhed, c xl dol; grades to mas, dk gy, f-m xl dol at base with mnr scat gy-wh c xl lam.

980'

Dol, dk gy, micxl - v f xl, mas, indistinct bdg in pt; scat intbds of thn lam gy-wh dol; shattered in pt with lt gy secondary dol infill.

1120'

Dol, banded with shattered dk gy micxl dol and mas, m-c, lt brn intbds; the dk gy frac bds are infilled with wh secondary dol, in pt having a pseudo-brec appearance.

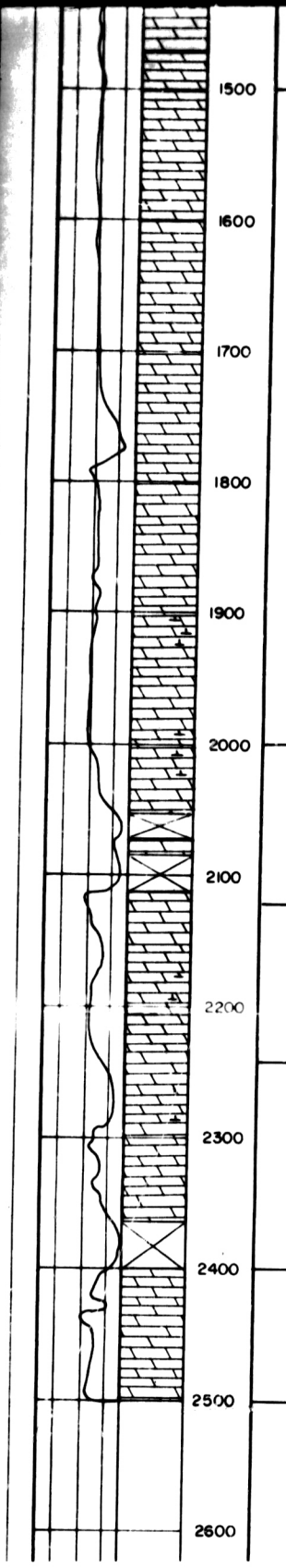
1220'

Dol, mic-crpxl, banded with alternating mas, dk gy, blky to shattered bds; and tan, pebbly wthrg bds.

1500'

Banded dol become crpxl to dns below 1500'.

2 of



1500'

Banded dol become crpxl to dns below 1500'.

2000'

Dol, alternating lt-dk gy, finely col lam. dol.

2120'

Dol, dk gy-blk, mot with abundant wh, secondary calc infilling vugs + fractures, dolomitized bioclas ls.

2240'

Dol, dk gy, mic-crpxl, mas, relict bioclas material, fetid.

2400'

Dol, mostly crpxl with only scat traces of relict bioclastic material.

2500'

End of Outcrop

373

LOG OF OUTCROP SECTION

STATION NO. 5

CAMSELL RANGE

LOCATION: LSD UNIT SEC ZONE TWP NTS RGE W M.
SEC L-9 LAT 62° 20' LONG 123° 30'

Description of location:
East face of southern end of Camsell Range.

ELEVATION MEASURED June, 1960
METHOD Tape & Brunton

FORMATIONS

DEVONIAN	1750'+
Hume Formation	570'
Lone Mountain Formation	1180'+

TO ACCOMPANY REPORT

Surface Geology of the Wrigley Area

BY: IMPERIAL OIL LIMITED
DATE: 1960

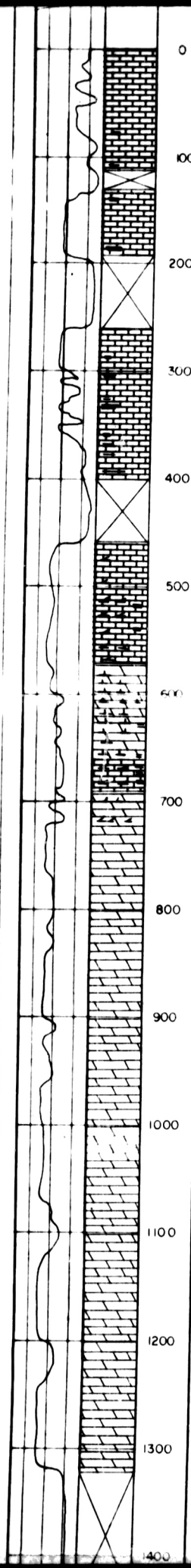
LEGEND

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 Ls, dk gy, micxl to bioclas, m gy to bf wthrd, mostly mas, shattered in pt with blky to nod wthrg; bioclas material includes Strom, colonial Cor, mnr branching Cor, solitary Cor, Brac and a few Trilo.
		100	
		200	
		300	300' Ls, micxl, arg with thn calc Sh intbds.
		400	

1 of



0'

DEVONIAN

Hume Formation

Ls, dk gy, micxl to bioclas, m gy to bf wthrd, mostly mas, shattered in pt with blky to nod wthrg; bioclas material includes Strom, colonial Cor, mnr branching Cor, solitary Cor, Brac and a few Trilo.

300'

Ls, micxl, arg with thn calc Sh intbds.

460'

Ls, dk gy, micxl, tr bioclast (Brac + Gast), mas-plty, gy bf wthrg; intbdd with mnr
Dol, gy brn, crpxl, jointed.

570'

Lone Mountain Formation

Intbdd dol + ls;
Dol, dkg-brn, mic-crpxl, calc, grading to ls in pt; m gy-bf wthrg, mas, blky.
Ls, dk gy-blk, micxl, thn bdd, plty, shattered in pt, dol, arg in pt.

720'

Dol, dk gy, mic-crpxl, sbhed, mas, gy-bf wthrg, blky.

800'

Dol, dk gy-brn, f-v c xl, tr relict bioclas, shattered with secondary gy-wh dol infill.

860'

Intbdd
Dol, dk gy-wh, micxl-v f xl and c xl, shattered with pseudo-brec appearance in pt, striped lt and dk gy in pt; and
Dol, dk gy, mas, micxl.

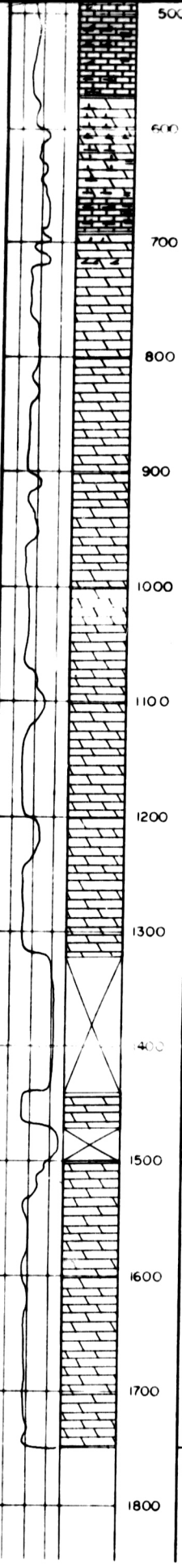
1060'

Dol, dk gy, micxl-v f xl, mostly mas with scat pseudo-brec beds; a few stringers of wh c xl dol.

1160'

Dol, banded m-dk gy and brown, v f xl - crpxl, gy bf wthrg, mostly sbhed, mas.

2 of



intbdd with mnr
Dol, gy brn, crpxl, jointed.

570' — Lone Mountain Formation

Intbdd dol + ls;
Dol, dkg-brn, mic-crpxl, calc, grading to ls in pt; m gy-bf wthrg, mas, blky.
Ls, dk gy-blk, micxl, thn bdd, plty, shattered in pt, dol, arg in pt.

720'

Dol, dk gy, mic-crpxl, sbhed, mas, gy-bf wthrg, blky.

800'

Dol, dk gy-brn, f-v c xl, tr relict bioclas, shattered with secondary gy-wh dol infill.

860'

Intbdd
Dol, dk gy-wh, micxl-v f xl and c xl, shattered with pseudo-brec appearance in pt, striped lt and dk gy in pt; and
Dol, dk gy, mas, micxl.

1060'

Dol, dk gy, micxl-v f xl, mostly mas with scat pseudo-brec beds; a few stringers of wh c xl dol.

1160'

Dol, banded m-dk gy and brown, v f xl - crpxl, gy bf wthrg, mostly sbhed, mas.

1750' — End of Outcrop

3 of 3

LOG OF OUTCROP SECTION

STATION NO. 6

CANYON HILL

LOCATION: LSD. SEC. TWP. RGE. W M.
UNIT ZONE N.T.S
SEC P-41 LAT 63° 00' LONG 123° 45'

Description of location:

Camsell Range just south of Root River.

ELEVATION MEASURED July, 1960
METHOD Depe & Brunton

FORMATIONS

DEVONIAN	3428'+
Hume Formation	780'
Lone Mountain Formation	2648'+

TO ACCOMPANY REPORT

Surface Geology of the Wrigley Area

BY: IMPERIAL OIL LIMITED

DATE: 1960

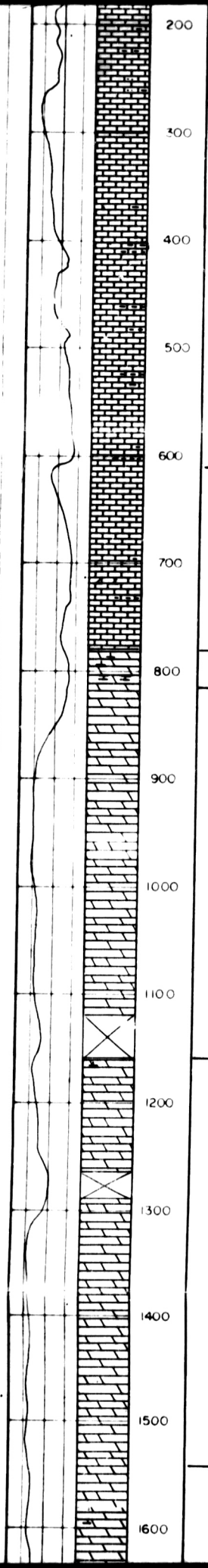
LEGEND

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 Ls, dk gy, micxl with mnr amt of biclas Crin, Cor and Brac frag; mas, lt gy-gy bf wthrg, tr pyr.
		100	
		200	
		300	
		400	

1 of



610'

Ls, gy + dk gy, micxl with mnr bioclas, mas to rubbly, lt gy + gy bf wthrg.

780' — Lone Mountain Formation

Dol, lt gy, micxl, calc, lt gy wthrg, sl frac.

815'

Dol, dk gy, v f - f xl, mas, gy wthrg; bnd and brec in pt with abundant wh c xl dol infill, much frac.

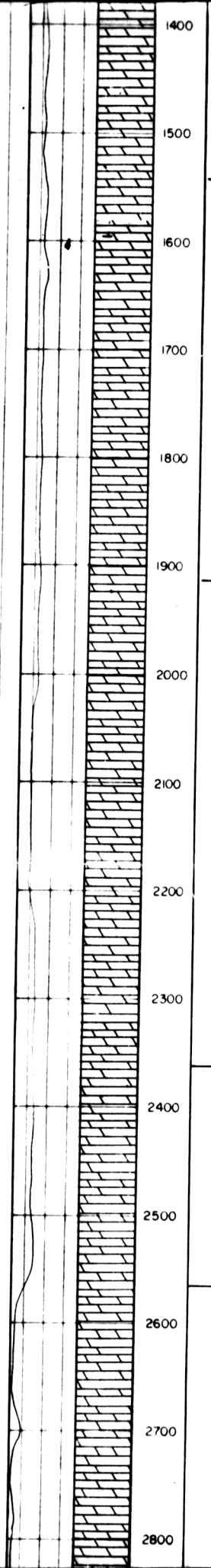
2 of

1160'

Dol, gy and dk gy, micxl - v f xl, mas, dk gy wthrg; mnr amt bnd + brec with c xl wh dol infill.

1540'

Dol, dk gy, micxl - v f xl, mas, rubbly, dk gy + lt gy wthrg bnds.



-1540'

Dol, dk gy, micxl - v f xl, mas, rubbly, dk gy + lt gy wthrg bnds.

1910'

Dol, mic - crpxl, bnd gy + dk gy col + wthrg, mas~~+~~ thk bdd, some rubbly bds, lam in pt o wthrd surface, styl in pt.

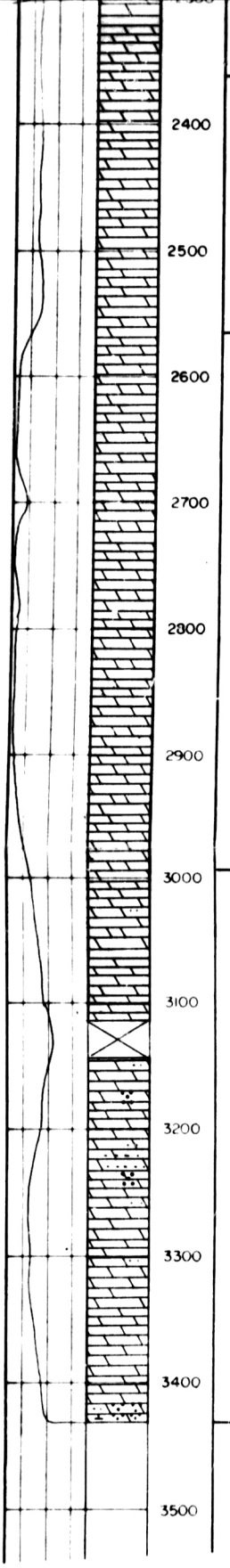
2360'

Dol, as abv, intbdd with
Dol carrying mnr amts skel mat and wh c xl dol infill.

2560'

Dol, dk gy, micxl - crpxl, some bioclas mat, wh c xl dol infill decreasing in lower prt; mas, dk gy wthrg.

130



2360'

Dol, as abv, intbdd with
Dol carrying mnr amts skel mat and wh c xl dol infill.

2560'

Dol, dk gy, micxl - crpxl, some bioclas mat, wh c xl dol infill decreasing in lower prt; mas, dk gy wthrg.

2990'

Dol, gy, lt gy + lt crm gy, crpxl, dns, slty in pt with some floating m gr qtz snd gr, m bdd, lt gy + gy bf wthrg; f gr sndy dol at base.

4 of 4

LOG OF OUTCROP SECTION

STATION NO. 7

WOLF CREEK

LOCATION: LSD. SEC. TWP. RGE. W. M.
UNIT ZONE N.T.S
SEC I-2 LAT 63° 10' LONG 124° 45'

Description of location:

Canyon Ranges just north of Root River.

ELEVATION MEASURED June, 1960
METHOD Tape & Brunton

FORMATIONS

DEVONIAN	1900'+
Hume Formation	830'
Lone Mountain Formation	1070'+

TO ACCOMPANY REPORT

Surface Geology of the Wrigley Area

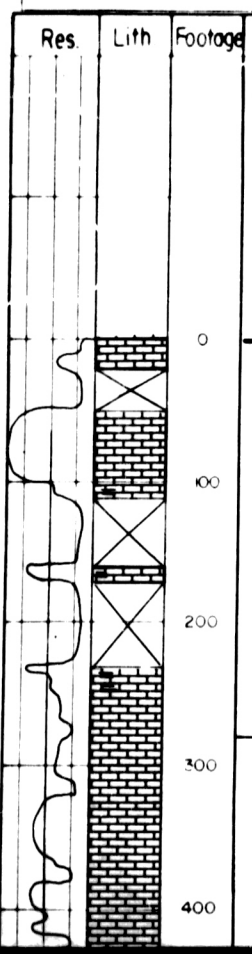
BY: IMPERIAL OIL LIMITED

DATE: 1960

LEGEND

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

IMPERIAL OIL LIMITED EXPLORATION DEPARTMENT PEACE RIVER DISTRICT



Description

0' — DEVONIAN

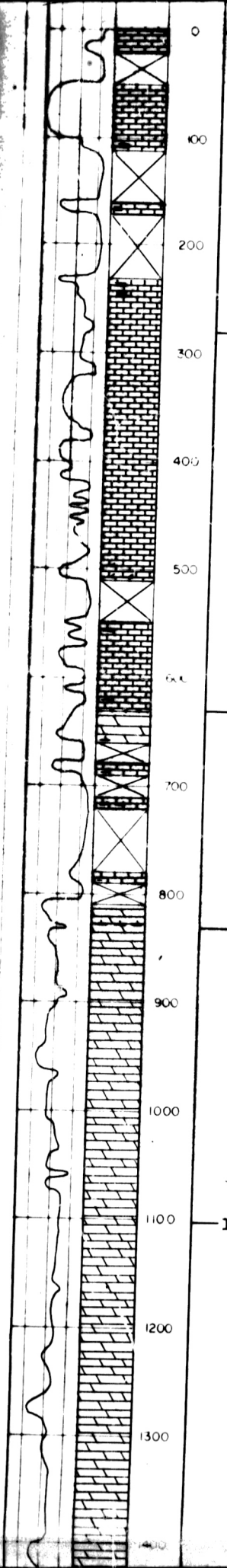
Hume Formation

Ls, dk gy micxl to bioclas with Brac, Crin, and a few scat colonial Cor; mas, resistant, cliff forming, m gy-bf wthrg, nod to pebbly.

280'

Ls, dk gy, micxl with tr bioclas mat (Brac, Crin, a few solitary Cor); thn bdd - mas, rubbly, m gy wthrg, blky to plty frac; tr pyr; mnr intbdd dolomitic ls at base.

1 of



0'

DEVONIAN

Hume Formation

Ls, dk gy micxl to bioclas with Brac, Crin, and a few scat colonial Cor; mas, resistant, cliff forming, m gy-bf wthrg, nod to pebbly.

280'

Ls, dk gy, micxl with tr bioclas mat (Brac, Crin, a few solitary Cor); thn bdd - mas, rubbly, m gy wthrg, blky to plty frac; tr pyr; mnr intbdd dolomitic ls at base.

630'

Dol, wh-m gy, bnd in pt, v f - c xl, mas, a few styl; intbdd with Ls, dk gy, micxl, dol, thn bdd to plty, nod wthrg.

27

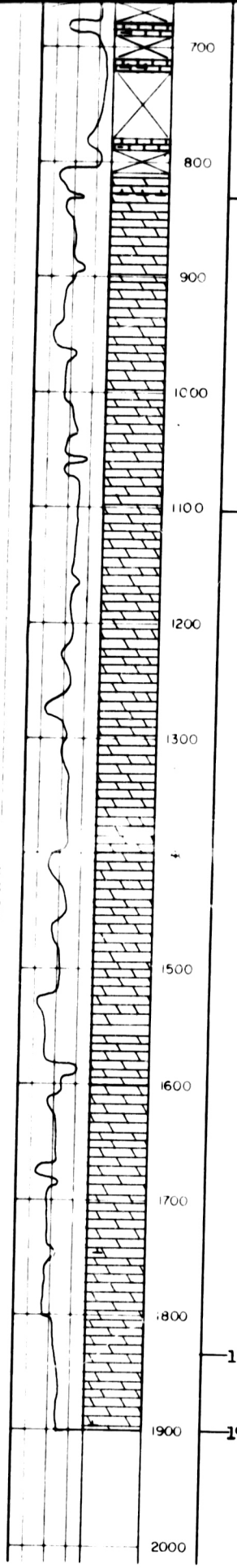
830'

Lone Mountain Formation

Dol, m-dk gy, micxl-v f xl, tr relict skeletal mat, dolomitized micxl to bioclas ls; mot in pt with pseudo brec zones; m gy blky wthrg, mas.

1100'

Dol, m-dk gy, gy-bf wthrg, micxl-v f xl; scat incl. lenses and strg of wh c xl secondary dol; occ pseudo brec zones; tr relict skel mat (Brac, colonial Cor); max, blky.



Ls, dk gy, micxl, dol, tan bed to plty, nod wthrg.

830' — Lone Mountain Formation

Dol, m-dk gy, micxl-v f xl, tr relict skeletal mat, dolomitized micxl to bioclas ls; mot in pt with pseudo brec zones; m gy blky wthrg, mas.

1100'

Dol, m-dk gy, gy-bf wthrg, micxl-v f xl; scat incl, lenses and strg of wh c xl secondary dol; occ pseudo brec zones; tr relict skel mat (Brac, colonial Cor); max, blky.

1830'

Dol, dk gy-blk, micxl - v f xl, distinct mot appearance due to c xl secondary dol, mas.

1900' — End of Outcrop

373

LOG OF OUTCROP SECTION

STATION NO. 8

NORTH NAHANNI

LOCATION: LSD. SEC. TWP. RGE. W. M.
UNIT ZONE N.T.S
SEC H-29 LAT 62° 20' LONG 124° 15'

Description of location:
Creek on north side of North Nahanni River.

ELEVATION MEASURED July, 1960
METHOD Tape & Brunton

FORMATIONS

DEVONIAN	1010'+
Imperial Formation	680'+
Canol Formation	200'
Hare Indian Formation	100'
Hume Formation	30'+

TO ACCOMPANY REPORT

Surface Geology of the Wrigley Area

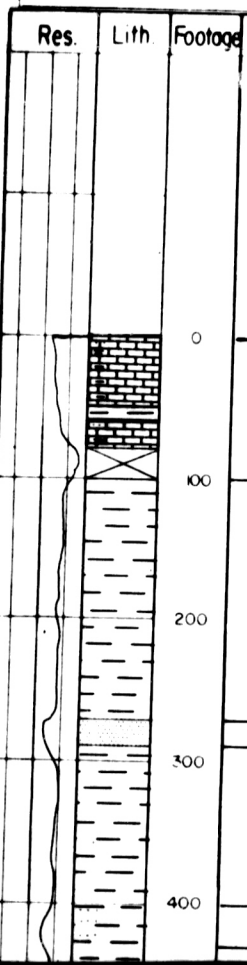
BY: IMPERIAL OIL LIMITED

DATE: 1960

LEGEND

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

IMPERIAL OIL LIMITED EXPLORATION DEPARTMENT PEACE RIVER DISTRICT



Description

0' — DEVONIAN

Imperial Formation

Ls, dk gy, slty + arg, pyr; flaggy bdd with calc sh ptgs, m gy + dk gy wthrg.

100'

Sh, dk gy, fis, badly frac, occ sil conc, gy wthrg.

270'

290' Sltst, dk gy, arg, m + thk bdd, frac, gy bf wthrg.

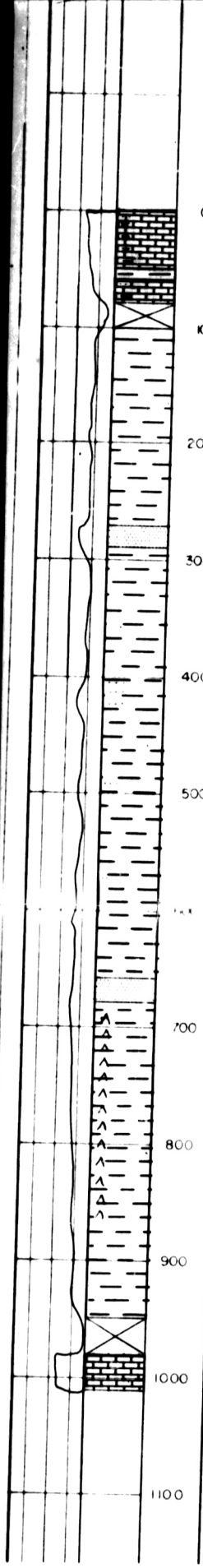
Sh, dk gy, fis, splty, frac, gy wthrg.

400'

Sh, gy + gy gn, fis, slty, gy + crm gy wthrg.

430'

1 of



0' — DEVONIAN

Imperial Formation

Ls, dk gy, slty + arg, pyr; flaggy bdd with calc sh ptgs, m gy + dk gy wthrg.

100'

Sh, dk gy, fis, badly frac, occ sil conc, gy wthrg.

270'

290' Sltst, dk gy, arg, m + thk bdd, frac, gy bf wthrg.

Sh, dk gy, fis, splty, frac, gy wthrg.

400'

430' Sh, gy + gy gn, fis, slty, gy + crm gy wthrg.

Sh, dk gy, fis, occ slty bnds, small Fe-st conc, gy + rusty rd wthrg.

660'

680' Sltst, dk gy-blk, 3-6" bds, dns, sil, sb conch frac.

Canol Formation

Sh, blk-dk gy, sil, bit or carb, flaggy bdd, plty to splty, sb conch frac, yel sulph efflorescence, rare sil nod.

880'

Hare Indian Formation

Sh, dk gy, fis, soft and recessive, bit or carb, highly frac; gy, dk gy and rusty rd wthrg.

980'

Hume Formation

Ls, micxl and bioclas, dk gy, mas to rubbly bdd, dk gy wthrg, abnt Brac and a few Crin in upper 6'.

1010' End of Outcrop

2 of 2

LOG OF OUTCROP SECTION

STATION NO. 9

ACOUSTIC LAKES

LOCATION: LSD. SEC. TWP. RGE. W. M.
UNIT ZONE N.T.S
SEC E-46 LAT 62° 20' LONG 124° 00'

Description of location:
Cliff on north side of valley.

ELEVATION MEASURED July, 1960
METHOD Tape and Brunton

FORMATIONS

DEVONIAN	1325'+
Hume Formation	505'±
Lone Mountain Formation	820'

TO ACCOMPANY REPORT

Surface Geology of the Wrigley Area

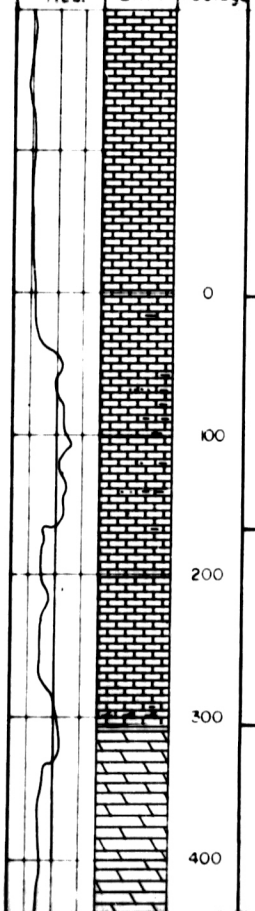
BY: IMPERIAL OIL LIMITED

DATE: 1960

LEGEND

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

IMPERIAL OIL LIMITED EXPLORATION DEPARTMENT PEACE RIVER DISTRICT



Description

DEVONIAN
Hume Formation

200', inacessible, near vertical cliff.
Ls, mas, lt gy + gy bf wthrg.

0' ———

Ls, dk gy, micxl, mnr lump, tr bioclas, v sl slty + arg in pt, pyr in pt, mas to rubbly bdd, gy + bf wthrg.

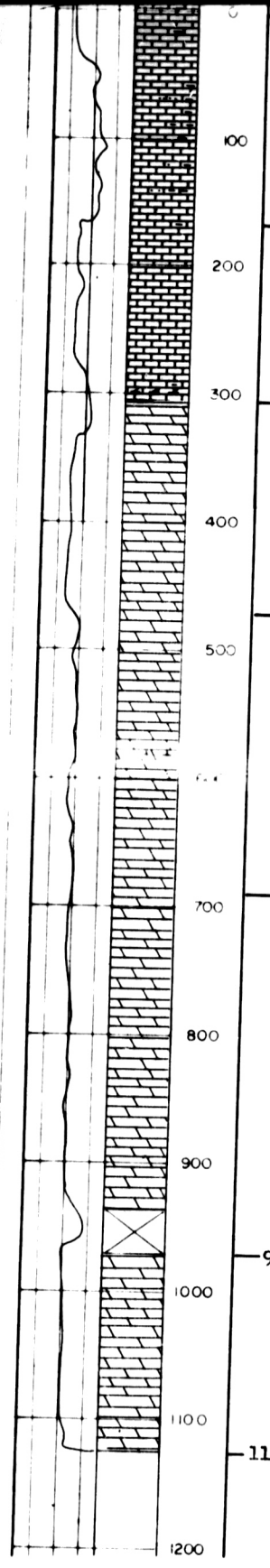
165' ———

Ls, dk gy, micxl, mnr wh calc infill, mas to rubbly bdd, bf + gy bf wthrg.

305' ——— Lone Mountain Formation ———

Dol, gy, lt gy + wh, m-c xl, becoming v f xl near base; pseudo brec in pt with v c xl dol infill.

1 of



0'

Ls, dk gy, micxl, mnr lump, tr bioclas, v sl slty + arg in pt, pyr in pt, mas to rubbly bdd, gy + bf wthrg.

165'

Ls, dk gy, micxl, mnr wh calc infill, mas to rubbly bdd, bf + gy bf wthrg.

305' — Lone Mountain Formation

Dol, gy, lt gy + wh, m-c xl, becoming v f xl near base; pseudo brec in pt with v c xl dol infill.

470'

Dol, dk gy + gy, v f xl, styl in pt, crudely lam on wthrd surfaces, thk to rubbly bdd; gy, dk gy and gy bf wthrg.

690'

Dol, as abv but micxl with mnr v f xl.

970'

Dol, dk gy, micxl, styl in pt, crudely lam in pt, mas to rubbly bdd, dk gy and gy bf wthrg.

1125' — End of Outcrop

LOG OF OUTCROP SECTION

STATION NO. 10

RIVER BETWEEN TWO MOUNTAINS "A"

LOCATION: LSD SEC. TWP. RGE. W M.
UNIT ZONE NTS
SECD-2 AT 63° 10' LONG 123° 00'

Description of location: 6½ miles north of where River Between Two Mountains crosses the McConnel Range.

ELEVATION MEASURED July, 1960
METHOD Tape & Brunton

FORMATIONS

DEVONIAN	1170'+
Hume Formation	555'
Bear Rock Formation	615'

TO ACCOMPANY REPORT

Surface Geology of the Wrigley Area

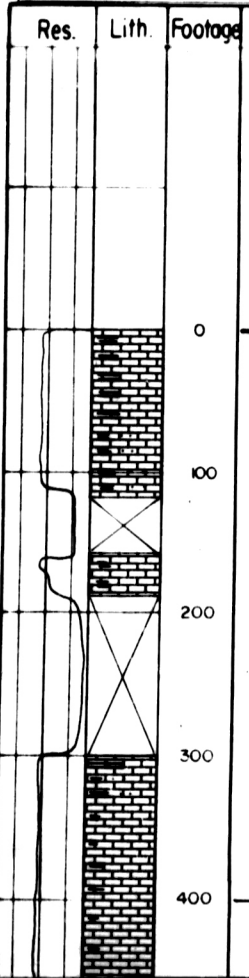
BY: IMPERIAL OIL LIMITED

DATE: 1960

LEGEND

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

IMPERIAL OIL LIMITED EXPLORATION DEPARTMENT PEACE RIVER DISTRICT



Description

0' — DEVONIAN

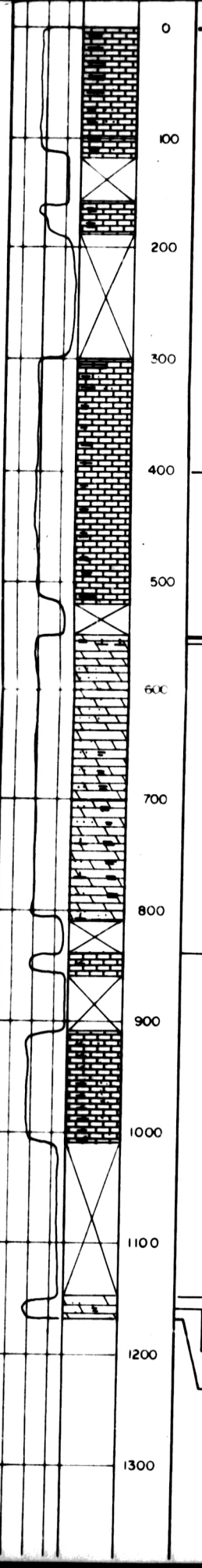
Hume Formation

Ls, m gy, m-lt gy wthrg, micxl with mnr bioclas, mostly Crin frag, a few Strom and scat colonial Cor; thk bdd, abnt calc veinlets.

1 of

400' —

Ls, lt brn gy, m-lt gy wthrg, micxl with some pel bds, sparry calc infill, thk-mas bdd.



0' — **DEVONIAN**

Hume Formation

Ls, m gy, m-lt gy wthrg, micxl with mnr bioclas, mostly Crin frag, a few Strom and scat colonial Cor; thk bdd, abnt calc veinlets.

400' —

Ls, lt brn gy, m-lt gy wthrg, micxl with some pel bds, sparry calc infill, thk-mas bdd.

555' — **Bear Rock Formation**

Dol, wh-lt gy col & wthrg; wh c xl dol with m gy bnds of m xl dol; some bit infill.

560'

Dol, lt brn gy-dk gy, lt brn gy-m gy wthrg, micxl, thk bdd, vaguely lam.

850' —

Ls brec, lt gy-lt brn gy, lt gy-bf wthrg, 60-70% ls frags with 10-20% dol frags, ang, less than 5 cm, p srtd, 20% matrix of mic brec; mas indistinct bdg, rubbly; p scat vug por.

1150' —

Dol, m-dk gy, m gy wthrg, 25% v c dolomitized frags of branching colonial Cor in matrix of micxl dol.

1160' —

Dol, lt brn gy, mic-crpxl, m & thk bdd.

1170' — End of Outcrop

2 of 2

LOG OF OUTCROP SECTION

STATION NO. 11

RIVER BETWEEN TWO MOUNTAINS "B"

LOCATION: LSD SEC. TWP RGE. W M.
UNIT ZONE N.T.S.
SEC K-1 LAT 63° 10' LONG 123° 00'

Description of location: 6 miles north of where River Between Two Mountains crosses the McConnell Range.

ELEVATION MEASURED July, 1960
METHOD Tape & Brunton

FORMATIONS

DEVONIAN	930'+
Bear Rock Formation	930'
SILURIAN - ORDOVICIAN	50'+

TO ACCOMPANY REPORT

Surface Geology of the Wrigley Area

BY: IMPERIAL OIL LIMITED

DATE: 1960

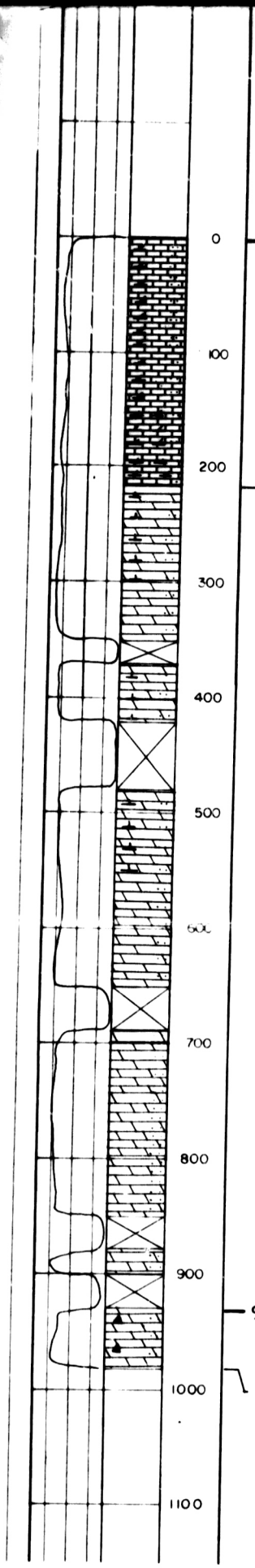
LEGEND

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 Bear Rock Formation Ls brec, lt gy, lt brn gy - lt bf col + wthrg, 60% v dol ls frags, ang, less than 6 cm sz, p srtd, 20% matrix of mic brec, sl slty; mas, indistinct bdg, rubbly; scat vug por.
		100	
		200	215' — Dol, lt gy-lt brn gy col + wthrg, f xl - crpxl, v sl slty, mas - thk bdd 5' reefal bd at 265', dol branching colonial Cor frags in dol matrix, f xl - micxl, m gy col + wthrg, thk - mas bdg.
		300	
		400	

1 of



0' — DEVONIAN

Bear Rock Formation

Ls brec, lt gy, lt brn gy - lt bf col + wthrg, 60% v dol ls frags, ang, less than 6 cm sz, p srtd, 20% matrix of mic brec, sl slty; mas, indistinct bdg, rubbly; scat vug por.

215'

Dol, lt gy-lt brn gy col + wthrg, f xl - crpxl, v sl slty, mas - thk bdd
5' reefal bd at 265', dol branching colonial Cor frags in dol matrix, f xl - micxl, m gy col + wthrg, thk - mas bdg.

930' — SILURIAN - ORDOVICIAN

RONNING GROUP

Dol, lt brn gy, brn gy wthrg, v f xl - micxl, mas - thk bdd; cht nod; some scat mas Cor.

End of Outcrop

272

LOG OF OUTCROP SECTION

STATION NO. 12

RIVER BETWEEN TWO MOUNTAINS "C"

LOCATION: LSD SEC. TWP RGE. W M.
UNIT ZONE NTS
SEC L-6 AT 63° 00' LONG 123° 00'

Description of location: North side of valley where River Between Two Mountains crosses the McConnell Range.

ELEVATION MEASURED July 1960
METHOD Tape & Brunton

FORMATIONS

DEVONIAN	630'+
Bear Rock Formation	630'+
SILURIAN - ORDOVICIAN	400'+
RONNING GROUP	400'+

TO ACCOMPANY REPORT

Surface Geology of the Wrigley Area

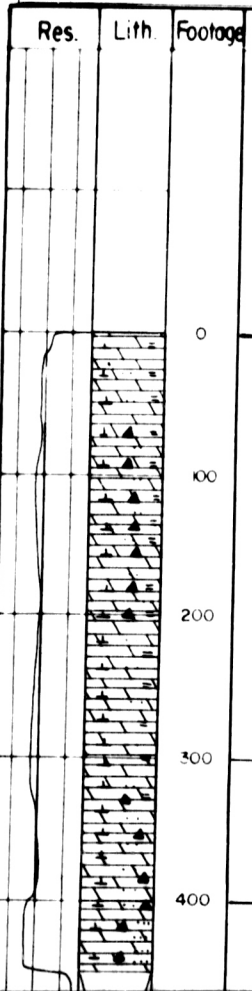
BY: IMPERIAL OIL LIMITED

DATE: 1960

LEGEND

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

IMPERIAL OIL LIMITED EXPLORATION DEPARTMENT PEACE RIVER DISTRICT



Description

0' — DEVONIAN

Bear Rock Formation

Dol, lt & m & lt brn gy, lt gy wthrd, micxl & crpxl, m - thk ireg bdd.

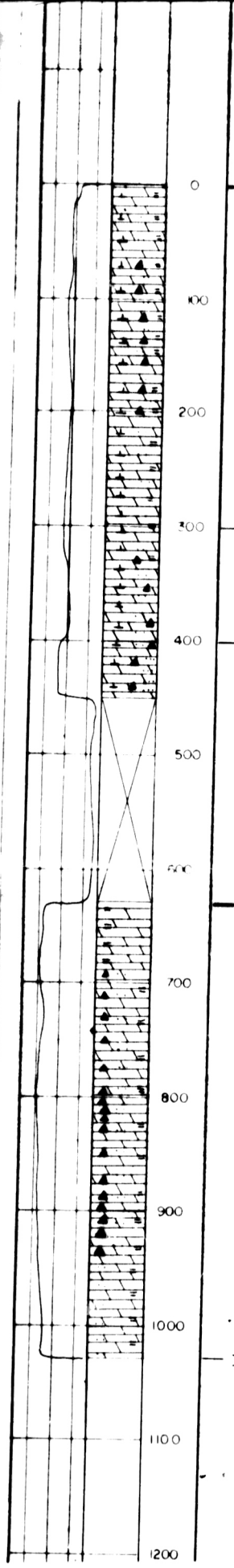
11 of

300' —

Dol, lt gy - lt brn gy, lt bf wthrd, crpxl, mas, rubbly, vaguely bdd.

400' —

Dol, lt gy, lt bf wthrg, crpxl, m w bdd.



0'

DEVONIAN

Bear Rock Formation

Dol, lt & m & lt brn gy, lt gy wthrd, micxl & crpxl, m - thk ireg bdd.

300'

Dol, lt gy - lt brn gy, lt bf wthrd, crpxl, mas, rubbly, vaguely bdd.

400'

Dol, lt gy, lt bf wthrg, crpxl, m w bdd.

630'

SILURIAN - ORDOVICIAN

RONNING GROUP

Dol, lt brn gy, brn gy wthrg, micxl, mas; mnr cht, lt brn gy in bnds & scat ireg masses.

1030'

Base of Outcrop

2 of 2

LOG OF OUTCROP SECTION

STATION NO. 13

McDUFF CREEK

LOCATION: LSD. SEC. TWP. RGE. W M
UNIT ZONE N.T.S
SEC 1-31 LAT 64° 10' LONG 123° 15'

Description of location:

ELEVATION MEASURED July, 1960
METHOD Tape, Brunton & Plane table.

FORMATIONS

DEVONIAN	1710'+
Bear Rock Formation	1710'
SILURIAN-ORDOVICIAN	2940'
RONNING GROUP	2940'
CAMBRIAN	1450'+
Saline River Formation	380'±
Mt. Cap Formation	
Mt. Clark Formation	50'+

TO ACCOMPANY REPORT

Surface Geology of the Wrigley Area

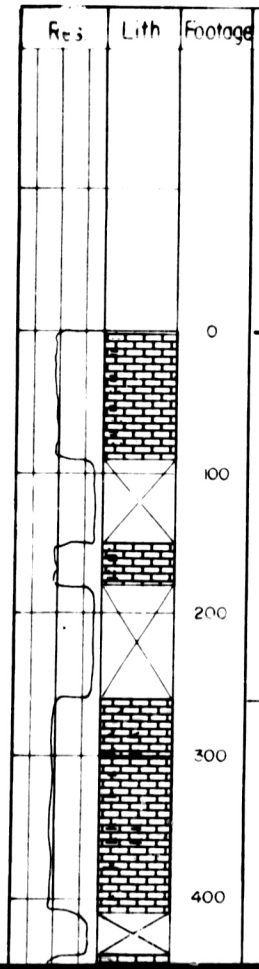
BY: IMPERIAL OIL LIMITED

DATE: 1960

LEGEND

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

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



Description

1 of

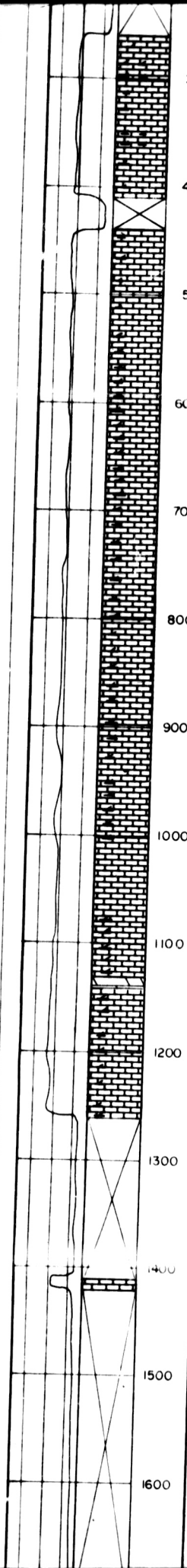
0' — DEVONIAN

Bear Rock Formation

Ls brec, blocks and frags to 6', micxl ls, ang, p srted, unstratified, in calc + v sl arg matrix; lt brn-gy & bf col and wthrg; brec zones grade laterally to highly fractured vaguely bdd zones, scat vug por.

260'

Ls brec, blocks and frags of micxl ls, to 1' ang, p srtd, unstrat, in calc & v sl arg matrix, sl dol; lt brn-gy col, wthrg lt brn gy, lt gy & gy crm; vug & frac por.



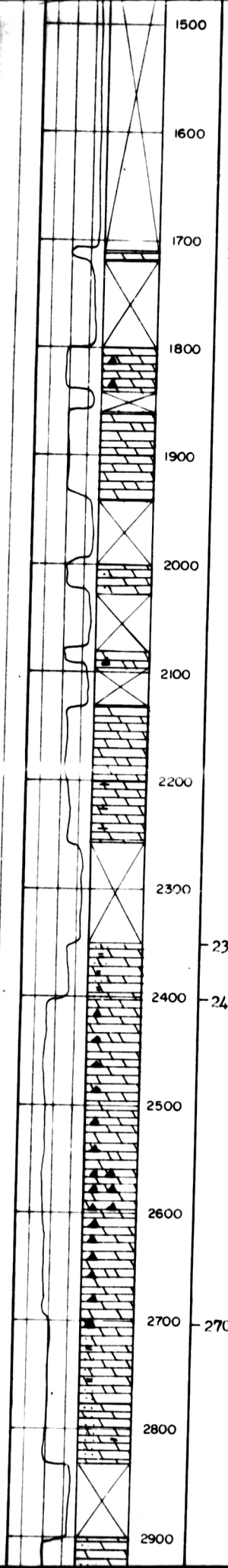
260'

Ls brec, blocks and frags of micxl ls, to 1' ang, p srtd, unstrat, in calc & v sl arg matrix, sl dol; lt brn-gy col, wthrg lt brn gy, lt gy & gy crm; vug & frac por.

2 of

1410'

Ls brec, pebbles & cobbles of micxl ls, ang, p srtd, unstratified, calc matrix; dusky yel, lt pnk and gy bf; wthrg lt gy-gy bf; p exposure.



1710' — SILURIAN - ORDOVICIAN

~~ANTICOSTI~~ GROUP

Dol, v f xl to micxl, scat bioclas (Crin & cup Cor, sil in pt); tr slt as lam; lt brn gy and dk gy brn col; wthrg lt brn gy to lt gy.

137

2350' —

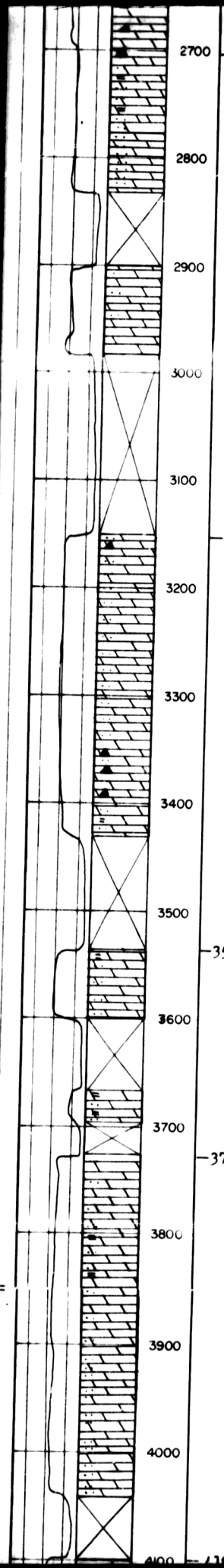
Dol, v f xl-micxl, anhed, slty lam; gy brn, wthrg lt brn gy.

2400' —

Dol, v f xl-micxl, anhed, mnr bioclas (mostly v c Crin frags & cup Cors & Alg masses); cht nods; brn gy; wthrg gy bf-m gy.

2700' —

Dol, micxl, slty, v sl arg (as ptgs); tr pyr; lt brn gy, gn gy and gy pnk; wthrg gy crm and gy pnk; plty.



2700'

Dol, micxl, slty, v sl arg (as ptgs); tr pyr; lt brn gy, gn gy and gy pnk; wthrg gy crm and gy pnk; plty.

3150'

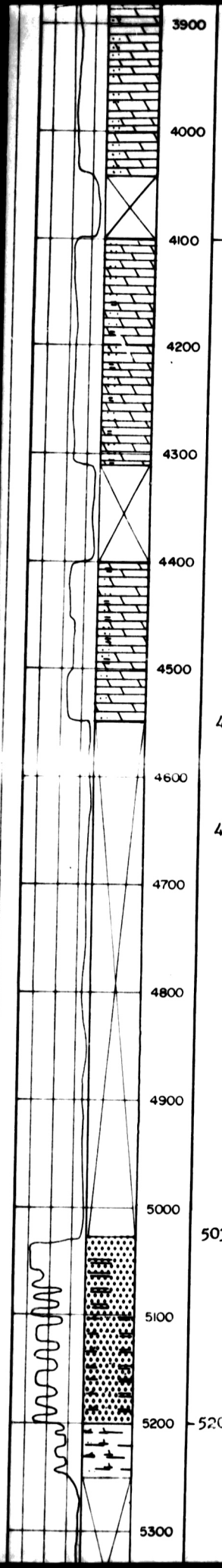
Dol, micxl, anhed, lt brn gy-lt bf, wthrg lt bf-gy bf; scat ireg cht nod, slty lam.

3545'

Dol, micxl, anhed, sl slty; lt brn gy to pale olive and rose brown; wthrg bf, rose brown and tan.

3725'

Dol, micxl, anhed, slty lam, arg ptgs, tr cht in pts; dk gy brn and lt brn gy; wthrg lt brn gy-gy bf; thk bdd, plty in pt.



4100' ———

Dol, micxl, anhed, sl slty, v sl arg towards base; dk gy brn; wthrg lt brn gy to gy bf to v lt bf.

4550'

4650' Approx. ——— CAMBRIAN ———

Saline River Formation

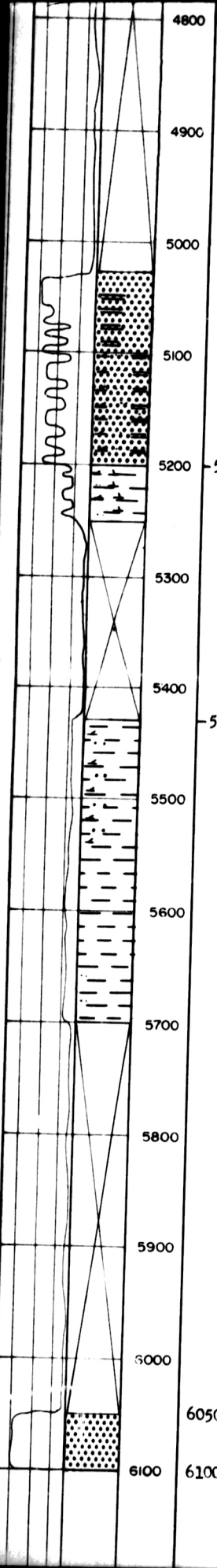
5030'? ——— Mt. Cap Formation ———

Orthoqtzt, m-c gr, w srtd, sbang, sil cmt; gy bf, wthrg brn bf; intbdd with
Sh, slty, dol, dk gy-dk olive gy; wthrg gn gy, plty.

5200' ———

Sh, as abv, intbdd w
Ls, micxl to bioclas (v c gr Brac), sl slty, sl arg; brn gy, wthrg lt brn gy.

15 of



5030'? — Mt. Cap Formation

Orthoqtzt, m-c gr, w srtd, sbang, sil cmt; gy bf, wthrg brn bf; intbdd with
Sh, slty, dol, dk gy-dk olive gy; wthrg gn gy, plty.

5200' —

Sh, as abv, intbdd w
Ls, micxl to bioclas (v c gr Brac), sl slty, sl arg; brn gy, wthrg lt brn gy.

5430' —

Sh, lt olive, wthrg bf to tan to olive brn; plty-semifis; mnr Ss intbds towards top.

6 of 6

6050' — Mt. Clark Formation

Orthoqtzt, m-c gr, sbrd, w srtd, sil cmt, lt pnk, gy crm to gy bf; wthrg gy pnk, bf-gy bf; thk bdd, x bdd.

6100' — End of Outcrop

LOG OF OUTCROP SECTION

STATION NO. 14, 15, 16.

LOWER REDSTONE TRAVERSE STATIONS

LOCATION: LSD SEC. TWP. RGE. W M.
UNIT ZONE NTS
SEC LAT LONG

Description of location: Outcrops along the lower Redstone River.

ELEVATION MEASURED August, 1960
METHOD Pogo stick

FORMATIONS

CRETACEOUS

DEVONIAN

Imperial Formation

TO ACCOMPANY REPORT

Surface Geology of the Wrigley Area.

BY: IMPERIAL OIL LIMITED

DATE: 1960

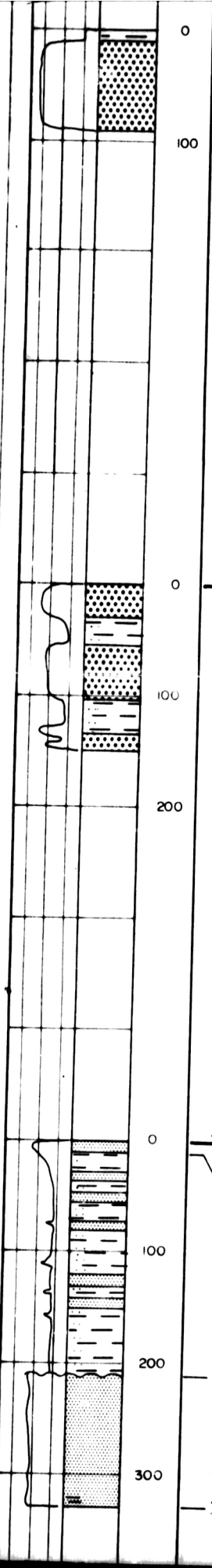
LEGEND

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

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

Res.	Lith.	Footage	Description
			Station No. 14 Sec. B-42 Lat. 64°10'; Long. 124°45'
		0	0' — CRETACEOUS
			10' — Sh, dk gy, bit, thn plty, p exposed.
		100	Ss, sbgywk, m-dk and grn gy, wthrg m gy & sl gy bf, m & c gr, ang, f-w srtd, 30-50% dk rk frags, 20% fld, balance qtz; p cmtd with clay matrix; fri, soft, mas, x-bdd in pt.

114



Sec. B-42 Lat.64°10'; Long.124°45'

0' — CRETACEOUS

Sh, dk gy, bit, thn plty, p exposed.

10'

Ss, sbgywk, m-dk and gn gy, wthrg m gy & sl gy bf, m & c gr, ang, f-w srtd, 30-50% dk rk frags, 20% fld, balance qtz; p cmtd with clay matrix; fri, soft, mas, x-bdd in pt.

Station No. 15

Sec. L-36 Lat.64°00'; Long.125°00'

0' — CRETACEOUS

Ss, sbywk & ark, lt gy, gy bf wthrg, m gr, ang, w srtd, soft & fri; mas - m bdd; intbdd with
Mdst, gn gy & tan, soft, slty, p otc.

Station No. 16

Sec. G-46 Lat.64°00'; Long.125°15'

0' — CRETACEOUS - DEVONIAN, undivided.

Sltst, m gy, sl arg, mas.

10'

Sh, m and m-dk gy, varying slty, ireg thn bdd to fis, mic-mica on bdg planes; intbdd with
Sltst, m gy, arg, ireg plty, thn & m bdd.

210' — Erosional Unconformity

Sltst, lt gy, lt brn gy & m gy; wthrg gy bf, quartzose with mnr dk grains & fld grains, m bdd - mas, resistant.

330' — End of Outcrop

2 of 2

LOG OF OUTCROP SECTION

STATION NO. 17

MACKAY RANGE

LOCATION: LSD. SEC. TWP. RGE. W M.
UNIT ZONE NTS
SEC K-5 AT 64° 50' LONG 125° 45'

Description of location:
North end of MacKay Range.

ELEVATION MEASURED
METHOD

FORMATIONS

CRETACEOUS

DEVONIAN	1,460'+
Hume Formation	760'
Bear Rock Formation	700'
SILURIAN-ORDOVICIAN	590'+
Ronning Formation	590'+

TO ACCOMPANY REPORT

Surface Geology of the Wrigley Area

BY: IMPERIAL OIL LIMITED

DATE: 1960

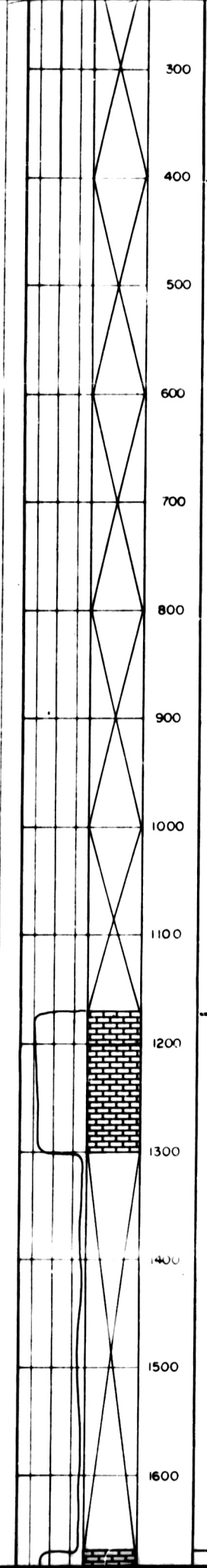
LEGEND

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 Ss, bf col & wthrg, sbang-sbrd, w srtd qtz gr, fri.
		100	
		200	
		300	
		400	DEVONIAN Cretaceous-Devonian contact lies somewhere in the covered interval.

11 of



DEVONIAN

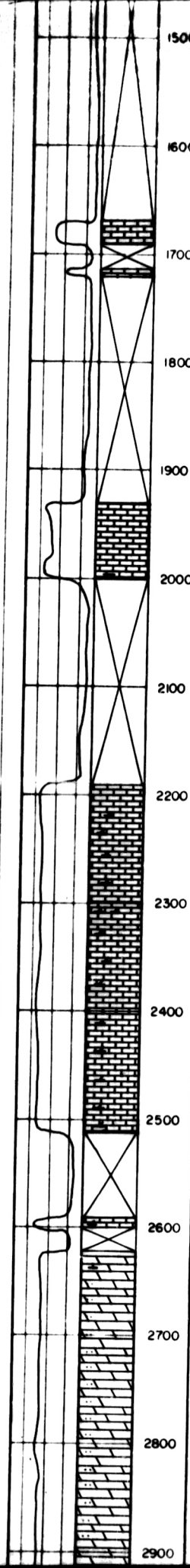
Cretaceous-Devonian contact lies somewhere in the covered interval.

27

1170' Hume Formation

Ls, dk and lt gy brn, wthrg lt-m gy and gy bf; mas-thk bdd; bioclas with some beds up to 90% Strom, and Cor; rubbly in pt.

1670'



1670'

Ls, m gy, bf wthrg, bioclas & lump ls with Strom, Brac and col Cors, mas-thn bdd.

1930' — Bear Rock Formation

Ls; micxl, pel & lump; m-dk gy, lt gy wthrg, sl arg, dol near base, thn-thk bdd, some Ost.

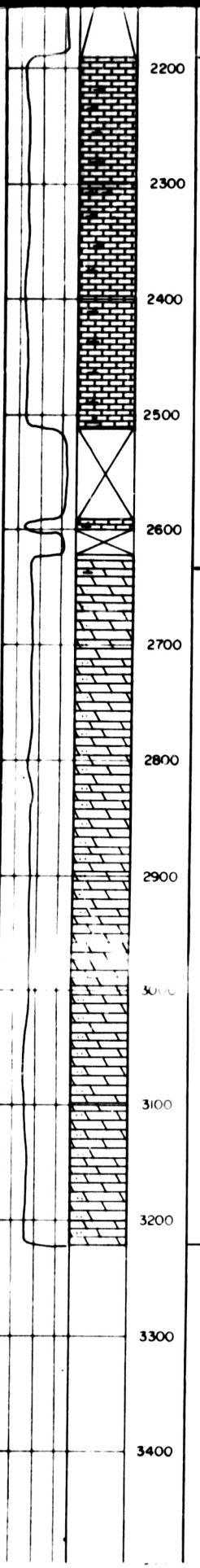
2190'

Ls & ls brec, micxl - c xl, sbhed, lt-m gy, bf wthrg; dol; little brec in upper part but badly frac, frac infilled w wh c xl calc; bottom part is welded brec with very few distinct blocks; mas; tr vug por.

137

2630' — SILURIAN - ORDOVICIAN
Ronning Formation

Dol, lt gy & gy bf; lt & m gy and gy bf wthrg, crpxl, dns; thn-thk bdd, mas in pt.



2190'

Ls & ls brec, micxl - c xl, sbhed, lt-m gy, bf wthrg; dol; little brec in upper part but badly frac, frac infilled w wh c xl calc; bottom part is welded brec with very few distinct blocks; mas; tr vug por.

2630' — SILURIAN - ORDOVICIAN

Ronning Formation

Dol, lt gy & gy bf; lt & m gy and gy bf wthrg, crpxl, dns; thn-thk bdd, mas in pt.

3220' — End of Outcrop

LOG OF OUTCROP SECTION

STATION NO. 18

GROTTO CREEK

LOCATION: LSD UNIT | SEC. ZONE | TWP. NTS | RGE. | W M.

SEC 0-27 AT 64° 50' LONG 126° 45'

Description of location: North side of Carcajou River 1/3 miles downstream from mouth of Grotto Creek.

ELEVATION — MEASURED August, 1960; METHOD Tape and Brunton

FORMATIONS

DEVONIAN	530'+
Imperial Formation	100'+
Canol Formation	337'
Hare Indian Formation	93'
Hume Formation	10'+

TO ACCOMPANY REPORT

Surface Geology of the Wrigley Area

BY: IMPERIAL OIL LIMITED

DATE: 1960

LEGEND

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

IMPERIAL OIL LIMITED EXPLORATION DEPARTMENT PEACE RIVER DISTRICT

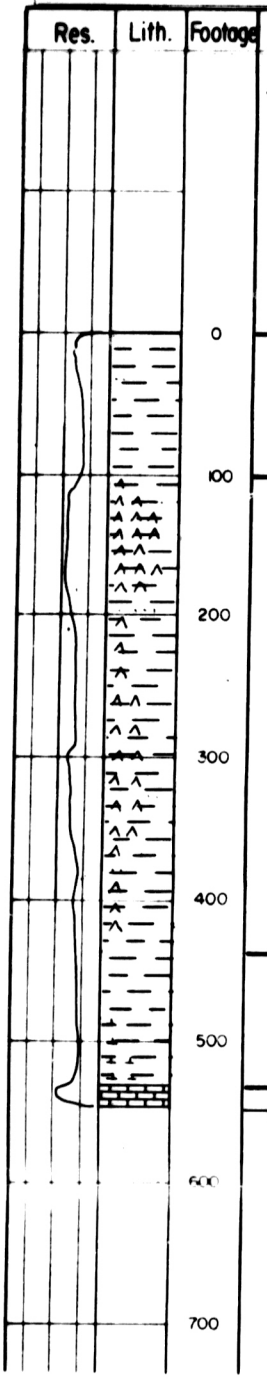
11 of

Res.	Lith.	Footage	Description
		0	0' — DEVONIAN
			Imperial Formation
			Sh, dk gy, fis, v sulphurous; rusty rd, dk gy & yel gy wthrg.
		100	100' — Canol Formation
			Sh, dk gy, blk & dk gy brr, variable sil, v sulphurous, sb conch frac in pt, rusty beneath surface, v bit, fis-plty bdg; wthrg gy, yel gy & rd brn.
		200	
		300	
		400	
			437' — Hare Indian Formation

LEGEND

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

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



Description

0' — **DEVONIAN**

Imperial Formation

Sh, dk gy, fis, v sulphurous; rusty rd, dk gy & yel gy wthrg.

100' — **Canol Formation**

Sh, dk gy, blk & dk gy brn, variable sil, v sulphurous, sb conch frac in pt, rusty beneath surface, v bit, fis-plty bdg; wthrg gy, yel gy & rd brn.

437' — **Hare Indian Formation**

Sh, blk, fis, v petroliferous, with ls conc & nod bnds, sulphurous, calc in pt, gy & dk gy wthrg, soft, mas.

530' — **Hume Formation**

Ls, dk gy brn, micxl, fos, mas, gy bf wthrg.

545' — End of Outcrop

2 of 2

LOG OF OUTCROP SECTION

STATION NO. 19

DODO CANYON

LOCATION: LSD UNIT SEC. ZONE TWP. NTS RGE. W M.

SEC 10 AT 65° 00' LONG 127° 15'

Description of location:

North side of Dodo Creek.

ELEVATION MEASURED August, 1960

METHOD Tope & Brunton

FORMATIONS

DEVONIAN	377'+
Hume Formation	377'+

TO ACCOMPANY REPORT

Surface Geology of the Wrigley Area

BY: IMPERIAL OIL LIMITED

DATE: 1960

LEGEND

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

IMPERIAL OIL LIMITED EXPLORATION DEPARTMENT PEACE RIVER DISTRICT

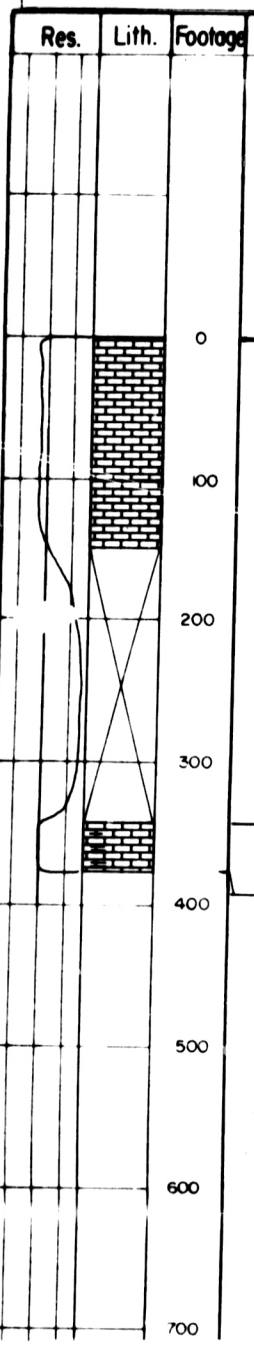
Res.	Lith.	Footage	Description
		0	0' — DEVONIAN Hume Formation Ls, lt brn & gy brn, micxl, bioclas in pt, badly frac, mas-thk bdd, gy & gy bf wthrg.
		100	
		200	
		300	
			343' — Ls, lt brn & lt gy brr, micxl [illegible] with mnr bioclas, buff wthrg, thn bdd, with arg ptgs & thn bll [illegible] intbds.
		400	377' — End of Outcrop

1 of 1

LEGEND

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

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



Description

0' — **DEVONIAN**

Hume Formation

Ls, lt brn & gy brn, micxl, bioclas in pt, badly frac, mas-thk bdd, gy & gy bf wthrg.

343' —

Ls, lt brn & lt gy brn, micxl [illegible] th mnr bioclas, buff wthrg, thn bdd, with arg ptgs & thn blk [illegible] intbds.

377' — End of Outcrop

2 of 2

LOG OF OUTCROP SECTION

STATION NO. 20

LONG LAKE

LOCATION: LSD. SEC. TWP. RGE. W M.
UNIT ZONE N.T.S
SEC I-67 LAT 63° 30' LONG 124° 45'

Description of location: North side of valley.

ELEVATION MEASURED August, 1960
METHOD Plane Table, Tape and Brunton

FORMATIONS

DEVONIAN	1993'+
Hume Formation	700'
Lone Mountain Formation	1293'+

TO ACCOMPANY REPORT

Surface Geology of the Wrigley Area

BY: IMPERIAL OIL LIMITED

DATE: 1960

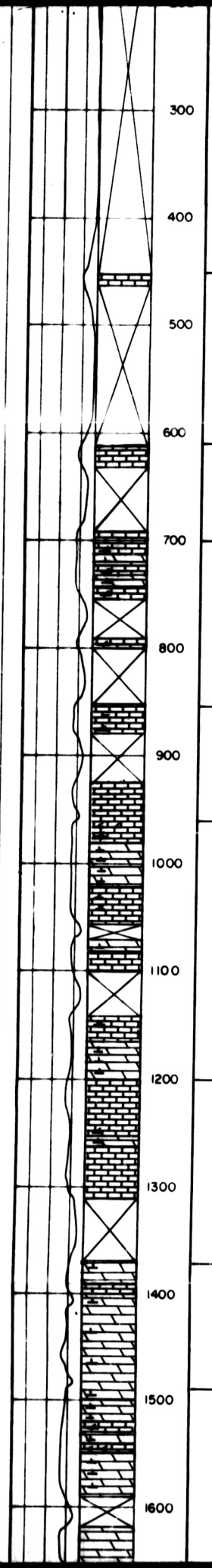
LEGEND

Coa | 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 Ls, dk gy, micxl & bioclas with small Brac frags & Crin stems, sl arg in pt, with rare beds containing sil Cor & Strom; gy wthrg, mas, rubbly.
		100	
		200	
		300	
		400	

11 of



450'

Ls, dk gy, micxl, wh m xl calc infill, gy wthrg.

610'

Ls, dk gy; micxl, wh-pnk calc infill, small styl, gy wthrg, p exposed.

700' — Lone Mountain Formation

Ls, dk gy, micxl, dol in pt with small styl, lt gy wthrg, intbdd with
Dol, gy & dk gy, v f xl, calc, lam on wthrd surface, thn bdd, dk gy wthrg.

853'

Ls, lt gy brn & dk gy, micxl, lam in pt, badly frac with mnr calc frac infill, tr brec; rubbly lt gy & lt gy bf wthrg.

960'

Dol, gy, v f xl with subhed-sbhed xls in calc matrix, lam on wthrd surface, mas, rubbly dk gy & gy wthrg; intbdd with
Ls, dk gy, micxl, dol, badly frac with mnr brec in pt, mas, rubbly, lt gy & gy wthrg.

2 of

1200'

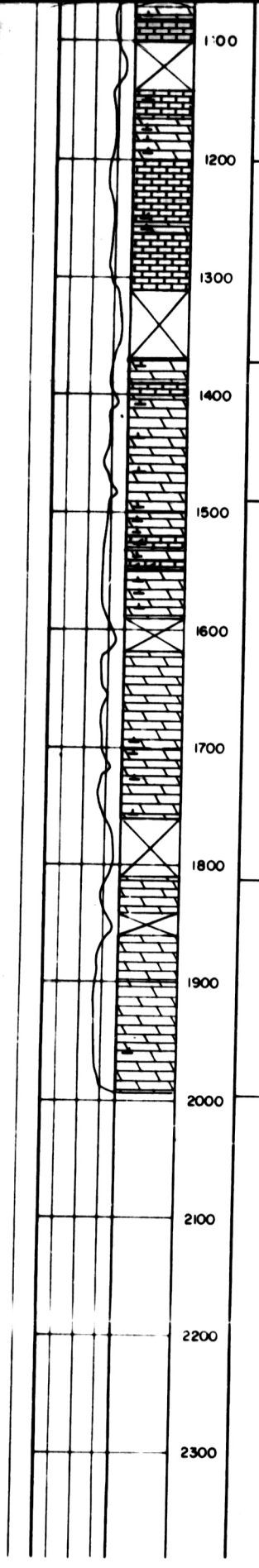
Ls, gy & lt gy brn, micxl, badly frac, mas, rubbly lt gy & lt gy bf wthrg, occ intbds of
Dol, as abv.

1370'

Dol, gy & dk gy, v f xl-micxl, tr to v calc, finely lam, surface vugs lined with calc xls, mas, dk gy & gy wthrg.

1490'

Dol, dk gy & gy, v f xl, sbhed, w srtd, calc, lam in pt on wthrd surf, m bdd & mas, dk gy & lt gy wthrg, some wh c xl calc infill.



1200'

Ls, gy & lt gy brn, micxl, badly frac, mas, rubbly lt gy & lt gy bf wthrg, occ intbds of
Dol, as abv.

1370'

Dol, gy & dk gy, v f xl-micxl, tr to v calc, finely lam, surface vugs lined with calc xls, mas, dk gy & gy wthrg.

1490'

Dol, dk gy & gy, v f xl, sbhed, w srtd, calc, lam in pt on wthrd surf, m bdd & mas, dk gy & lt gy wthrg, some wh c xl calc infill.

1810'

Dol, gy & dk gy, v f xl-micxl, tr calc, lam on wthrd surf, frac in pt, m bdd-mas, dk gy & gy wthrg.

1993' — End of Outcrop

3 of 3

LOG OF OUTCROP SECTION

STATION NO. 21

MONASTERY CREEK

LOCATION: LSD. SEC. TWP. RGE. W M.
UNIT ZONE N.T.S
SEC 0-47 LAT 63° 50' LONG 125° 30'

Description of location: Along creek.

ELEVATION

MEASURED August, 1960
METHOD Plane Table & Pogo stick.

FORMATIONS

DEVONIAN	3990'+
Imperial Formation	3990'+

TO ACCOMPANY REPORT

Surface Geology of the Wrigley Area

BY: IMPERIAL OIL LIMITED

DATE: 1960

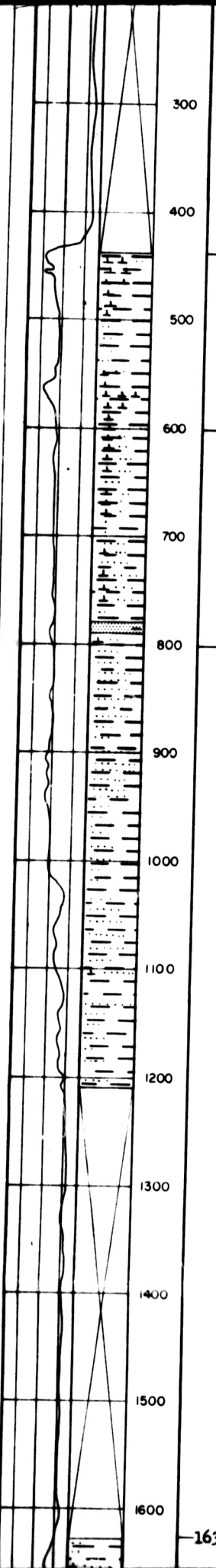
LEGEND

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	
		200	
		300	
		400	

11 of



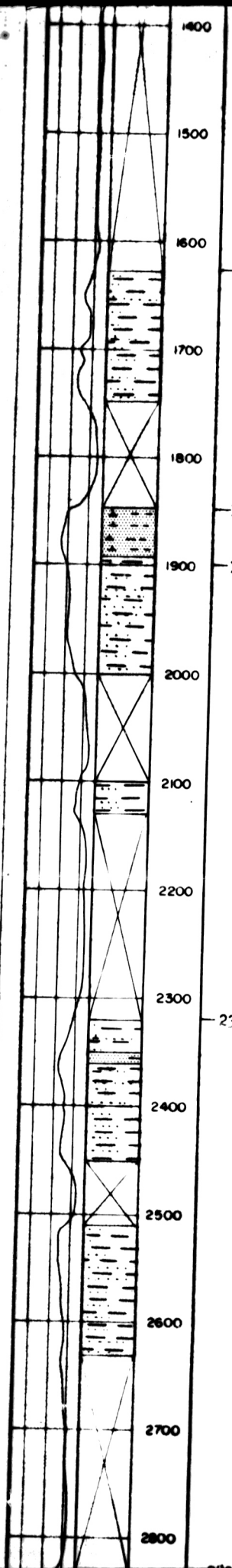
Sh, dk gy gn & gy gn, fis-lam, calc, v sl slty in pt, dk gy gn, dk gy wthrg, Brac in upper 20'; intbdd with Ls, lt gy, gy & gn gy, bioclas, arg, gy bf wthrg, thn bdd.

Sh, dk gy gn & gy gn, fis to lam, v sl calc, sl slty; mar, tan and dk gy wthrg.

Sh, dk gy gn & gy gn, fis, slty with lam and lenses of sltst, plty-blky, tr calc in pt, gy gn & rd brn wthrg.

29

Sh, gy gn, fis, slty with lenses and thn bnds, tr calc



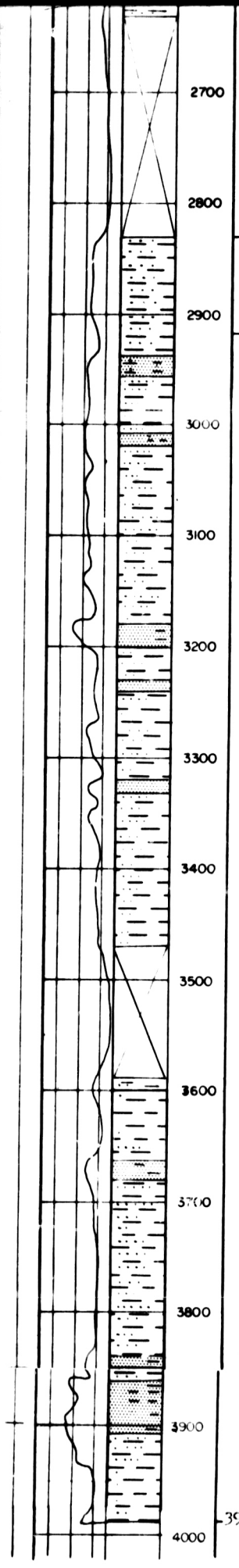
1630' — Sh, gy gn, fis, slty with lenses and thn bnds, tr calc, gy gn wthrg.

1850' — Sltst, m gy & gy gn, calc, thn bdd, gy gn wthrg; intbdd with Sh, gy gn, fis, slty, gygn wthrg; some Brac.

1900' — Sh, dk gy gn & gy gn, fis, slty, gy gn & tan wthrg.

2320' — Sh, dk gy gn and gy gn, fis to lam, slty with thn slt bands & lenses, gy gn & gy brn wthrg.

137



2830' — Sh, as abv.

2920' — Sh, gn gy & dk gn gy, fis, slty, sm gy & tan wthrg, intbdd with
Sltst, m gy & dk gn gy, lam to thn bdd, calc, arg, mar to gy brn wthrg, plty in pt.

3990' — End of Measurement

4 of 4

LOG OF OUTCROP SECTION

STATION NO. 22

SLIDE MOUNTAIN

LOCATION: LSD. SEC. TWP. RGE. W M.
UNIT ZONE N.T.S
SEC I-12 AT 62° 50' LONG 125° 30'

Description of location: Tributary of Redstone River.

ELEVATION MEASURED August, 1960
METHOD Plane Table, Tape & Brunton.

FORMATIONS

DEVONIAN

Imperial Formation	3540'+
Canol Formation	430'
Hare Indian Formation	220'
Hume Formation	10'+

TO ACCOMPANY REPORT

Surface Geology of the Wrigley Area

BY: IMPERIAL OIL LIMITED

DATE: 1960

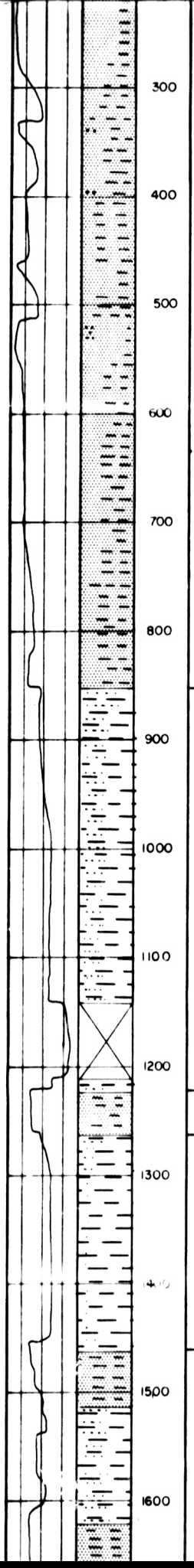
LEGEND

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 Sltst, m-dk gy, wthrg dk gy & bf, thn bdd-mas, x bdd, lam, arg, sl sndy in pt.
		100	
		200	
		300	
		400	

1 of



850'

Sh, gy, wthrg gy with some rust cols, fis, slty, a few intbds of v arg sltst, frac, soft.

1220'

Sltst, m gy, wthrg bf & rust, m-thk bdd, arg, shaly ptgs, lam.

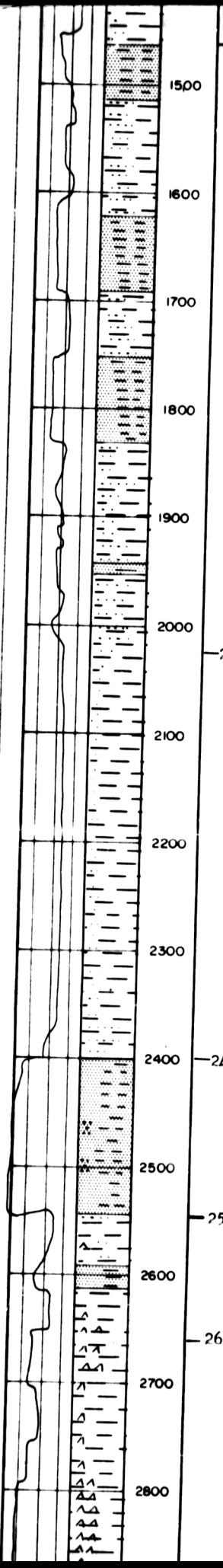
1260'

Sh, gy, wthrg gy with some rust, fis, sl slty, much frac, soft, soapy feel.

1460'

Sh, gy, wthrg rust & gy, fis, soft, much frac, nod below 1900', sl slty - v slty, intbdd & grading into
Sltst, thn-m bdd, m gy; wthrg bf, rust & dk gy, arg.

2 of



1460'

Sh, gy, wthrg rust & gy, fis, soft, much frac, nod below 1900',
sl slty - v slty, intbdd & grading into
Sltst, thn-m bdd, m gy; wthrg bf, rust & dk gy, arg.

2020'

Sh, gy, wthrg rust & gy, fis, sl slty, sil nods in lower prt,
few small sltst intbds in lower part, frac, soft.

2400'

Sltst, m gy, wthrg, bf & rust, v sl sndy, arg, pyr in pt,
thk bdd - mas, lam, ripple marks, shaly ptgs.

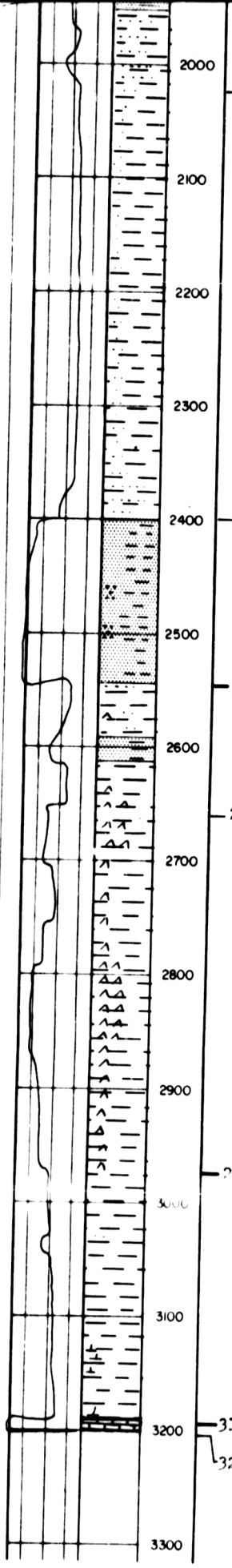
2540' — Canol Formation

Sh, blk, wthrg rust & yellowish, fis, soft, sil & plty in pt;
intbdd with
Sltst, m gy, wthrg bf & rust, pyr, thk bdd - mas, sil .

2655'

Sh, blk, bit or carb, sil, fis-thn bdd, plty, wthrg orange,
yellow & blk, scat pyr conc.

137



2020' — Sh, gy, wthrg rust & gy, fis, sl slty, sil nods in lower prt, few small sltst intbds in lower part, frac, soft.

2400' — Sltst, m gy, wthrg, bf & rust, v sl sndy, arg, pyr in pt, thk bdd - mas, lam, ripple marks, shaly ptgs.

2540' — **Canol Formation**

Sh, blk, wthrg rust & yellowish, fis, soft, sil & plty in pt; intbdd with
Sltst, m gy, wthrg bf & rust, pyr, thk bdd - mas, sil .

2655' — Sh, blk, bit or carb, sil, fis-thn bdd, plty, wthrg orange, yellow & blk, scat pyr conc.

2970' — **Hare Indian Formation**

Sh, blk, sil & wthrg, some wh & yel sulph efflorescence, some cream wthrg nods; bit or carb; numerous conc with marcasite covering and a hr , dns calc pyr & sil center; frac; selenite along frac & bdg planes.

3190' — **Hume Formation**

Not measured.

3200' — End of Outcrop

4 of 4

LOG OF OUTCROP SECTION

STATION NO. 23

FORAN LAKE

LOCATION: LSD. SEC. TWP. RGE. W M.
UNIT ZONE N.T.S.
SEC 36 LAT 64° 00' LONG 126° 00'

Description of location: Ridge east of Foran Lake.

ELEVATION MEASURED
METHOD

FORMATIONS

DEVONIAN	450'+
Bear Rock Formation	450'+
SILURIAN-ORDOVICIAN	2200'+
RONNING GROUP	2200'+

TO ACCOMPANY REPORT

Surface Geology of the Wrigley Area

BY: IMPERIAL OIL LIMITED

DATE: 1960

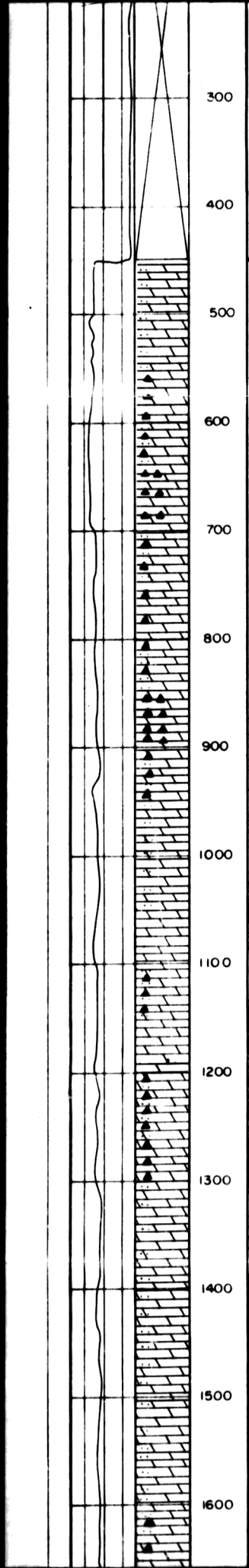
LEGEND

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 Bear Rock Formation Dol, v f xl, sbhed-anhed, sl calc, lt gy, wthrg gy bf, mas & thk bdd, lam.
		100	
		200	
		300	
		400	

11 of



SILURIAN-ORDOVICIAN

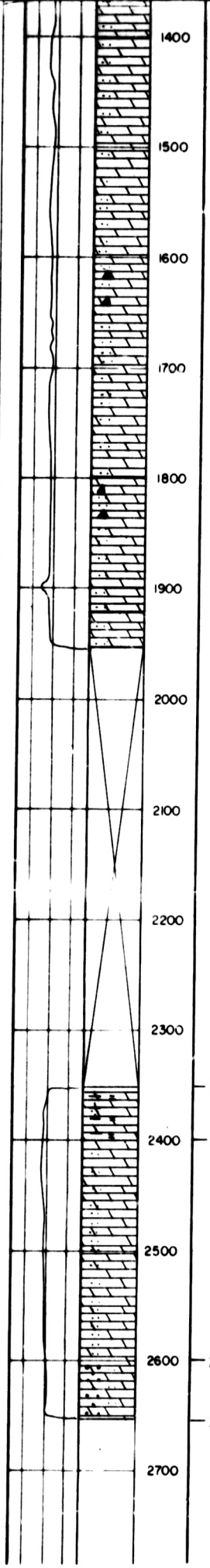
HONDLING GROUP

Dol, v f xl-micxl, sbhed, sl slty, lt brn gy-gy bf wthrg.

Dol, v f xl-micxl, sbhed-anhed, f xl and euhed in pt, cht as v irreg wh blebs and nod, sil skeletal and organic mat with original tex indistinct due to rexl; tr calc. m-dk gy & lt brn gyp wthrg m gy & lt gy bf; m-thk ireg bdd, often mas.

2 of

Dol, v f xl-micxl, sbhed, v sl slty, v sl sil in pt (mostly as sil org mat, Cor, Gast, Alg), lt-m & dk gy, wthrg m gy & lt gy bf, m & thk mostly ireg bdg.



tnk mostly irreg blg.

2350' —

Dol, crpxl, calc, intbdd with
Ls, bioclas, m-dk gy, gy bf wthrg.

2400' —

Dol, crpxl, gy bf col & wthrg, v sl slty.

2600' —

Dol, crpxl, v sl slty; sndy, f-c ang otz grs; lt gy, wthrg gy bf.

2650' — End of Outcrop —

373

LOG OF OUTCROP SECTION

STATION NO. 24

"NORTH" REDSTONE

LOCATION: LSD. UNIT SEC. ZONE TWP. N.T.S RGE. W. M.

SEC E-80 AT 63° 20' LONG 125° 30'

Description of location: 6 miles south of where the Redstone River crosses the Mountain range.

ELEVATION

MEASURED August, 1960

METHOD Tape & Brunton

FORMATIONS

DEVONIAN

Bear Rock Formation 630'+

TO ACCOMPANY REPORT

Surface Geology of the Wrigley Area

BY: IMPERIAL OIL LIMITED

DATE: 1960

LEGEND

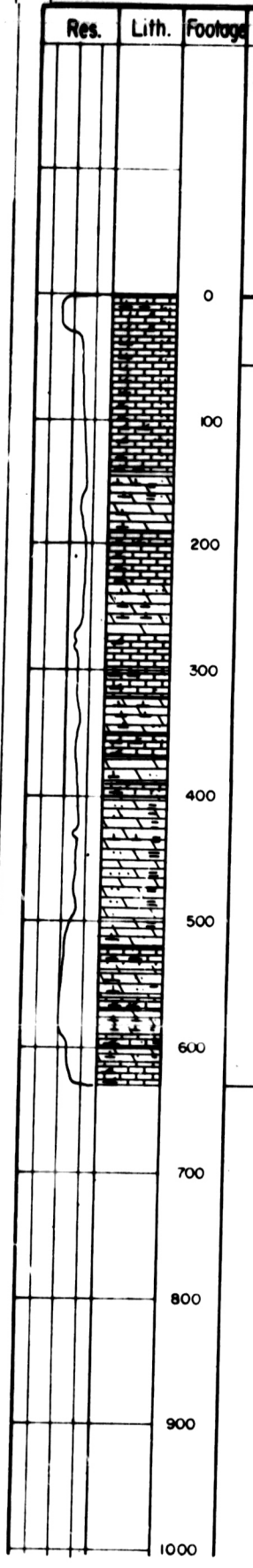
Coal | Salt | Anhydrite | Dolomite | Limestone | Massive Chert | Conglomerate | Sandstone | Siltstone | Shale

IMPERIAL OIL LIMITED EXPLORATION DEPARTMENT PEACE RIVER DISTRICT

Res.	Lith.	Footage	Description
		0	0' DEVONIAN
			Ls brec, lt-m gy, lt gy & bf wthrg, mas welded brec, scat vug por.
			30'
		100	Ls, lt-dk gy, gy bf wthrg, micxl with some bioclas, dol, thn bdd, intbdd with Dol, lt-dk gy with some bf, gy bf wthrg, micxl, thn bdd; all poorly exposed.
		200	
		300	
		400	

1 of

IMPERIAL OIL LIMITED EXPLORATION DEPARTMENT PEACE RIVER DISTRICT



0' — DEVONIAN

Ls brec, lt-m gy, lt gy & bf wthrg, mas welded brec, scat vug por.

30'

Ls, lt-dk gy, gy bf wthrg, micxl with some bioclas, dol, thn bdd, intbdd with
Dol, lt-dk gy with some bf, gy bf wthrg, micxl, thn bdd; all poorly exposed.

630' — End of Measurement

2 of 2

LOG OF OUTCROP SECTION

STATION NO. 2

MT. KINDLE

LOCATION: LSD. SEC. TWP. RGE. W. M.
UNIT ZONE N.T.S
SEC F-61 LAT 63° 30' LONG 123° 00'

Description of location: On Mt. Kindle

ELEVATION

MEASURED June, 1960
METHOD Tupe & Brunton

FORMATIONS

SILURIAN - ORDOVICIAN	1900'
RONNING GROUP	1900'
CAMBRIAN	50'+
Saline River Formation	50'+

TO ACCOMPANY REPORT

Surface Geology of the
Wrigley Area

BY: Imperial Oil Limited

DATE: 1960

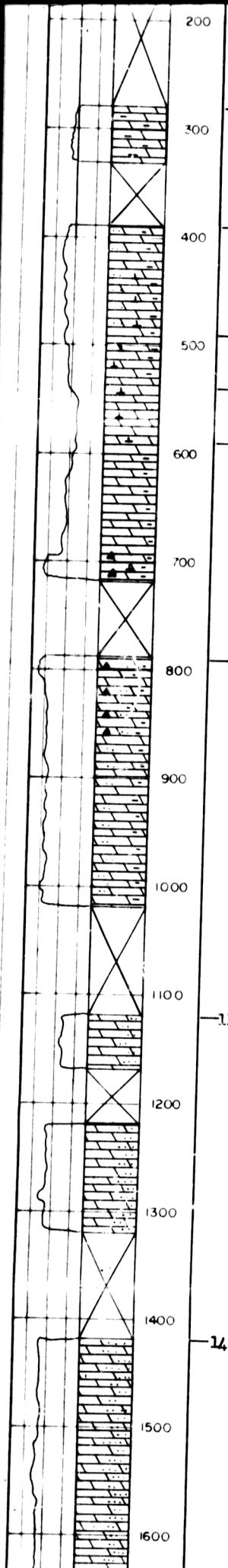
LEGEND

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 — SILURIAN - ORDOVICIAN RONNING GROUP Mt. Kindle Formation
			Dol, lt-m gy, gy bf in p. lt brn gy wthrd; v f xl, micxl + crpxl; m - thk bdd to mas
		100	
		200	
		280'	280' — Dol, lt gy, mas.
		300	
		390'	390' — Dol, lt - m gy, m + thk bdd; micxl;
		400	



280' —————

Dol, lt gy, mas.

390' —————

Dol, lt - m gy, m + thk bdd; micxl;

490' —————

Dol, lt - m gy, micxl, thik bdd, some Cor frag.

540' —————

Dol, m-dk gy, micxl, bit, fetid, reefal with many chain + mas colonial Cor.

590' —————

Dol, lt-m gy, v f to micxl, thk bdd, a few ireg cht nod, some scat solitary Cor.

790' ————— Franklin Mountain Formation —————

Dol, mostly lt gy, lt brn gy wthrd, thik bdd, micxl, a few bands c + m xl, some blk + wh nod and bnd cht in upper prt.

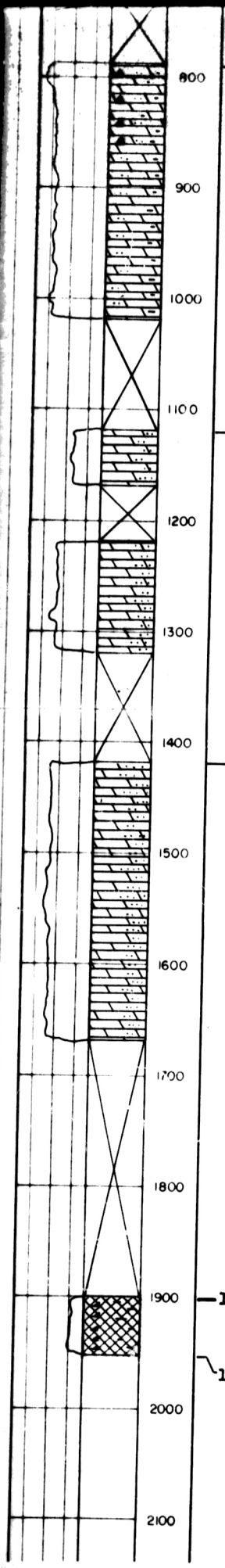
2 of

1120' —————

Dol, lt gy, bf wthrd, micxl, m + thk bdd, blky frac.

1420' —————

Dol, lt + m gy, some gy purple sl hem bands, micxl, slty, m + thk bdd, lam in pt.



790' — Franklin Mountain Formation

Dol, mostly lt gy, lt brn gy wthrd, thik bdd, micxl, a few bands c + m xl, some blk + wh nod and bnd cht in upper prt.

1120'

Dol, lt gy, bf wthrd, micxl, m + thk bdd, blky frac.

1420'

Dol, lt + m gy, some gy purple sl hem bands, micxl, slty, m + thk bdd, lam in pt.

1900' — CAMBRIAN

Saline River Formation

Gyp, v f xl, v lt bf, some rd brn; many c selenite xls; also gyp + dol sh.

1950' — End of Outcrop

3 of 3

LOG OF OUTCROP SECTION

STATION NO. 1

MT. WILLIAMS

LOCATION: LSD. UNIT | SEC. | TWP. | RGE. | W. M.
ZONE | N.T.S
SEC K-69 LAT 63° 20' LONG 123° 00'

Description of location:
Second spur south of Mt. Kindle

ELEVATION | MEASURED: June 1960
METHOD: Tape and Brunton

FORMATIONS

DEVONIAN	1080'+
Hume Formation	300'
Bear Rock Formation	780'

TO ACCOMPANY REPORT

Surface Geology of the Wrigley Area

BY: IMPERIAL OIL LIMITED

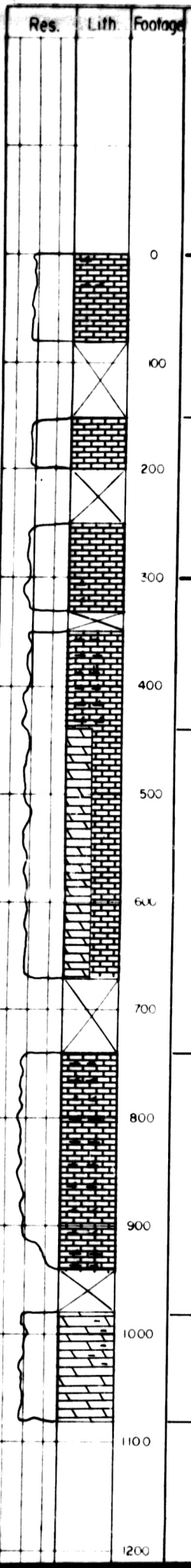
DATE: 1960

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 Ls, brn gy-m gy, lt gy wthrd, bioclas with Crin + Brac frag, thik w bdd, scat cup Cor, some Strom.
		100	
			150' — Ls, m gy + lt brn gy, lt gy wthrd, micxl, some pel, some sparry calc infill, thk w bdd.
		200	
			Ls, as abv.
		300	300' — Bear Rock Formation Ls sol + collapse brec, lt + m gy, some lt brn gy, lt gy + gy bf wthrd, p srtd, ang frag, less than 4 cm; mas, bdg indistinct, rubbly; matrix of mic brec.; mnr micxl dol frag; scat. lchd v c vug por.
		400	
			440'



Description

0' — **DEVONIAN**

Hume Formation

Ls, brn gy–m gy, lt gy wthrd, bioclas with Crin + Brac frag, thik w bdd, scat cup Cor, some Strom.

150' —

Ls, m gy + lt brn gy, lt gy wthrd, micxl, some pel, some sparry calc infill, thk w bdd.

Ls, as abv.

300' — **Bear Rock Formation**

Ls sol + collapse brec, lt + m gy, some lt brn gy, lt gy + gy bf wthrd, p srtd, ang frag, less than 4 cm; mas, bdg indistinct, rubbly; matrix of mic brec.; mnr micxl dol frag; scat. lchd v c vug por.

440' —

Ls + Dol brec, lt + m gy, lt gy mnr gy bf wthrd; micxl ls + micxl dol frag, 5–7 cm, ang, p srtd; rubbly, indistinct bdg; matrix of micbrec; scat p vug por.

740' —

Ls brec., as abv.

980' —

Dol, crpxl, gy bf + v lt pink, m bdd – mas, rubbly

1080' — End of Outcrop

2 of 2