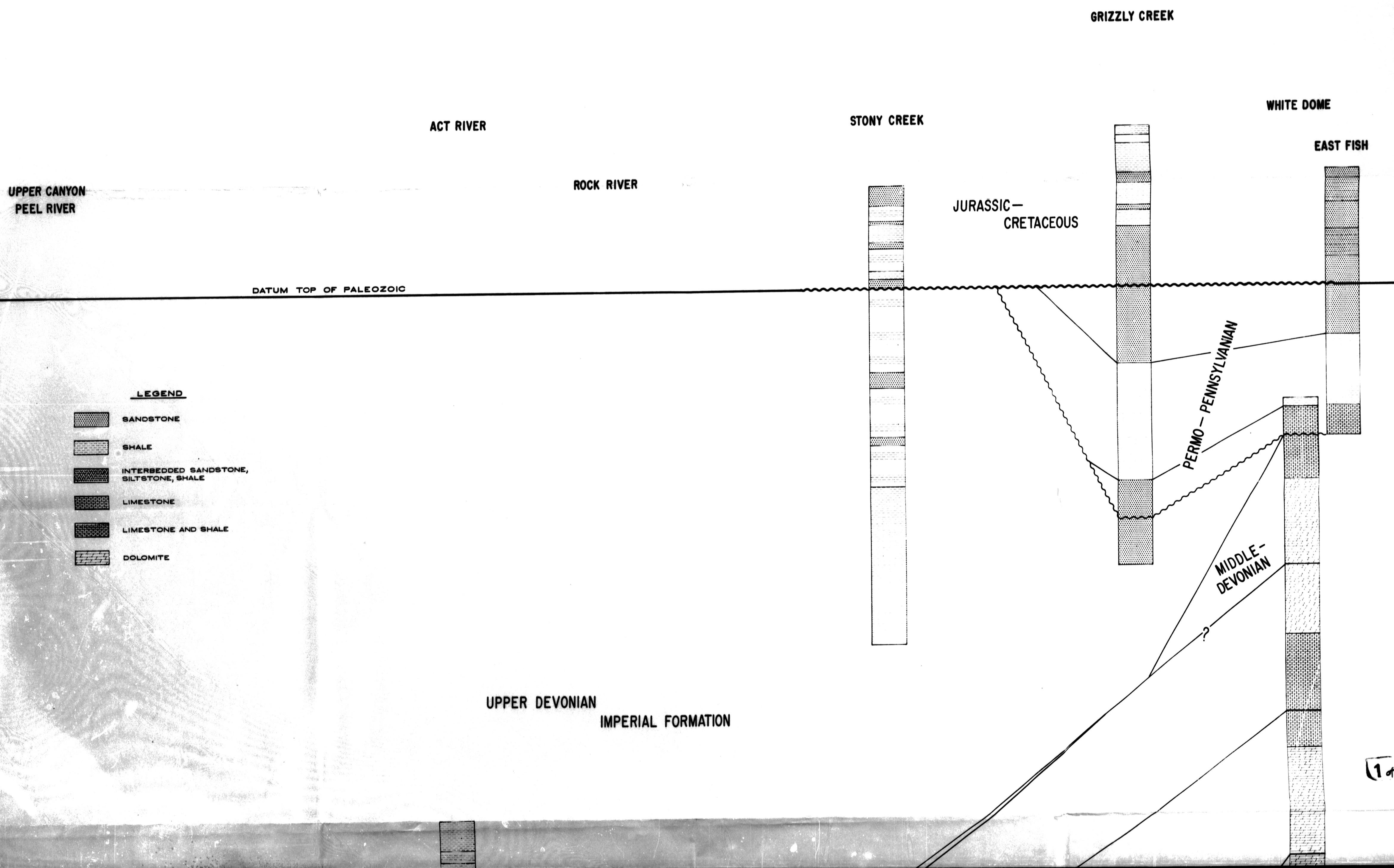
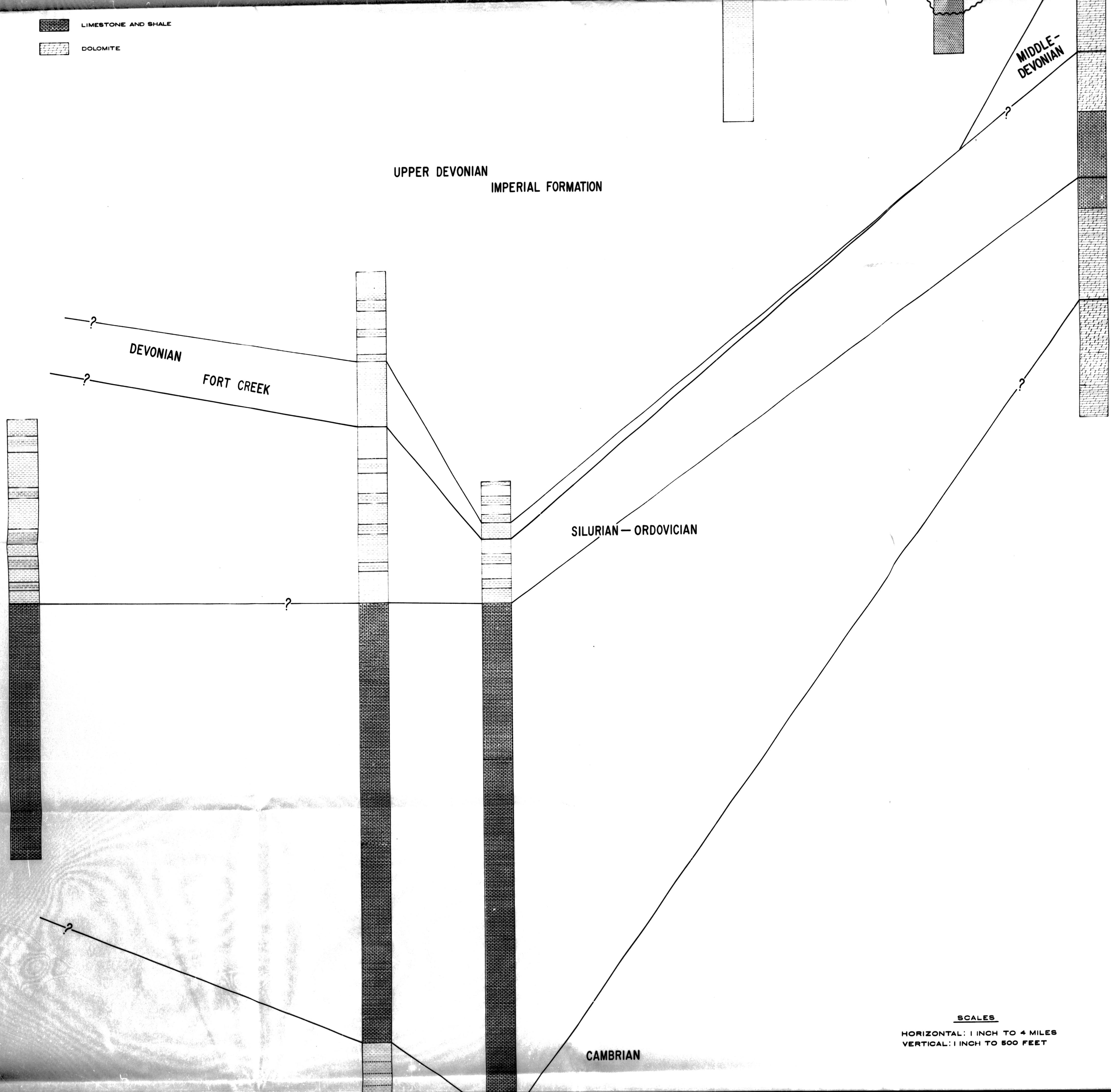


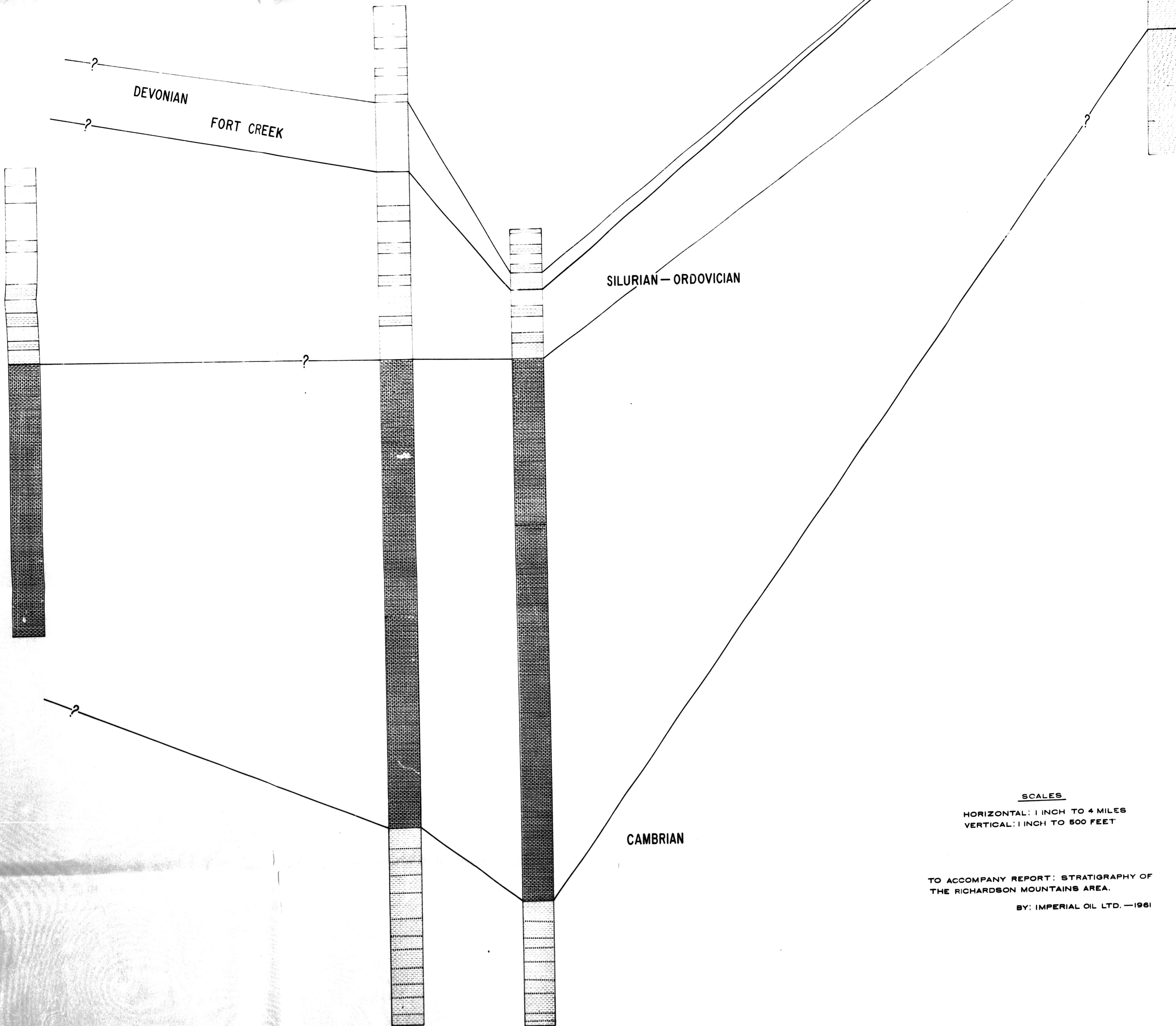
SOUTH
B

NORTH
B₁

CORRELATION SECTION







CORRELATION SECTION PRE-CRETACEOUS

WEST
A

BARN MTNS.

EAST
A₁

RICHARDSON MTNS.

WEST FLANK
BARN MTNS.

JOHNSON CREEK

WHITE DOME

EAST FISH
CREEK

MOSQUITO CREEK

BUG CREEK

DATUM—BASE OF CRETACEOUS

JURASSIC

MISSISSIPPIAN

ORDOVICIAN—
SILURIAN

CAMBRIAN

FOLDED
AND FAULTED
BENEATH
UNCONFORMITY

JURASSIC

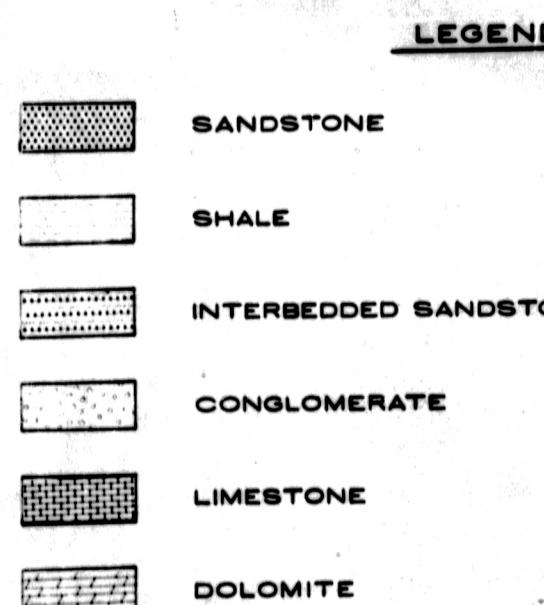
PERMIAN—
PENNSYLVANIAN

MIDDLE
DEVONIAN

ORDOVICIAN—
SILURIAN

CAMBRIAN

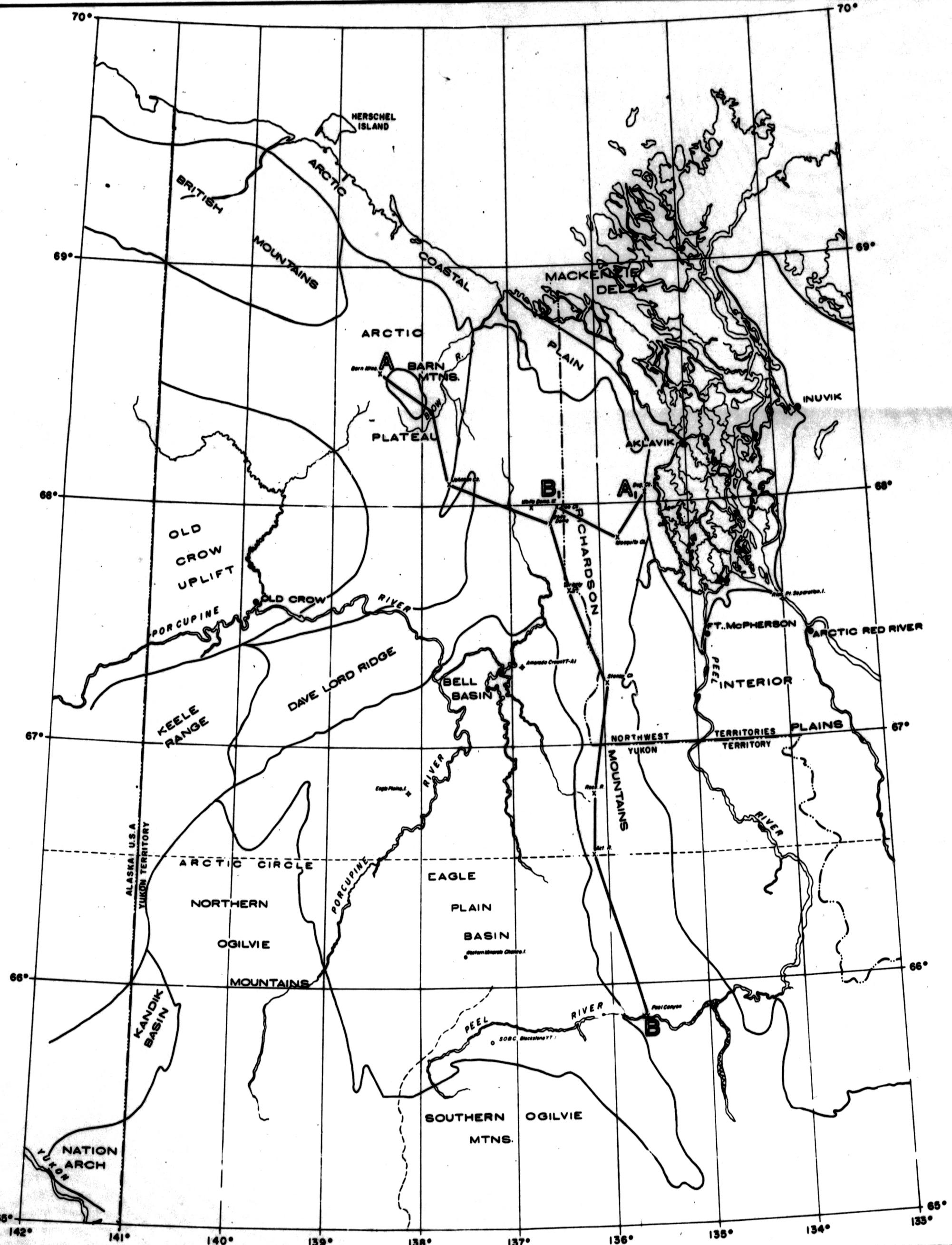
INTERBED LIMESTONE AND DOLOMITE
SOME SHALE AND SANDSTONE



SCALES
HORIZONTAL: 1 INCH TO 4 MILES
VERTICAL: 1 INCH TO 500 FEET

TO ACCOMPANY REPORT: STRATIGRAPHY OF
THE RICHARDSON MOUNTAINS AREA.

BY: IMPERIAL OIL LTD.—1961



LOCATION MAP OF
OUTCROP SECTIONS AND
LINES OF CORRELATION SECTIONS

SCALE

To accompany report: Stratigraphy of the Richardson
Mountains Area.

By Imperial Oil Ltd. 1961

STRATIGRAPHY

of the

RICHARDSON MOUNTAINS AREA

Imperial Oil Ltd.
1961

STRATIGRAPHY

OF THE

RICHARDSON MOUNTAINS AREA

JUL 6

Imperial Oil Limited
1961.

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Location map of outcrop sections and lines of cross-sections	In pocket
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Isopach Map -- Upper Paleozoics	In pocket
East-west Correlation Section A-A ₁	In pocket
North-south Correlation Section B-B ₁	In pocket

STRATIGRAPHY OF THE RICHARDSON MOUNTAINS AREA

INTRODUCTION

Area Covered

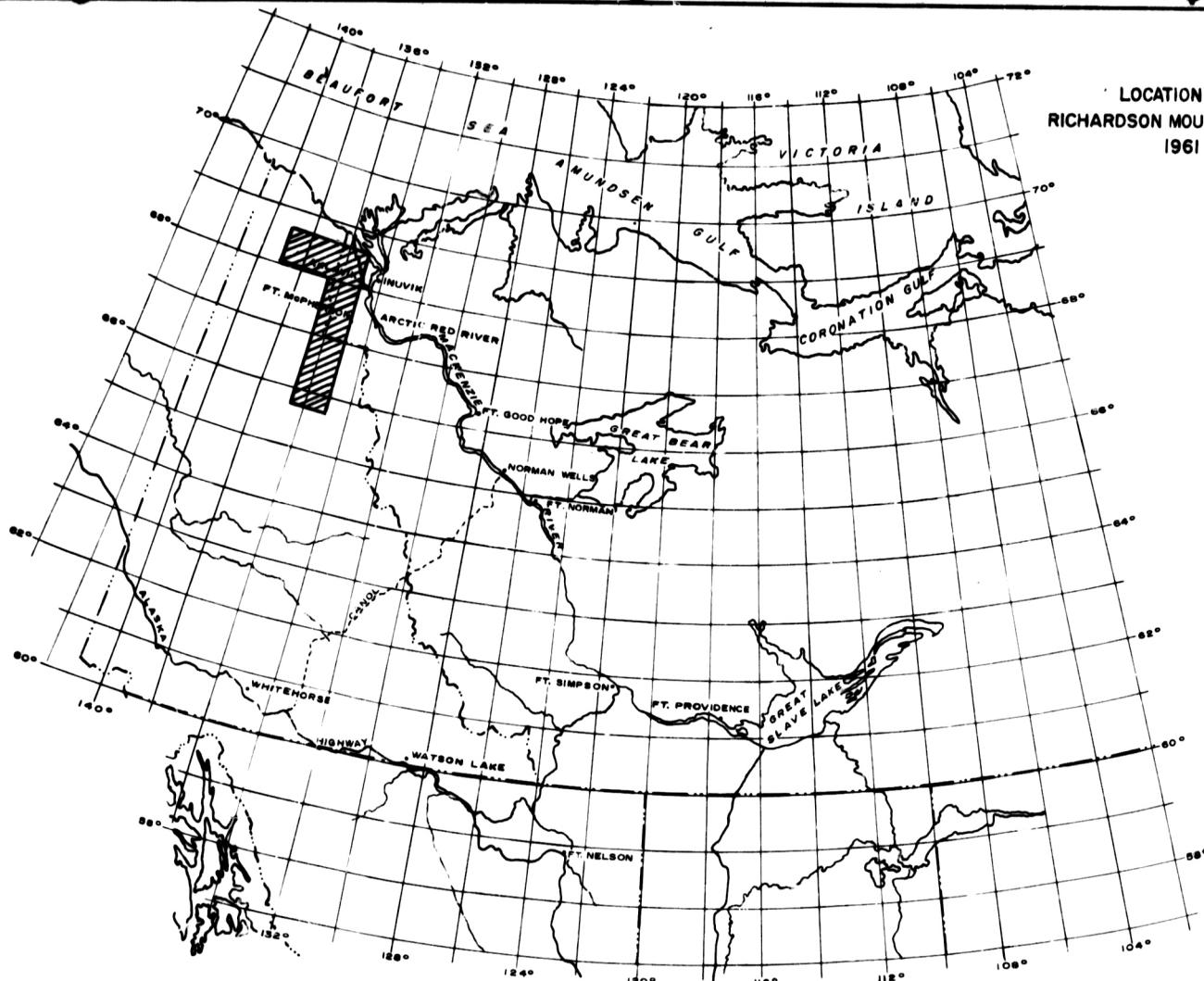
The Richardson Mountain Area is located between Latitudes 68°30' N. and 65°50' N. It extends along the length of the Richardson Mountains for 190 miles and is bounded by the Peel River to the south and the Blow River to the north. It includes the whole of the Richardson Mountains and the area of the Barn Mountains in the northwest part. The area covered in the 1961 field season comprises some 13,000 square miles.

Accessibility

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

Norman Wells and Inuvik are served by scheduled Pacific Western Airlines aircraft the year round, and during the summer months by river navigation. The Mackenzie River is the main artery into this remote region. Equipment can be sent from Edmonton by rail to Grimshaw or to Waterways in Alberta. From Grimshaw, the supplies are then trucked 380 miles north to Hay River on Great Slave Lake. Large barges travel the Mackenzie River as far north as the Arctic Coast.

LOCATION MAP
RICHARDSON MOUNTAIN AREA
1961



Supplies can also be transported by truck along the Alaska Highway to Dawson City in the Yukon, and from Dawson City by float-equipped aircraft. Heavy equipment for surveys and/or drilling could be transported in the winter months by cat train from Dawson City. On the Mackenzie River, barges could transport heavy drilling equipment which could be stored until freeze-up. Cat trains could complete the haul to the desired location.

Purpose of Study

The purpose of the 1961 field work was to do stratigraphic detail in the Richardson Mountains. The Paleozoic rocks were studied most extensively by means of measured stratigraphic sections. The better Mesozoic exposures were measured at widely scattered locations.

Method of Study

Crew.—A seven-man geological party spent 99 days in the field between May 22nd and August 27th, 1961. Support aircraft included a Hiller 12E helicopter, a float-equipped Beaver and, on occasion, the Company's Otter and DC-3.

Base Camps.—The project area was worked from the following four base camps: Inuvik, Fort MacPherson, Bonny and Caribou Lakes. The crew, equipment and a few supplies were flown to Inuvik airport from Dawson Creek in one DC-3 flight. The bulk of the equipment and non-perishable supplies for the balance of the season were barged from Fort Nelson to Fort McPherson by Mr. Dick Turner of South

Nahanni. From Fort McPherson, equipment and supplies were transported by Otter and Beaver to Caribou and Bonny Lakes. Perishable foodstuffs were flown to Norman Wells by DC-3 and stored under refrigeration. Weekly supply trips by Beaver were then made between the base camps and Norman Wells.

Communications.—Communications between the base camps and Norman Wells were maintained by a Spilsbury and Tindall TRT-300 transistorized radio powered by a heavy duty, 12-volt wet battery.

From Norman Wells, contact with our Dawson Creek District office was maintained through the Department of Transport telegraph service. Radio black-outs can occur for periods of up to 5 days.

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

Base camp to fly camp communication schedules were maintained twice daily. The fly camp radios were Spilsbury and Tindall PRT-20 transistorized radios powered by 90-volt 'B' batteries and six 'D' size flashlight batteries. These light, small, compact radios proved more than satisfactory as many hours of helicopter time were saved in not having to check fly camps daily.

Weather.—Generally good weather prevailed during June, July and early August. The long daylight hours allowed some time to be made up for any lost due to rain showers or low cloud. Most

'weather days' occurred in the later part of August. Of the 99 field days, 15 days were lost due to unfavorable weather.

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

A consistent sample interval of 10 feet was maintained, by acquiring two or three rock chips over the 10 feet. The quality of exposures in the Richardsons are poor, with the best occurring in the creek beds. Due to the generally low dip terrain most sections had to be plane-tabled. Stratigraphic reconnaissance was done by the Party Chief using the helicopter. Some reconnaissance was also accomplished with the Beaver.

The helicopter was unserviceable for a total of 18 days. Flying hours for the helicopter totalled 300 hours, and approximately 100 hours for the Beaver and Otter.

Previous Investigations

The recent drilling to the east and west of the Richardson Mountains has renewed interest in the possibilities that additional large petroleum reserves will be found in the Northwest Territories and Yukon. The indicated oil discovery announced by Western Minerals

at the Chance #1 well in the Eagle Plains, further substantiates the potential of the area for oil and gas.

The report, "Stratigraphy and Depositional Tectonics of the North Yukon - Lower Mackenzie Area" by L. J. Martin (1959) is an excellent compilation and summary of the literature dealing with the geology of the area. In recent years, many oil companies have undertaken geological studies along the length of the Richardson Mountains and adjacent areas.

STRATIGRAPHY

General Remarks

Sediments ranging in age from Cambrian to Quaternary were examined and estimated to comprise a sedimentary section approaching 50,000 feet. With the exception of the Triassic, all major geological divisions are represented. Because of non-deposition and erosion, the above total thickness will not be encountered at any one locality.

Table I gives a summary of the stratigraphic section as interpreted for the Richardson Mountains area.

The thicknesses and brief lithologies are illustrated by the means of two stratigraphic cross sections. Locations of measured sections and lines of cross sections are indicated on the accompanying location map.

Proterozoic

Precambrian rocks were not definitely identified. The lowest rocks exposed are in the core of the southern Richardson Mountains in the vicinity of Caribou River. Here a highly indurated section of schists and argillites are tentatively assigned to the Precambrian (?). No fossils were obtained from this locality and a correlation is made with similar Precambrian lithologies mapped to the west in Alaska.

TABLE I

AGE	SOUTHERN RICHARDSONS		NORTHERN RICHARDSONS	
	THICKNESS	LITHOLOGY	THICKNESS	LITHOLOGY
LOWER CRETACEOUS	1500 ⁺	Shale, siltstone, sandstone	4000 ⁺	Shale, siltstone, sandstone
JURASSIC	ABSENT		3000 ⁺	Shale, siltstone
TRIASSIC	ABSENT		ABSENT	
PERMO-PENNSYLVANIAN			2000 ⁺	Sandstone, shale limestone, conglomerate.
MISSISSIPPIAN	Not identified		Not identified	
UPPER DEVONIAN	8000 ⁺	Sandstone, siltstone shale, conglomerate	ABSENT	
MIDDLE DEVONIAN	ABSENT		2000 ⁺	Limestone
SILURIAN ORDOVICIAN	5000 ⁺	Shale, chert, limestone.	3000 ⁺	Limestone and dolomite.
CAMBRIAN	3000 ⁺	Shale, siltstone, sandstone.	?	Carbonate
PRE-CAMBRIAN	NOT IDENTIFIED			

Cambrrian

Cambrrian rocks are well-exposed in the lower canyons of the Peel River, the core of the southern Richardsons, White Dome and Mesquite Creek in the northern Richardsons, and the Barn Mountains.

Cambrrian strata are estimated to be in excess of 3,000 feet. Lithologically, the sequence in the southern Richardsons and Barn Mountains is composed of interbedded silty shales, dark grey siltstones and fine grained sandstones. The contact with the Ordovician is gradational. In the White Dome section, basal fine grained dolomites may be of Cambrrian age. The only fossils collected were a few sponge spicules.

Ordovician and Silurian

No reliable paleontologic or lithologic break occurs between the Ordovician and Silurian systems, and it therefore becomes necessary that they be discussed together.

In the southern Richardsons, Silurian-Ordovician rocks were examined; in the northern Richardsons, the basal beds of the White Dome section were examined.

Ordovician-Silurian strata range from 5000 - 10,000 feet in thickness and consist of fine-grained limestones and graptolite-bearing shales. Deposition appears to be continuous to Lower Devonian time.

Devonian (Imperial Formation
(Fort Creek Formation
(Middle Devonian carbonates

Middle Devonian.—Middle Devonian carbonates were sampled in the northern Richardsons and are absent in the southern Richardsons. Perry (1960) suggests that the absence is due to faulting along the Richardson Mountain front and to being covered in all other areas. Martin (1959) suggests early Upper Devonian uplift and erosion as the cause of the absence.

Fort Creek Formation.—The Fort Creek averages about 1000 feet of black, cherty shale and is exposed throughout the southern Richardsons. The top of the carbonate at White Dome shows erosion indicating as to why the Fort Creek and Imperial formations are absent at this locality.

Imperial Formation.—The contact between the Fort Creek and Imperial formations is apparently conformable. The Imperial is entirely clastic and consists of shaly silts and sands, with many interbeds of shale. The Imperial is generally considered to be of Upper Devonian age, however, it may include some Mississippian beds near the top.

Mississippian

Mississippian beds were not definitely identified; however, as previously stated, the Imperial Formation probably includes some Mississippian strata in local areas. Also, several authors have reported Mississippian clastics and carbonates in the Ogilvie Foothills.

Permo-Pennsylvanian

Permo-Pennsylvanian strata in excess of 2000 feet in thickness were examined at several localities in the northern Richardsons. The section can be broadly subdivided into a lower sand and carbonate, a middle shale, and an upper sand with conglomerates at the margins.

Mesozoic

No Triassic beds were observed.

Jurassic-Cretaceous

The Jurassic-Cretaceous rocks have a wide distribution and comprise a thick clastic section approaching 10,000 feet at the northern limits of the mapped area. The section is predominantly marine and the best exposures are to be found in the northern Richardsons.

Late Cretaceous and Tertiary rocks were not sampled, however, they are reported from the Bonnet Plume and Old Crow areas.

Quaternary

Quaternary deposits are restricted to the large river valleys and the low areas to the east and west of the Richardsons south of Latitude 67°30' N.

Intrusive Rocks

Granitoid rocks are present at Mount Fitton on the east flank of the Barn Mountains and are seen to intrude early Paleozoic rocks.

In the Aklavik Range in the northeast Richardsons, intrusive gypsum was observed intruding Cretaceous shales and sandstones.

STRUCTURAL GEOLOGY

The project area includes two main physiographic divisions: The Richardson Mountains and Barn Mountains as defined by Bestock (1948). It also includes small portions of the Eagle Plain, Peel Plateau, Interior Plain, Bell Basin, Dave Lord Ridge and Arctic Plateau.

Richardson Mountains

The northerly trend of the Richardson Mountains is the dominant, structural grain of the project area. The southern Richardsons are essentially a large anticlinorium plunging northward and bounded by steep reverse faults. The northern Richardsons are wider and break up into several large north-plunging anticlines and synclines, with associated bedding plane faults.

Barn Mountains

The Barn Mountains in the northwest corner of the project area are a rejuvenated late Paleozoic orogenic belt, consisting of a faulted and intruded Lower Paleozoic section.

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LITHOPERCENTAGE LOG OF OUTCROP SECTION

STATION NO.

ROCK RIVER

LOCATION: LSD. SEC. TWP. RGE. W. M.
UNIT ZONE N.T.S.
11b1 N.E. SEC I-48 LAT 58°50' LONG 136°00'

Description of location:

ELEVATION

MEASURED
METHOD

FORMATION

TO ACCOMPANY REPORT

Stratigraphy of the Richardson Mountains area.

BY: Imperial Oil Limited

DATE: 1961

DESCRIBED

BY:

DATE: August, 1961

LEGEND

Coal



Salt



Anhydrite



Dolomite



Limestone



Massive Chert



Conglomerate



Sandstone



Siltstone



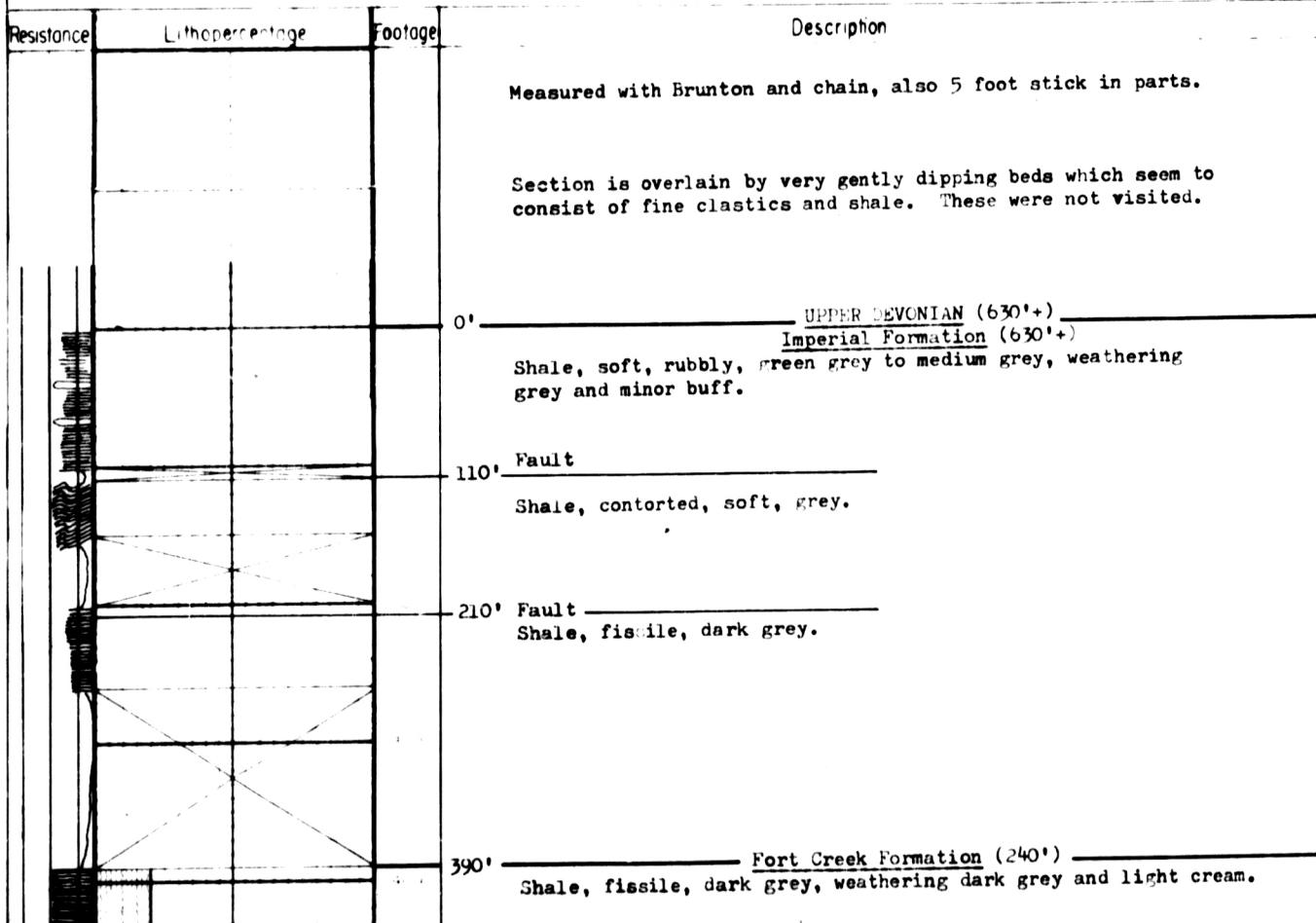
Shale

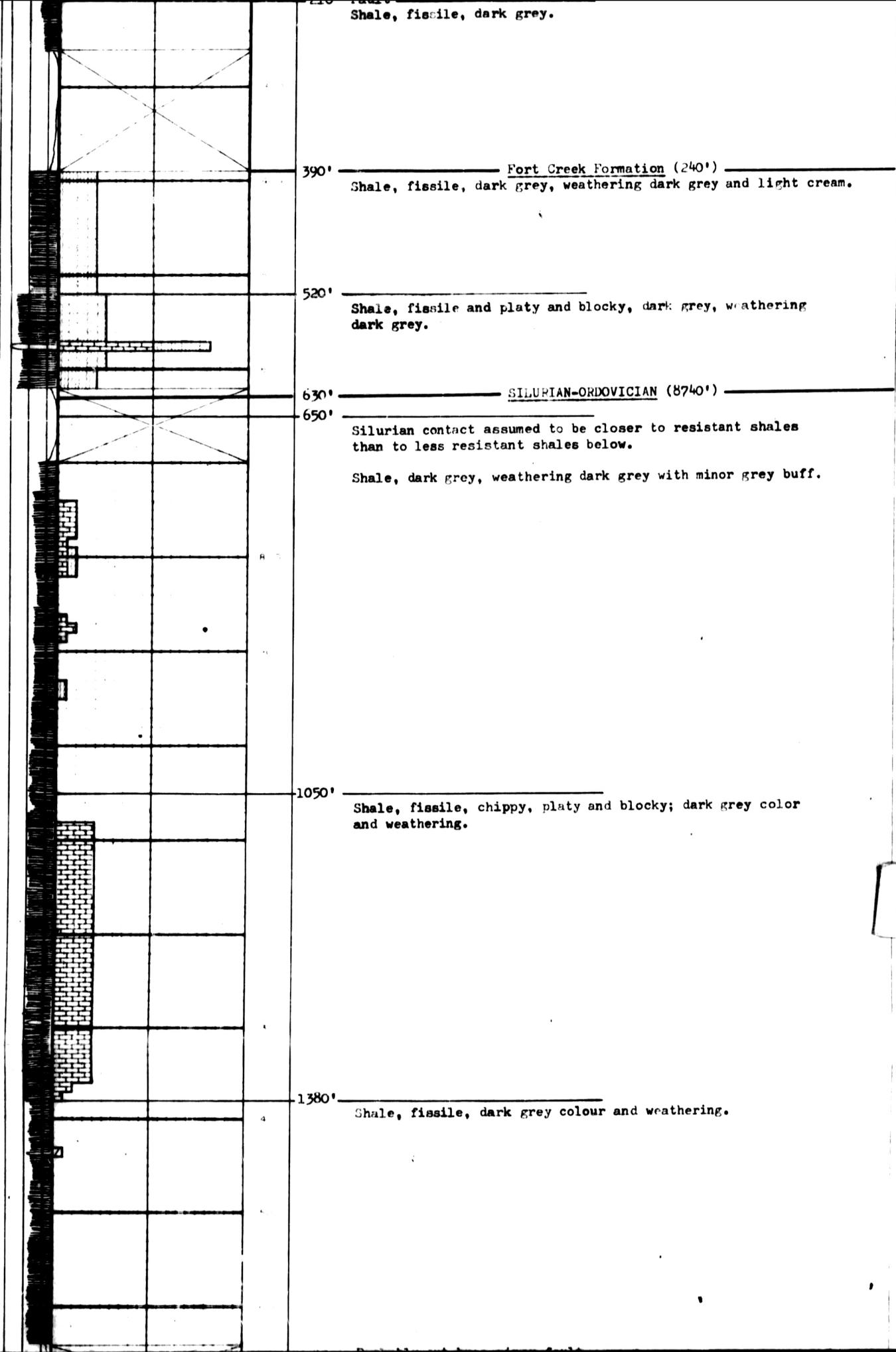


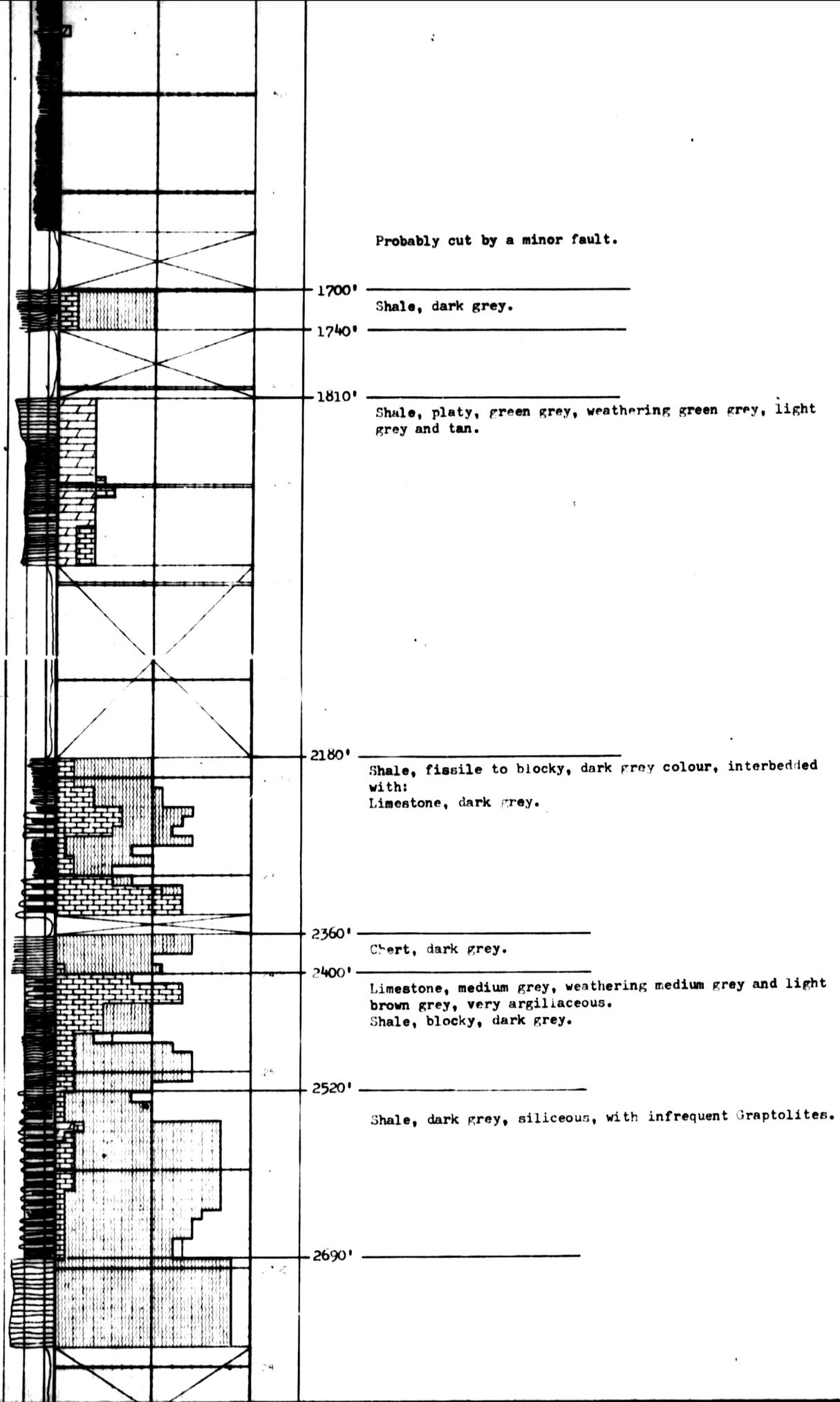
IMPERIAL OIL LIMITED

EXPLORATION DEPARTMENT

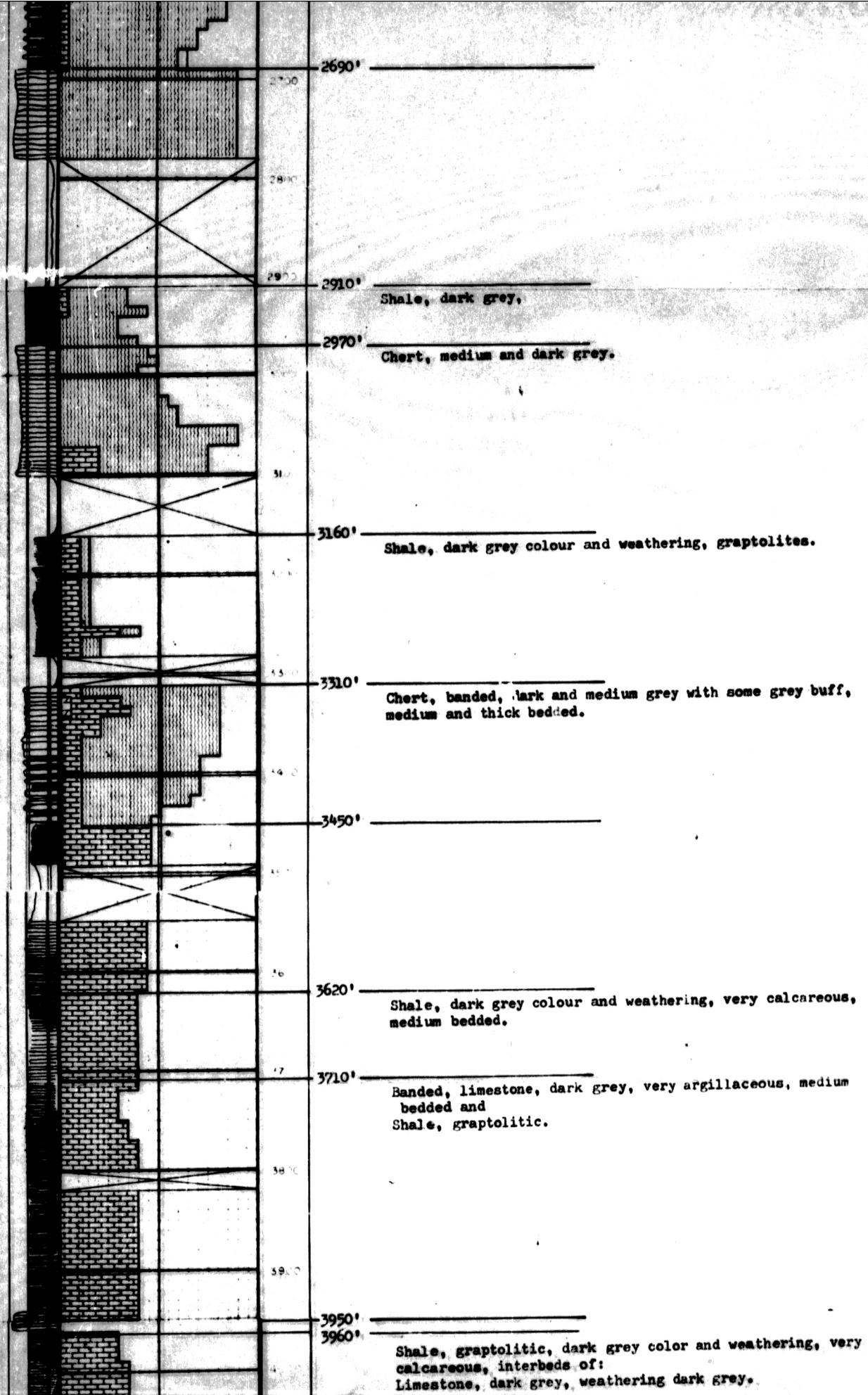
PEACE RIVER DISTRICT



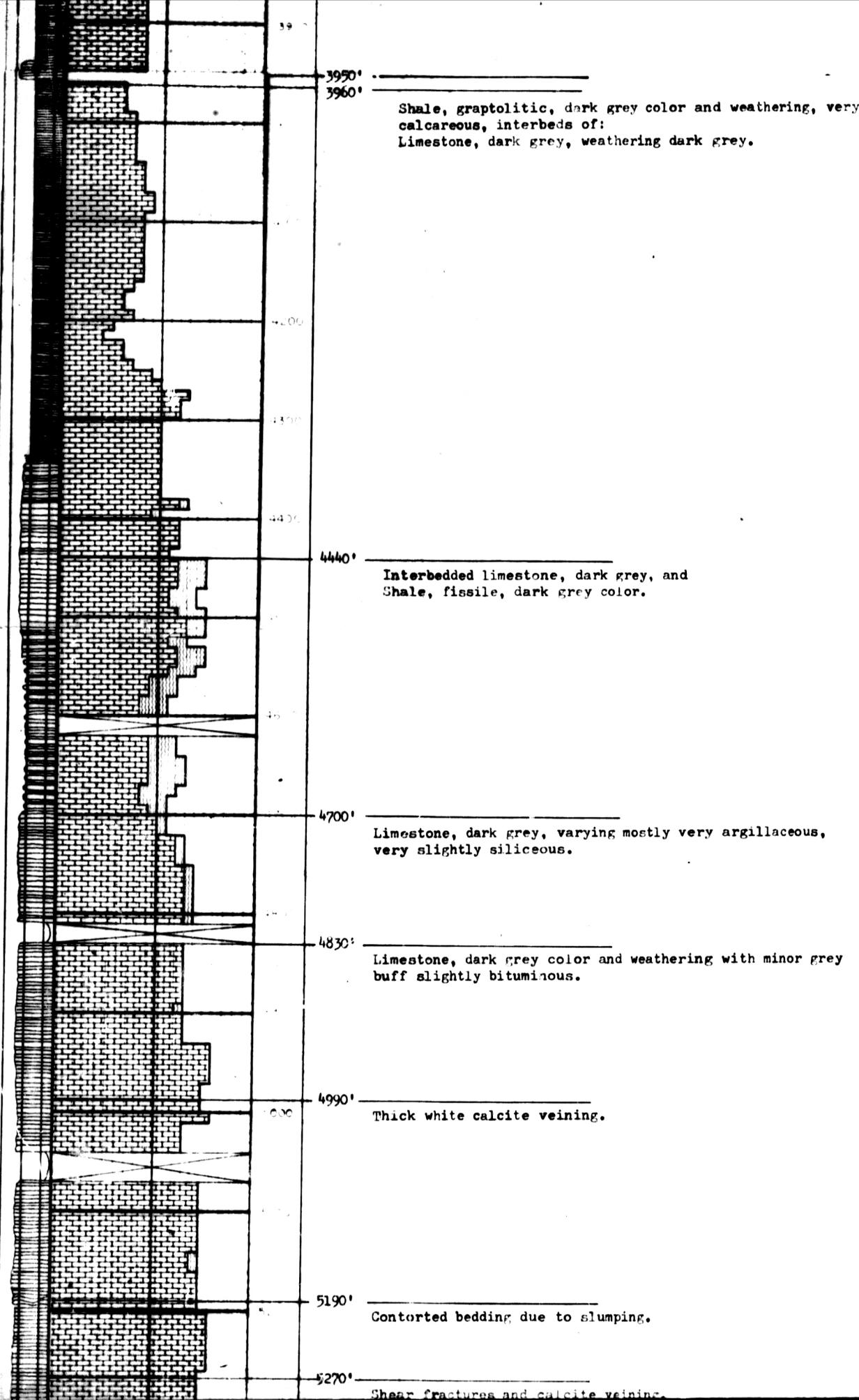




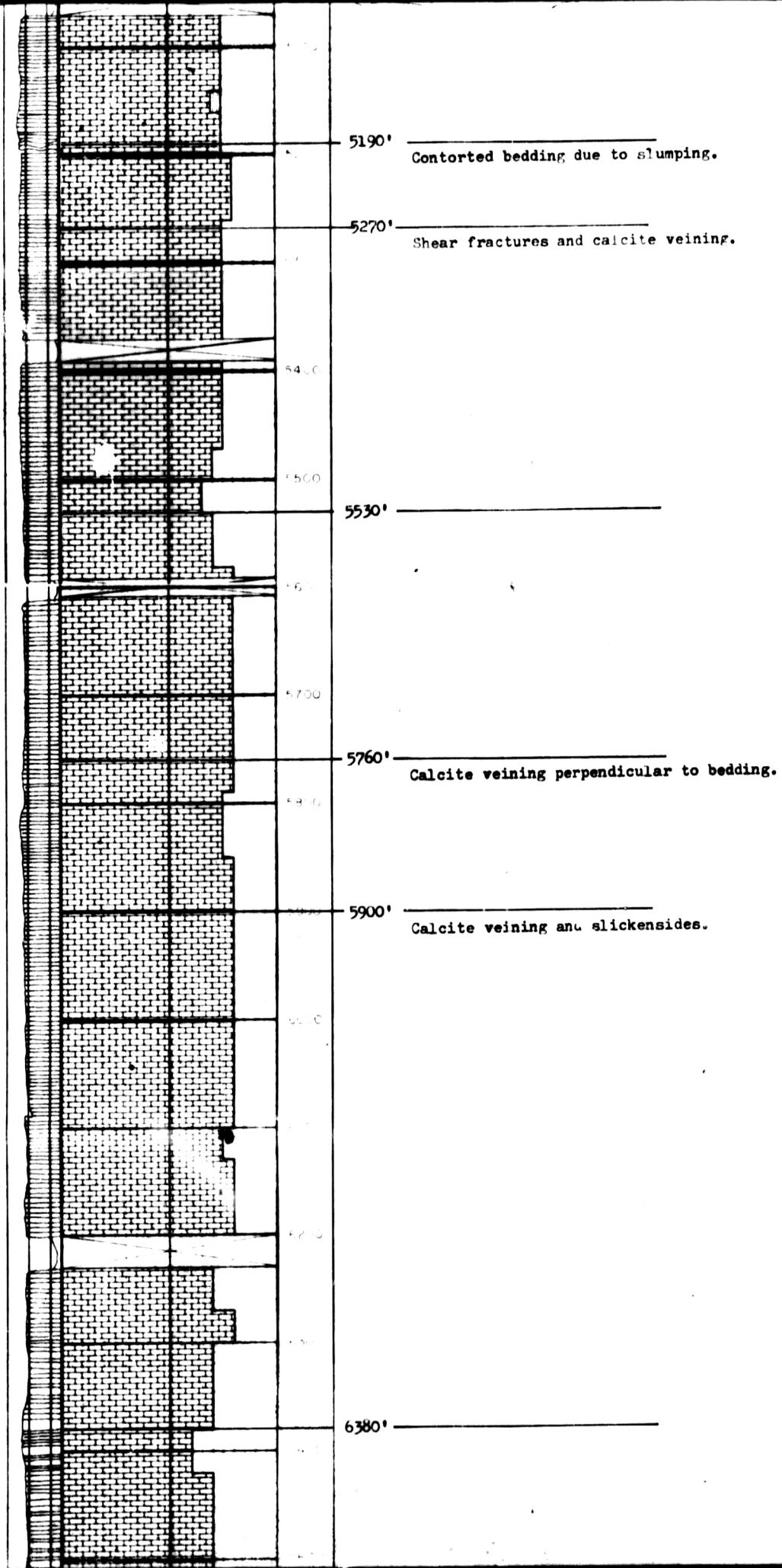
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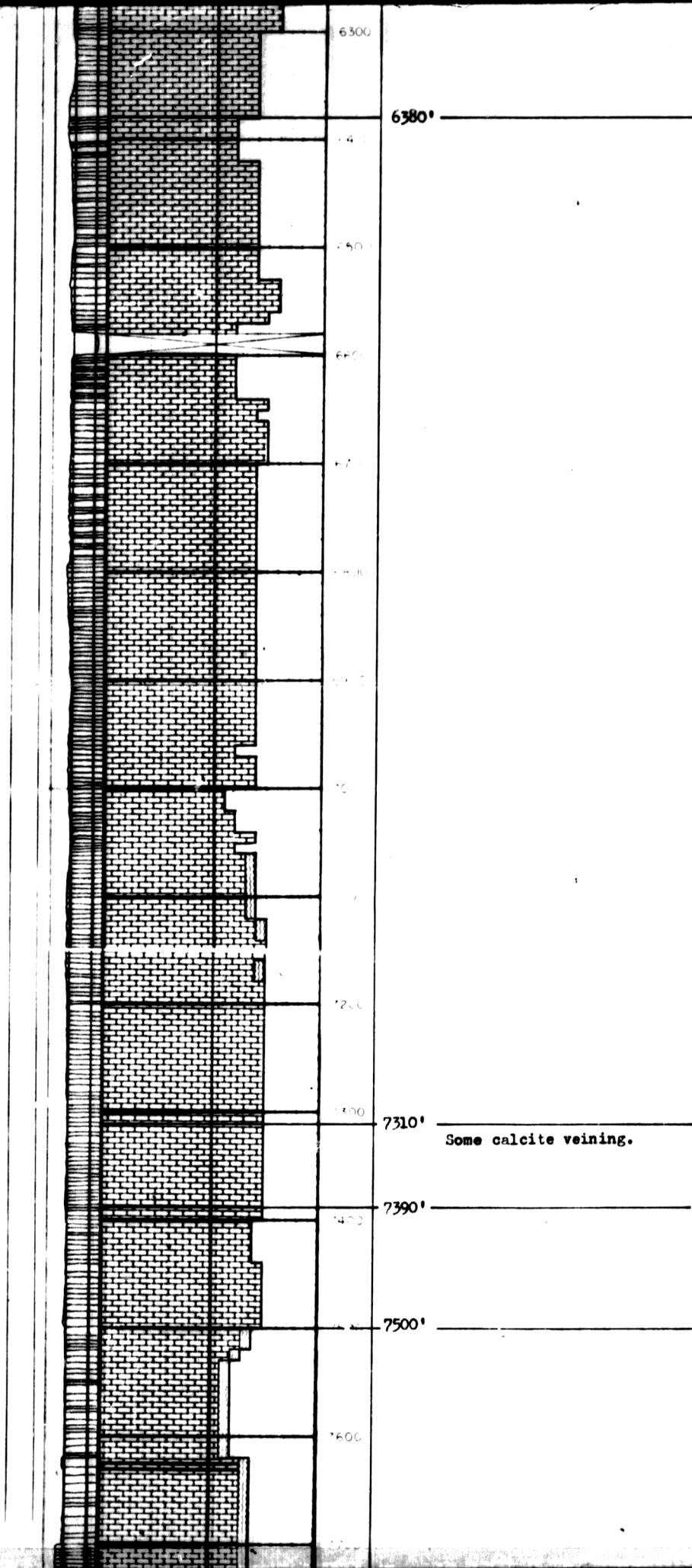
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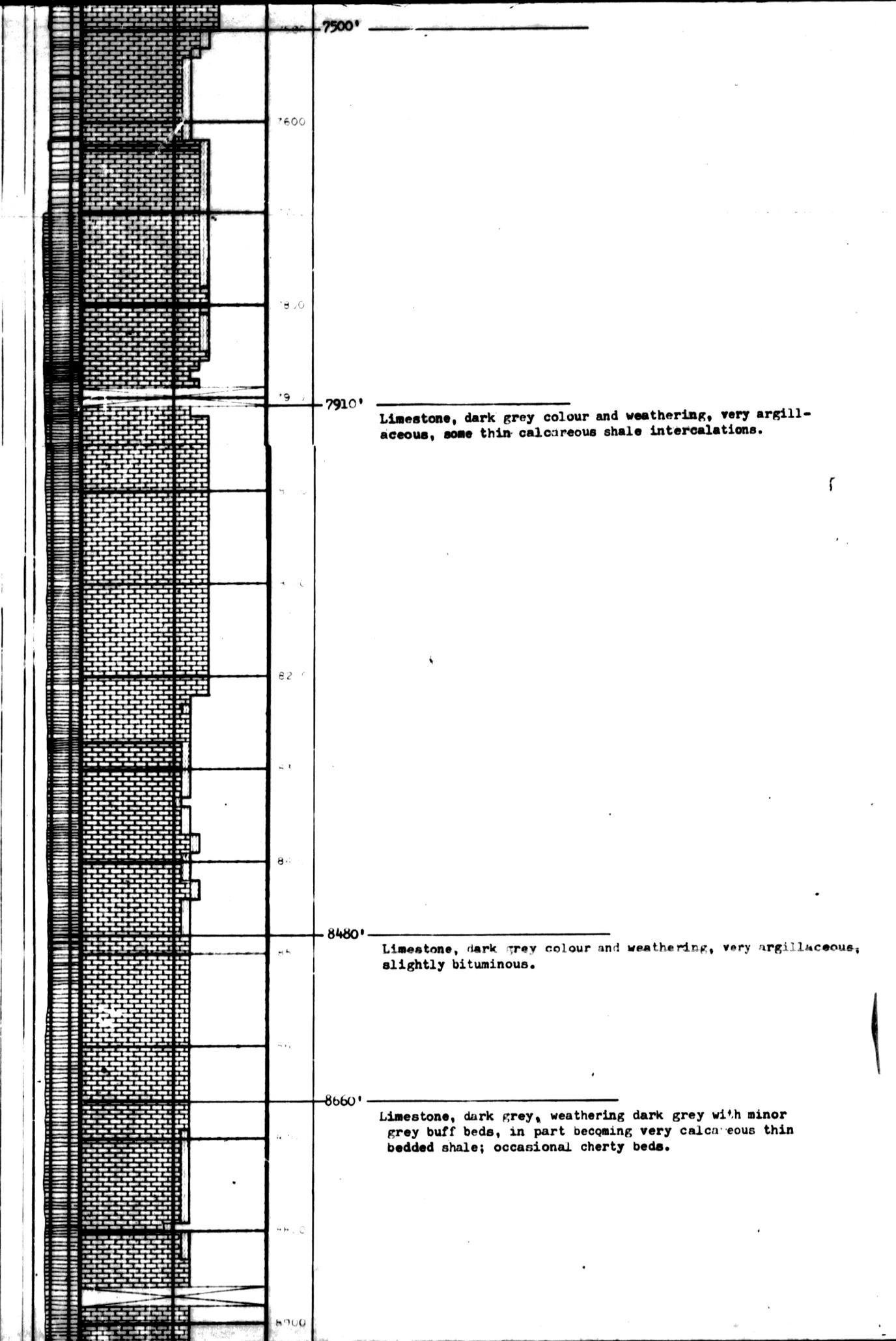


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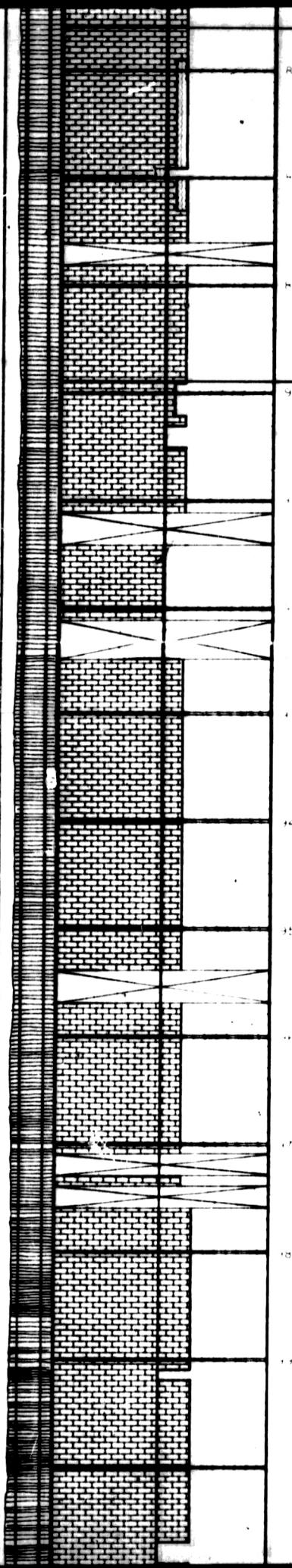


6 of





8 of



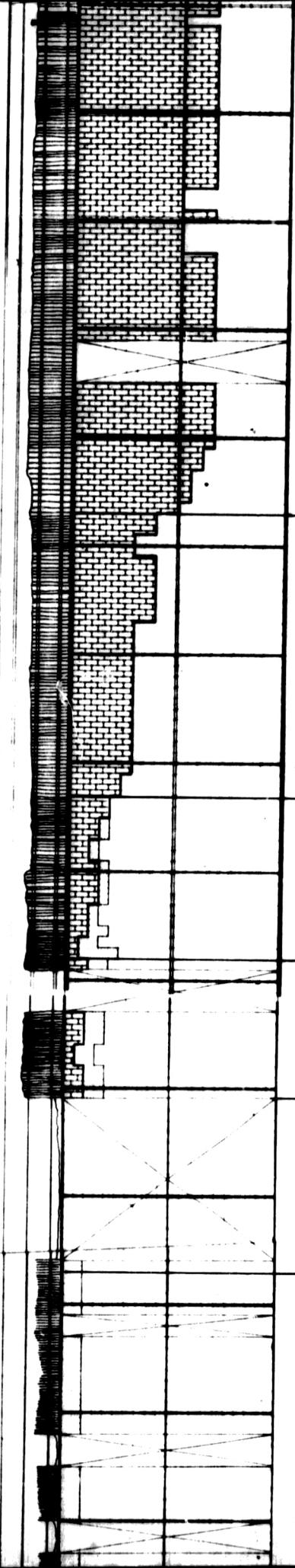
-8660*-

Limestone, dark grey, weathering dark grey with minor grey buff beds, in part becoming very calcareous thin bedded shale; occasional cherty beds.

-8990'-

Limestone, dark grey, weathering dark grey with minor grey buff, occasional Graptolites.

9 of



10370' CAMBRIAN ? (1330'+)

Shale, dark grey, weathering dark grey with minor grey buff, evenly stratified, medium bedded, flaggy with some thin platy interbeds.

10630'

10780'

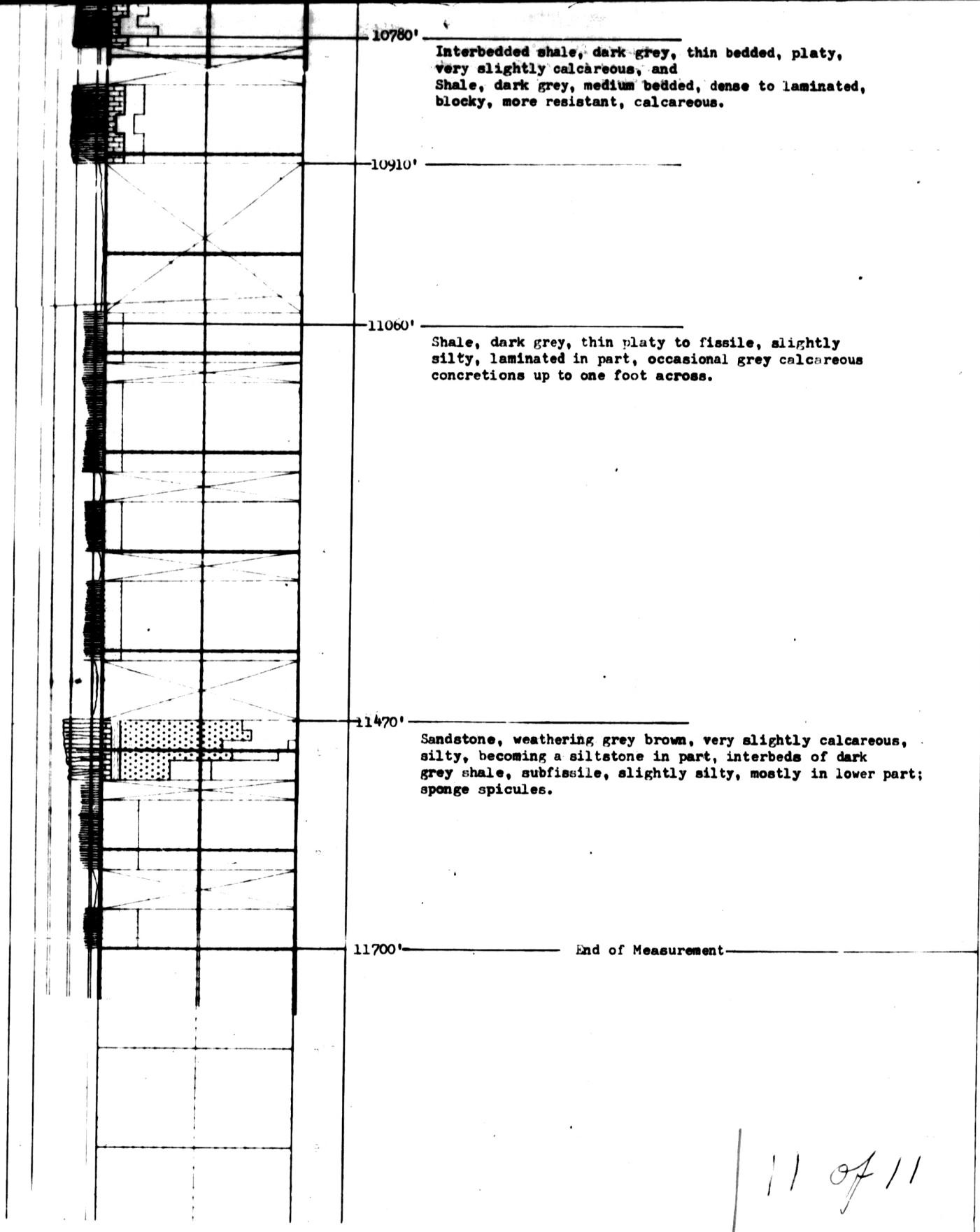
Interbedded shale, dark grey, thin bedded, platy, very slightly calcareous, and Shale, dark grey, medium bedded, dense to laminated, blocky, more resistant, calcareous.

10910'

11060'

Shale, dark grey, thin platy to fissile, slightly silty, laminated in part, occasional grey calcareous concretions up to one foot across.

10 of



11 of 11

LITHOPERCENTAGE LOG OF OUTCROP SECTION

STATION NO.
MOSQUITO CREEK

LOCATION: LSD. SEC. TWP. RGE. W. M.
UNIT ZONE N.T.S.
106NW SEC. F-12 LAT 68°00' LONG. 135°45'

Description of location:

ELEVATION

MEASURED

METHOD

FORMATIONS

TO ACCOMPANY REPORT

Stratigraphy of the Richardson Mountains area.

BY: Imperial Oil Limited

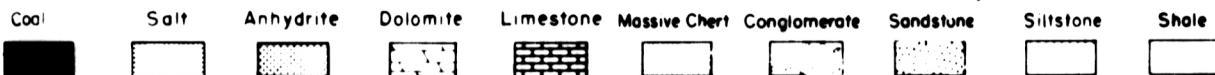
DATE: 1961

DESCRIBED

BY:

DATE: June, 1961

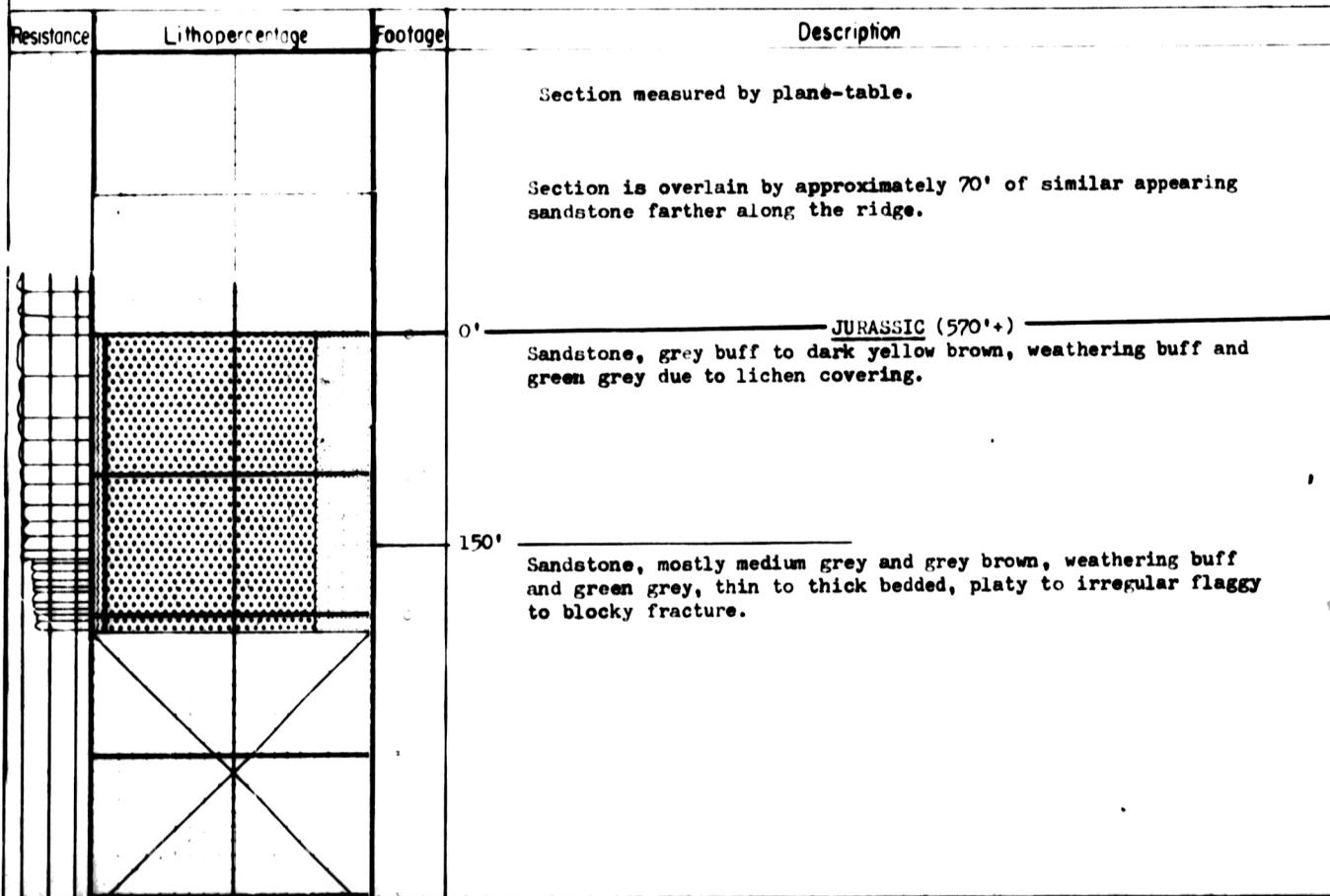
LEGEND

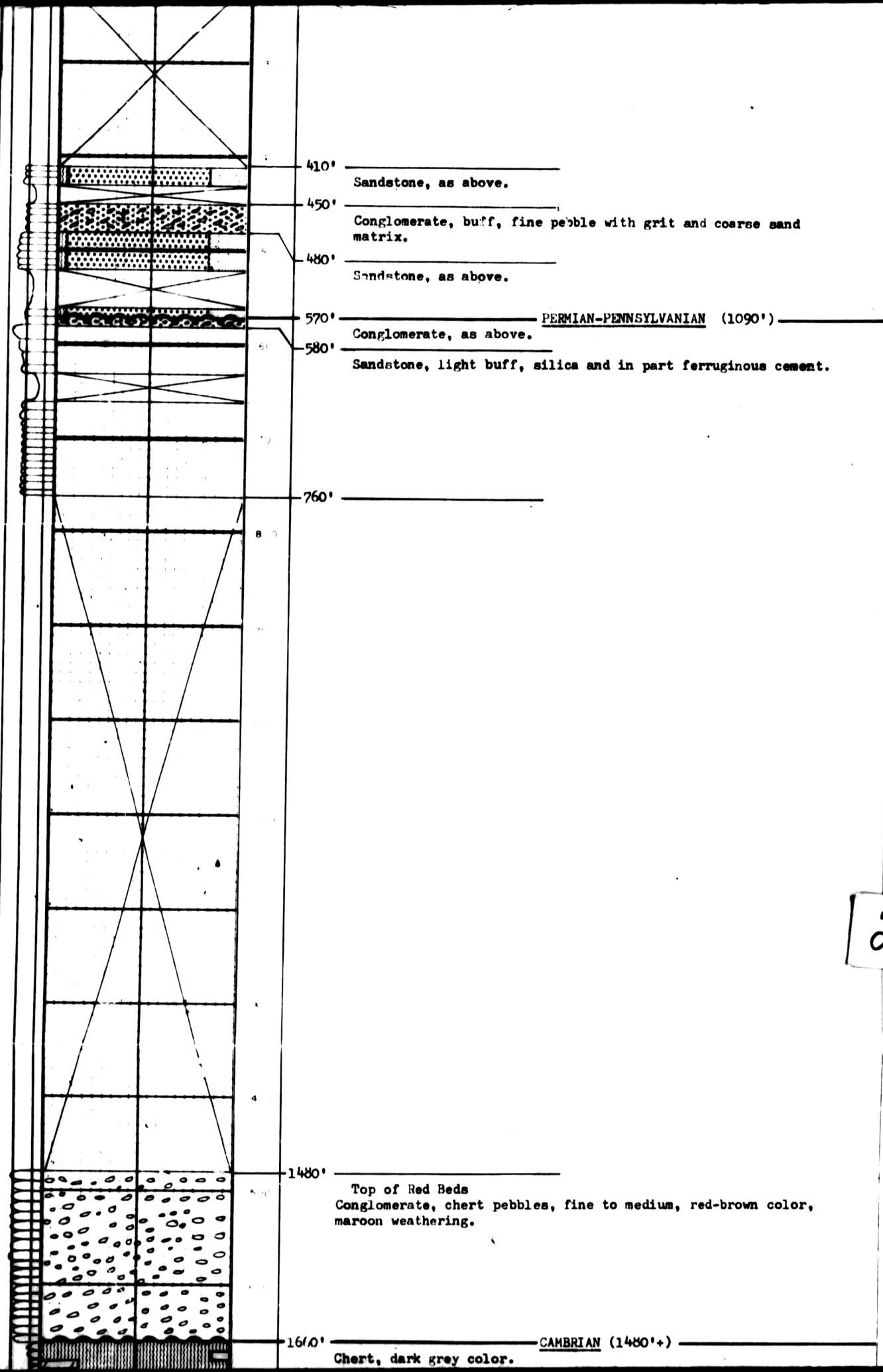


IMPERIAL OIL LIMITED

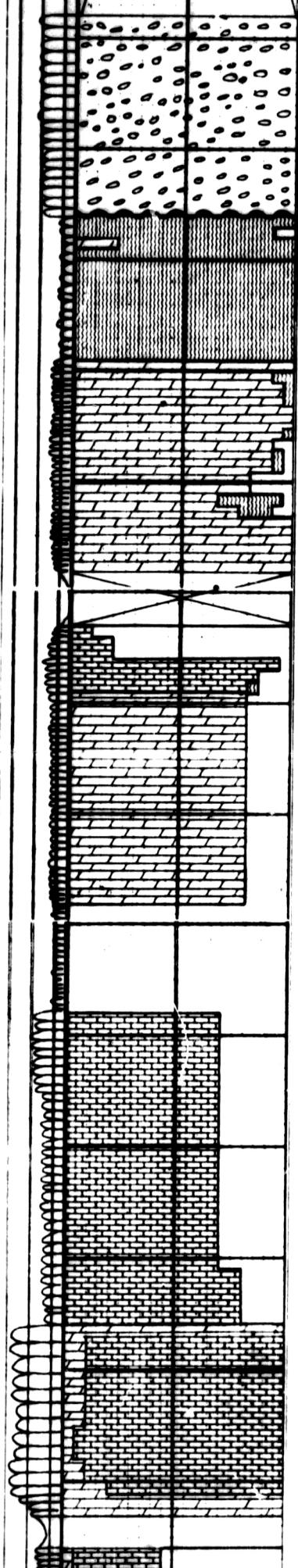
EXPLORATION DEPARTMENT

PEACE RIVER DISTRICT





2 of



1480' —————
Top of Red Beds
Conglomerate, chert pebbles, fine to medium, red-brown color, maroon weathering.

1660' ————— CAMBRIAN (1480'+)
Chert, dark grey color.

Dolomite, light to medium gray color, light to medium grey weathering. Slightly cherty.

Concealed.

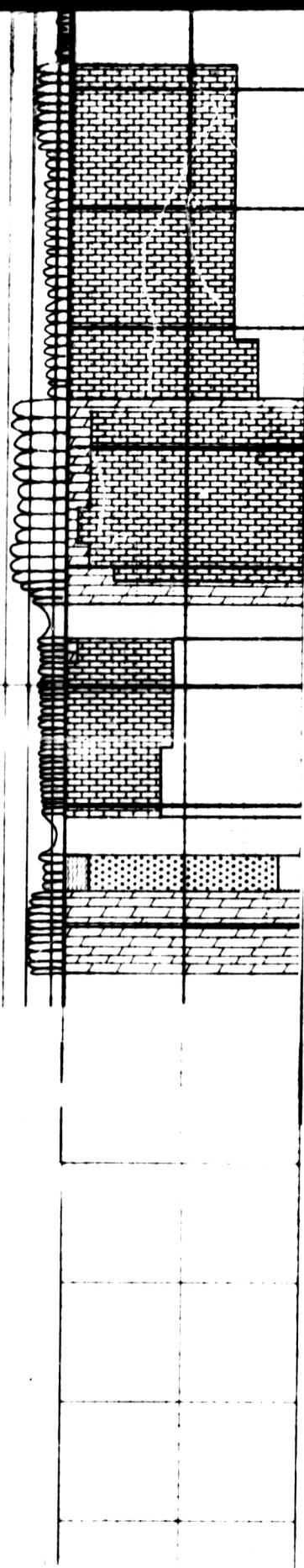
Shale, dark grey color, medium gray weathering.
Limestone, light gray color, light to medium gray weathering, argillaceous, very thin to thin bedded.
Dolomite, argillaceous as indicated by scattered outcrops.

Limestone, dark gray color, medium gray weathering, argillaceous, thin to medium bedded, poorly exposed.

Limestone, light to medium gray color, medium gray weathering.

Concealed.

13 of



Limestone, dark gray color, medium gray weathering, argillaceous, thin to medium bedded, poorly exposed.

Limestone, light to medium gray color, medium gray weathering.

Concealed.

Shale, subfissile to blocky,

Concealed.

Sandstone, dark gray color, medium gray weathering, slightly siliceous, slightly silty.

Dolomite, light brown color, medium gray and buff weathering,

494

LITHOPERCENTAGE LOG OF OUTCROP SECTION

STATION NO.

WHITE DOME

LOCATION: LSD. SEC. TWP. RGE. W. M.
JUNIT ZONE N.T.S.
116P/NE SEC. E-16 LAT 68°00' LONG 136°30'

Description of location:

ELEVATION

**MEASURED :
METHOD**

FORMATIONS

TO ACCOMPANY REPORT

Stratigraphy of the Richardson Mountains area.

BY : Imperial Oil Limited
DATE : 1961

DESCRIBED

BY:

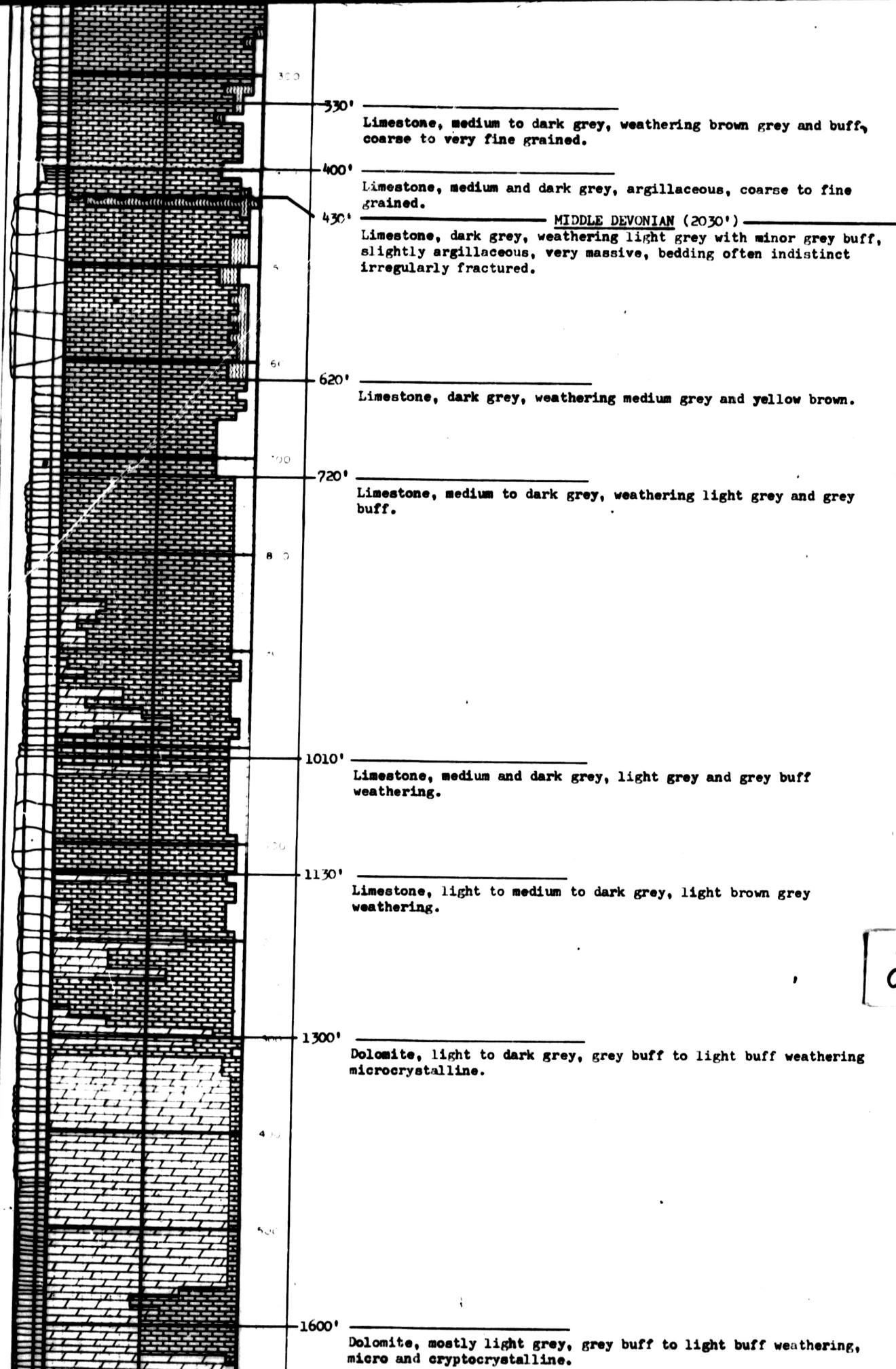
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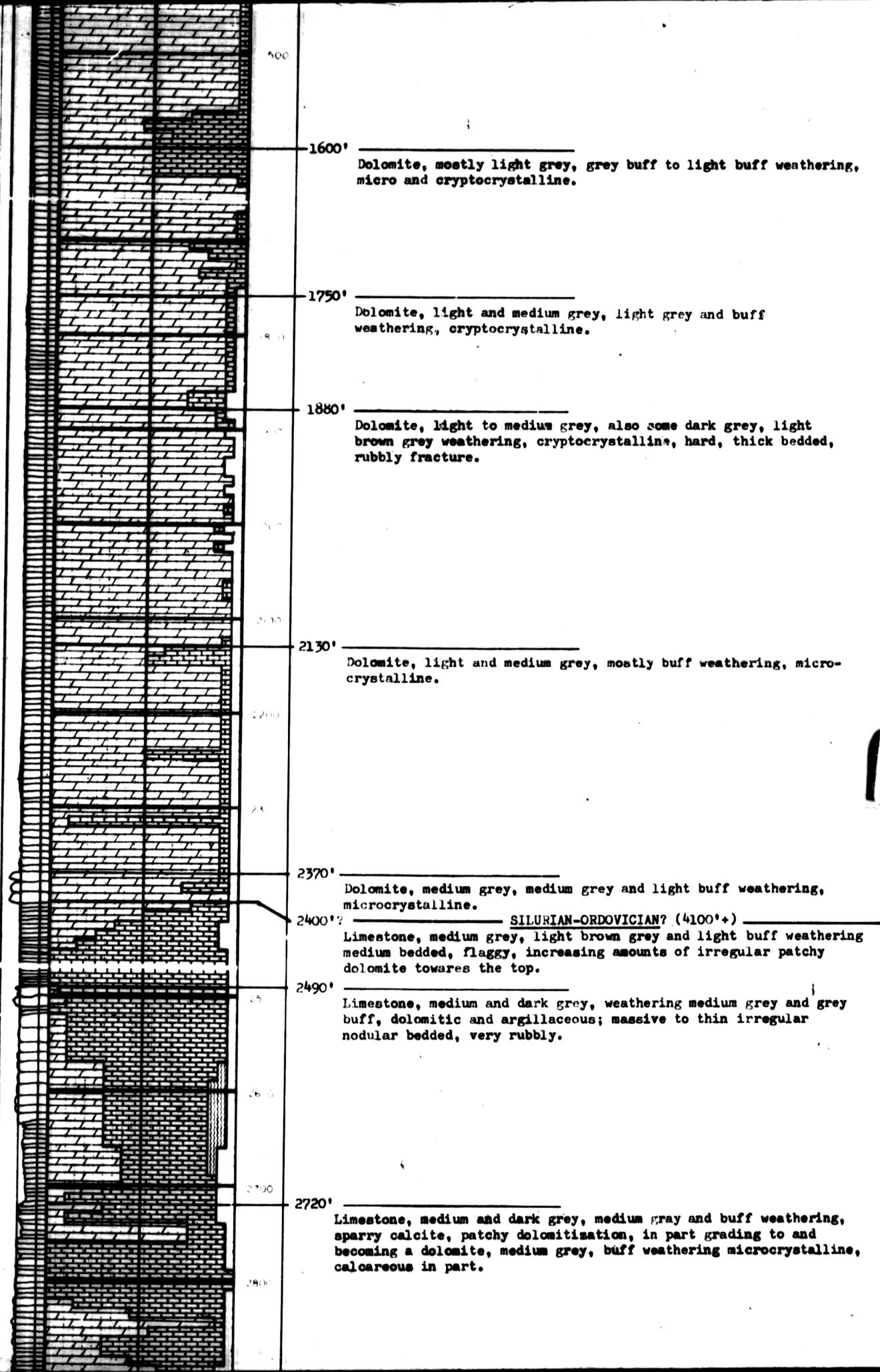
LEGEND

IMPERIAL OIL LIMITED

EXPLORATION DEPARTMENT

PEACE RIVER DISTRICT

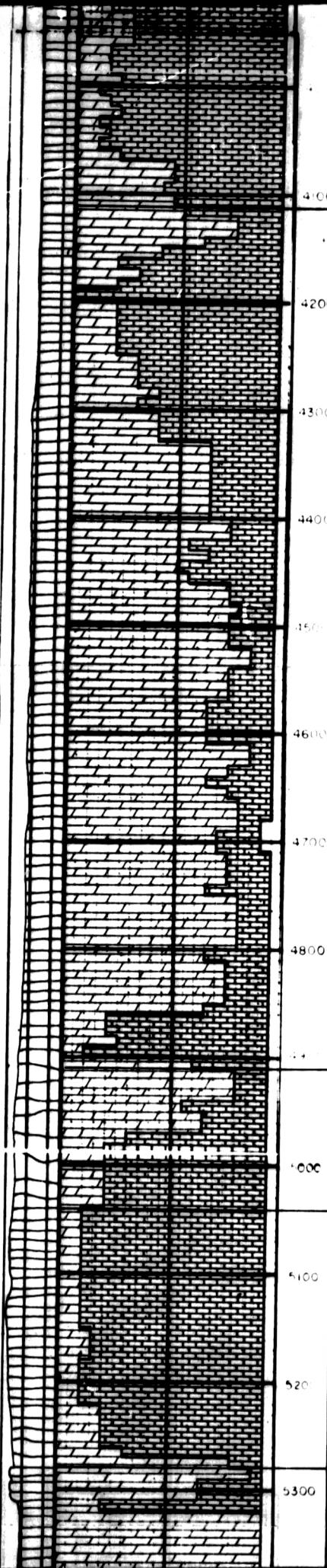




3 of

2700	2720'	Limestone, medium and dark grey, medium gray and buff weathering, sparry calcite, patchy dolomitization, in part grading to and becoming a dolomite, medium grey, buff weathering microcrystalline, calcareous in part.
2800		
2900	2930'	Limestone, medium and dark grey, weathering light grey, and minor grey buff, slightly dolomitic and argillaceous in part; very massive often with indistinct bedding; rubbly fracture.
31		
3200'	3200'	Dolomite, medium grey, weathering medium grey and buff, medium to very fine crystalline,
3270'	3270'	Limestone, light and medium grey, weathering light grey and minor light buff, dolomitic in part.
34	3400'	Limestone, dark grey, grey buff weathering.
35	3440'	Limestone, medium and dark grey, light grey weathering.
36	3620'	Limestone, light and medium grey, weathering light grey.
37		
38		
39		
4000	4110'	

14 of



4100' - 4110' Dolomite, light and medium grey, weathering light grey and minor grey buff, microcrystalline.

4200

4300

4400

4500

4600

4700

4800

4900' -

Dolomite, light grey, weathering light grey and grey buff, microcrystalline, calcareous, much fracturing.

5000

5040'

Limestone, light grey, weathering light grey and minor very light buff, mostly fine.

5100

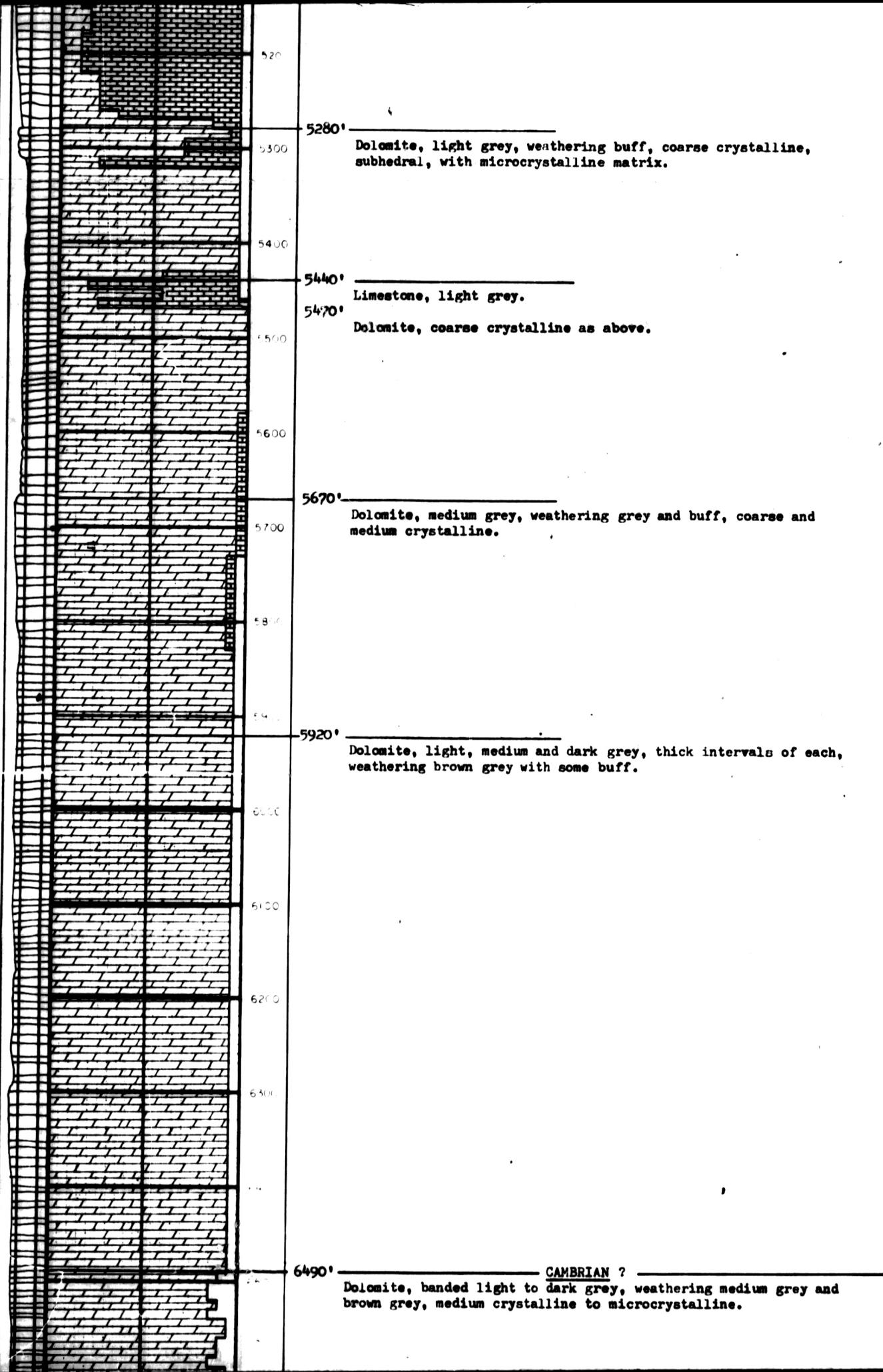
5200

5280'

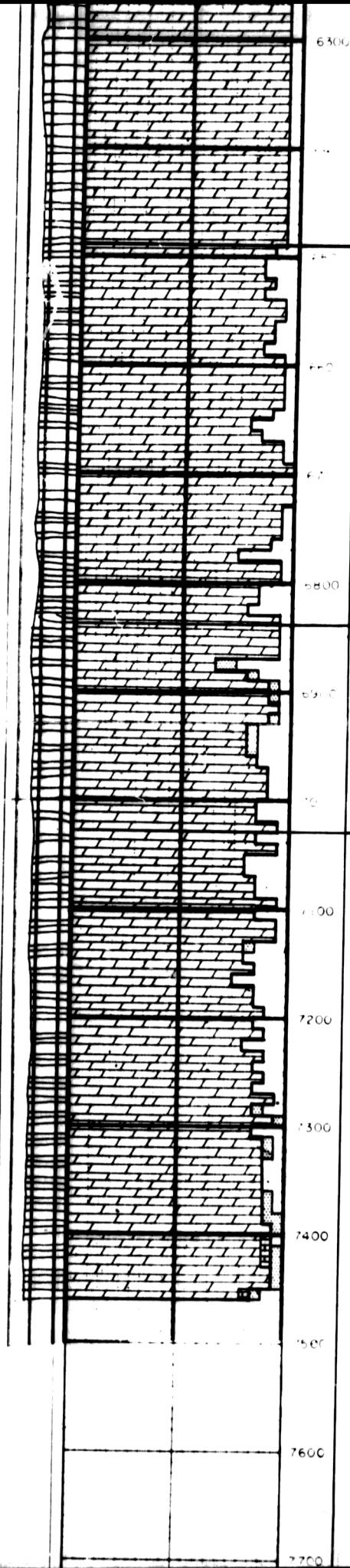
Dolomite, light grey, weathering buff, coarse crystalline, subhedral, with microcrystalline matrix.

5300

5 of



6 of



6490' CAMBRIAN ?
Dolomite, banded light to dark grey, weathering medium grey and brown grey, medium crystalline to microcrystalline.

6840' Dolomite, mostly medium grey, weathering banded medium grey and brown grey, microcrystalline.

7030' Dolomite, medium and dark grey, banded weathering in various greys and brown grey, beds of coarse crystalline to microcrystalline and cryptocrystalline dolomite.

7 of 7

**LITHOPERCENTAGE LOG
OF OUTCROP SECTION**

STATION NO.

EAST FISH CREEK

LOCATION: LSD. SEC. TWP. RGE. W. M.
UNIT ZONE N.T.S.
116P/N.E. SEC. I-80 LAT 68°00' LONG. 136°15'.

Description of location:

ELEVATION

MEASURED
METHOD

FORMATION

TO ACCOMPANY REPORT

Stratigraphy of the Richardson Mountains area.

BY: Imperial Oil Limited

DATE: 1961

DESCRIBED

BY:

DATE: June, 1961

LEGEND

Coal

Salt

Anhydrite

Dolomite

Limestone

Massive Chert

Conglomerate

Sandstone

Siltstone

Shale

IMPERIAL OIL LIMITED

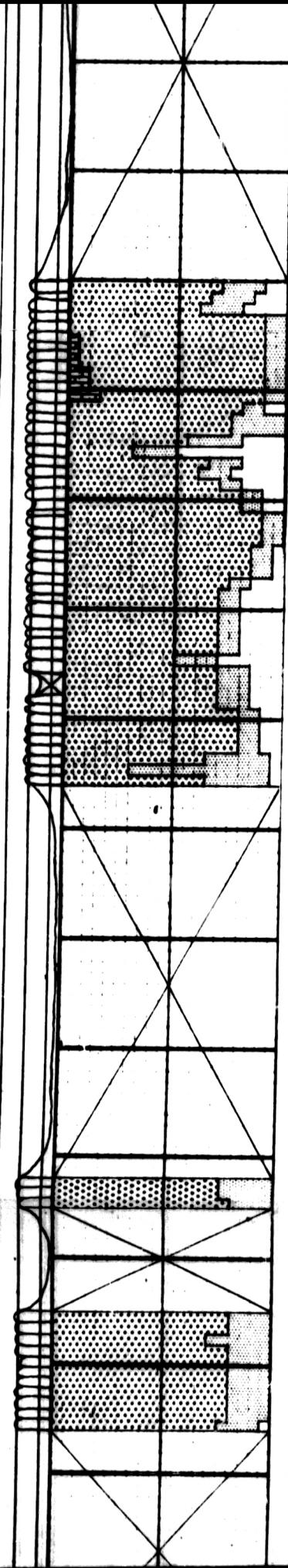
EXPLORATION DEPARTMENT

PEACE RIVER DISTRICT

Resistance	Lithopercantage	Footage	Description
			Measured with 5 foot stick.
			Section begins at top of mountain. Overlying beds eroded.
			CRETACEOUS - JURASSIC (1700'+) Sandstone, light brown gray color, buff to light gray weathering slightly silty, trace argillaceous.

Concealed.

1 of



Sandstone, light gray to light brown color, medium gray to buff weathering, slightly calcareous in part, silty, slightly argillaceous, fractured, medium bedded.

Concealed.

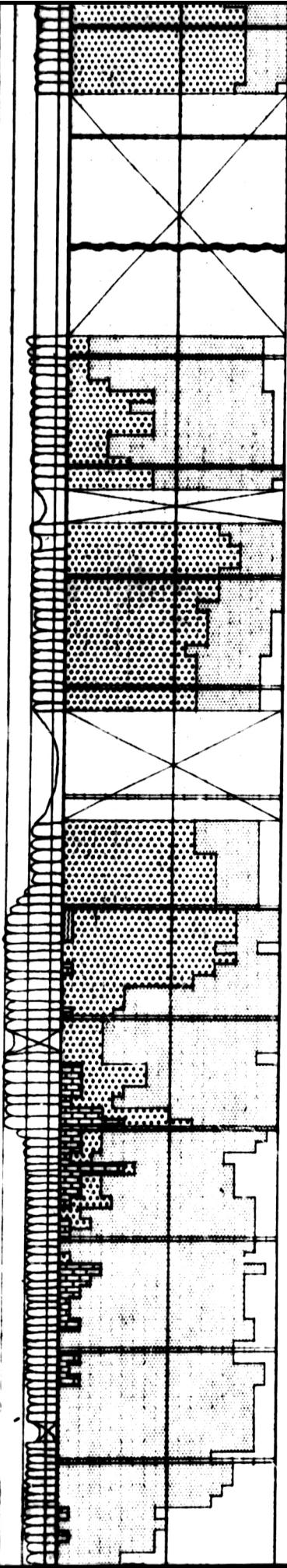
2 of

Sandstone, as above.

Concealed.

Sandstone, as above.

Concealed.



Sandstone, as above,

Concealed.

1700' +? ————— PERMO - PENN (1710'+) —————

Siltstone, medium to dark gray color, dark yellow buff weathering, sandy, slightly argillaceous, stained with Iron oxides along bedding planes and fractures, medium bedded.

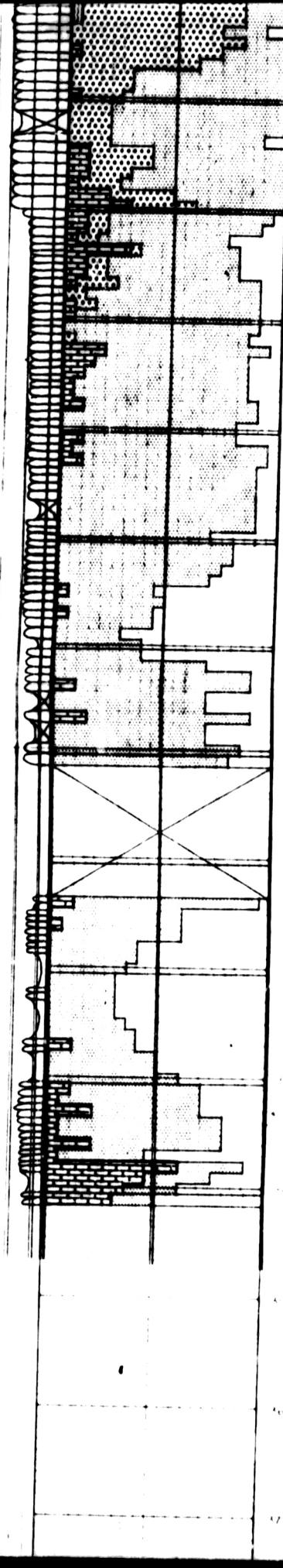
Concealed, but probably similar to above.
Sandstone, subrounded, medium gray color, medium gray
to yellow buff weathering, silty.

Concealed.

Sandstone, as above.

Siltstone, dark gray color, medium gray and dark yellow buff weathering, slightly calcareous, sandy towards top, slightly argillaceous getting argillaceous towards base, medium bedded.

396



Siltstone, dark gray color, medium gray and dark yellow buff weathering, slightly calcareous, sandy towards top, slightly argillaceous getting argillaceous towards base, medium bedded.

Concealed.

Siltstone, as above, and
Shale, subfissile to blocky, dark gray to dark brown
color, medium brown weathering, slightly calcareous,
very silty, generally not well exposed, thin bedded.

4 of 4

LITHOPERCENTAGE LOG OF OUTCROP SECTION

STATION NO.

UPPER CANYON PEEL RIVER

LOCATION: LSD. SEC. TWP. RGE. W. M.
106 E/N.W. UNIT ZONE N.T.S.
K-43 & 53 SEC. LAT 66°00' LONG. 135°30'

Description of location:

ELEVATION

MEASURED
METHOD

FORMATION

TO ACCOMPANY REPORT

Stratigraphy of the Richardson Mountains area.

BY: Imperial Oil Limited

DATE: 1961

DESCRIBED

BY:

DATE: August, 1961

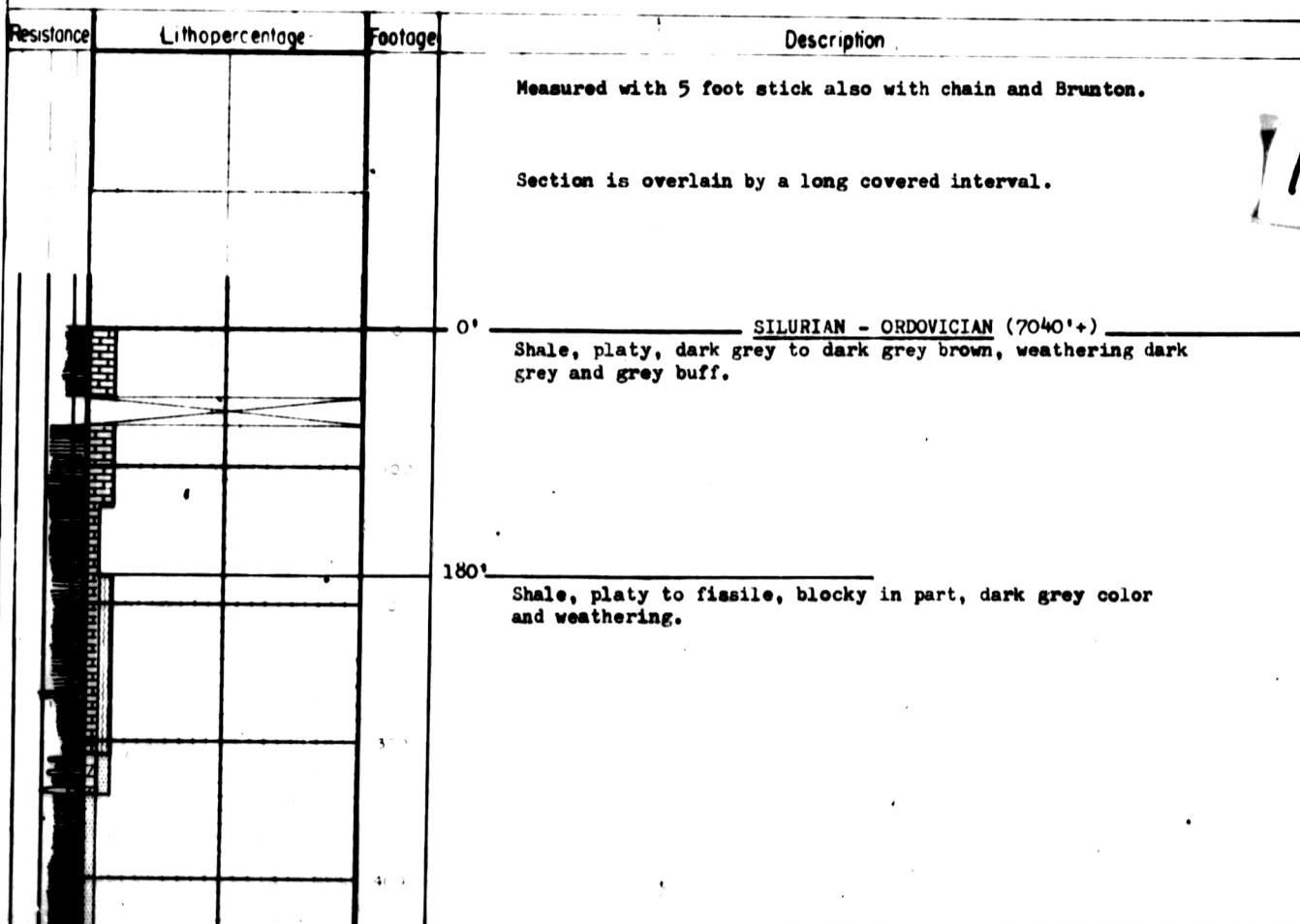
LEGEND

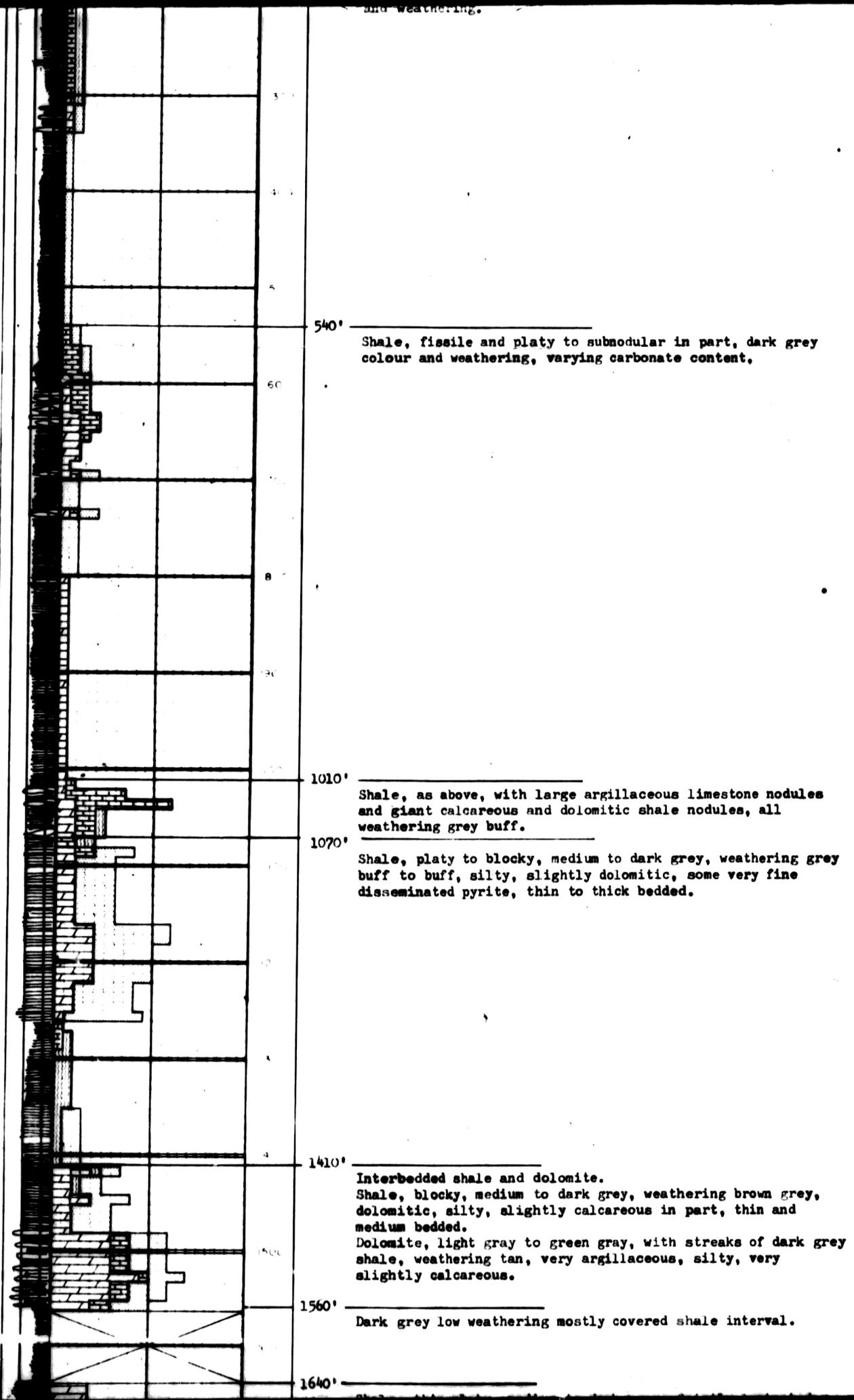


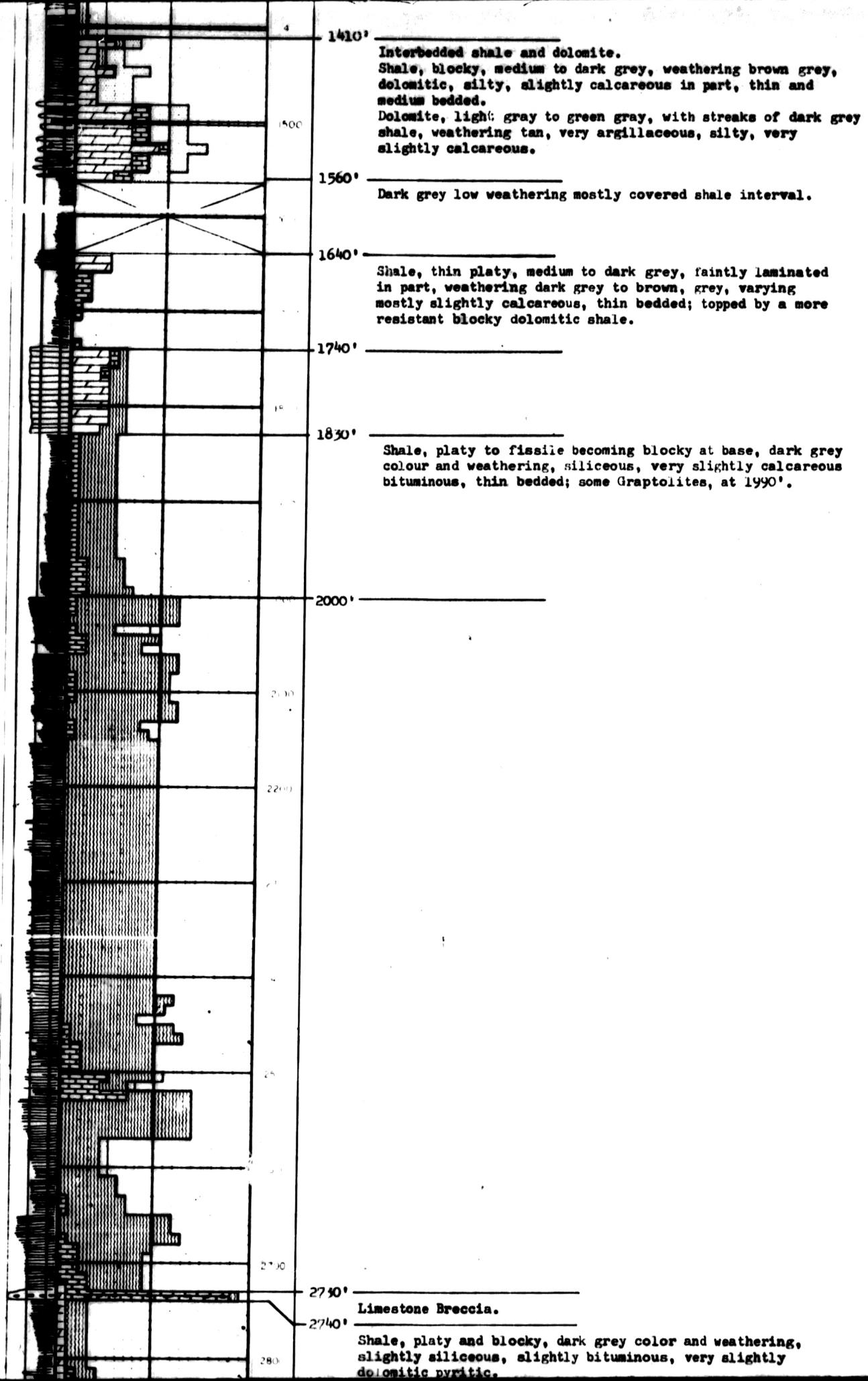
IMPERIAL OIL LIMITED

EXPLORATION DEPARTMENT

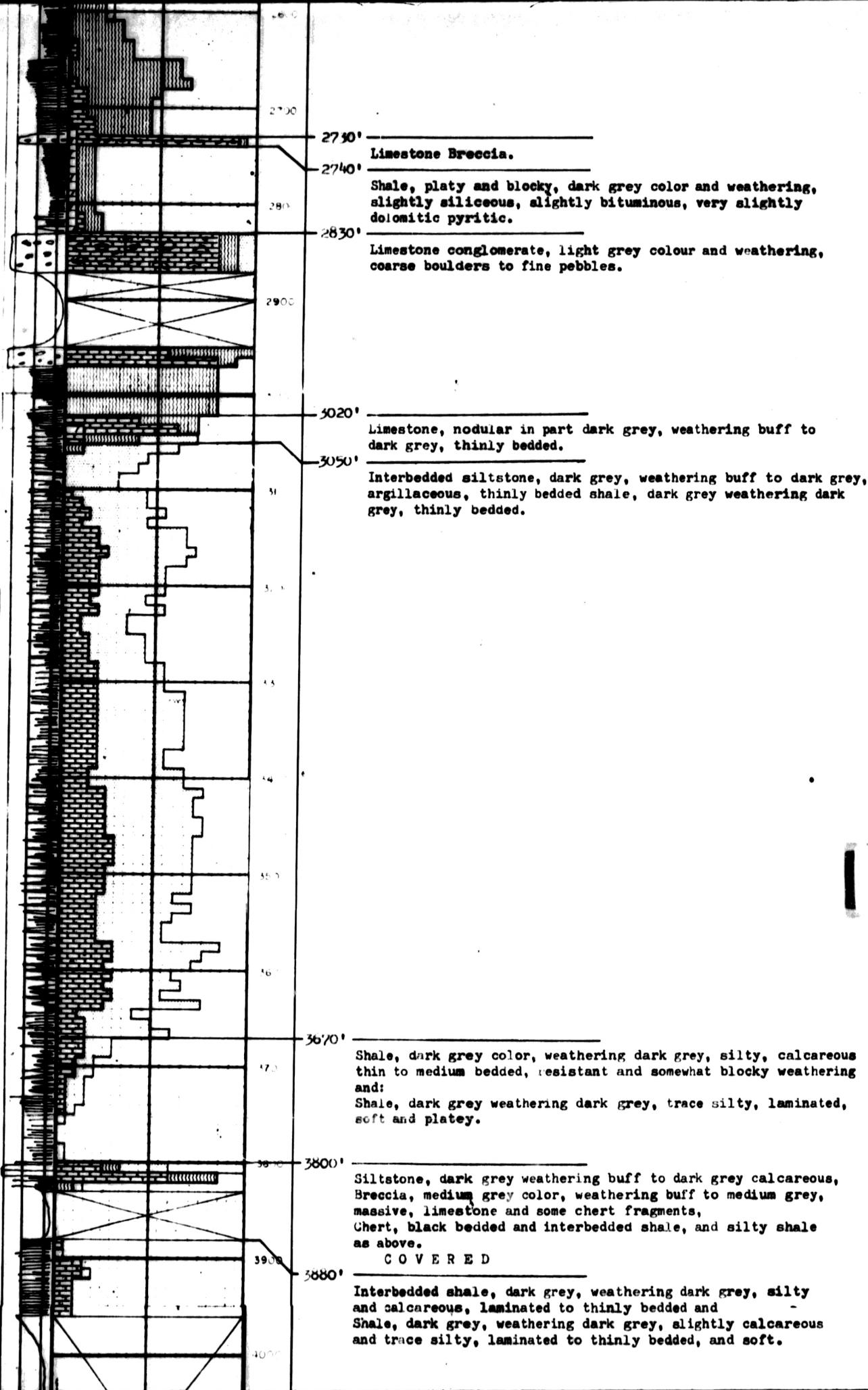
PEACE RIVER DISTRICT

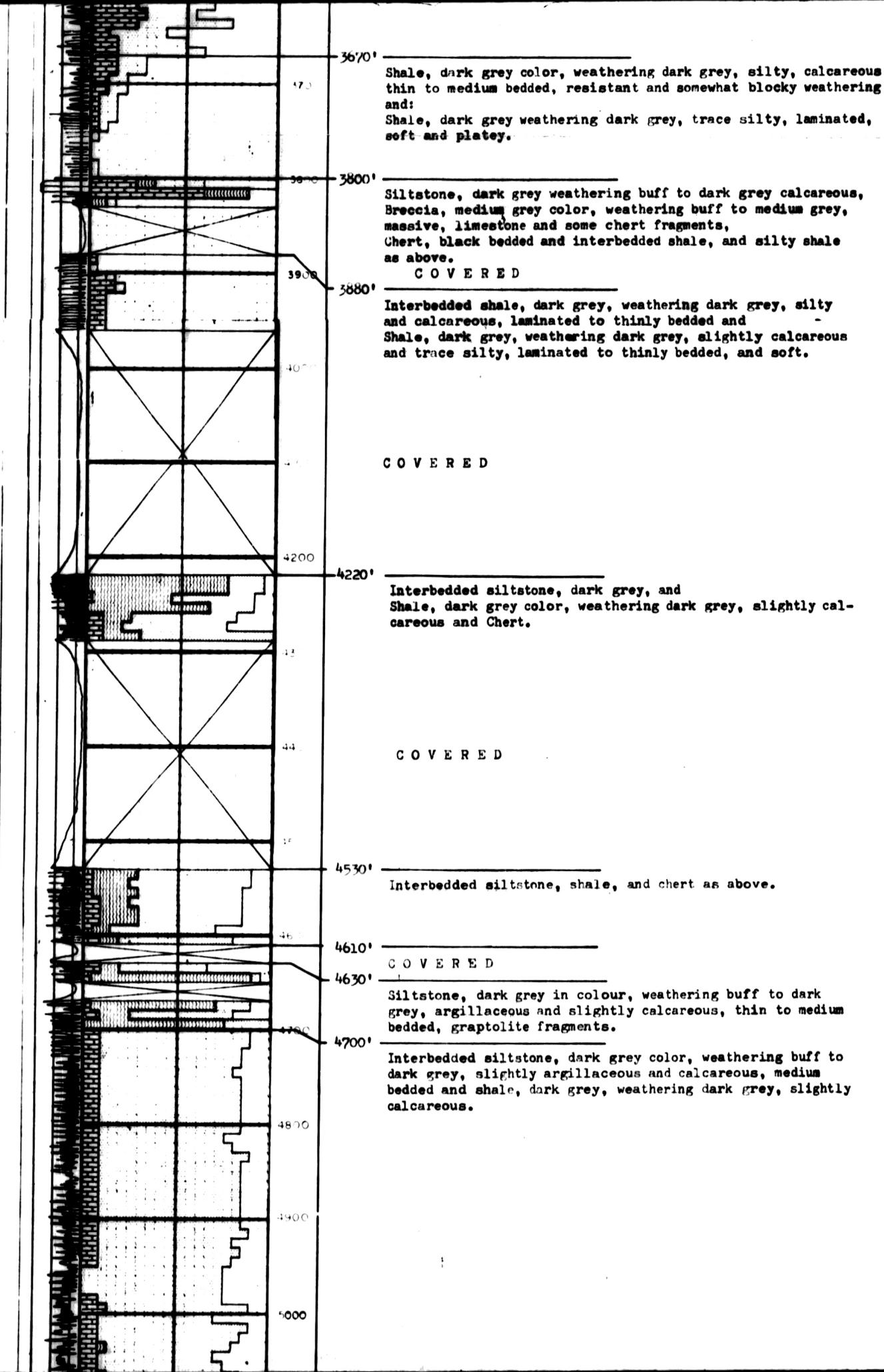






13 of

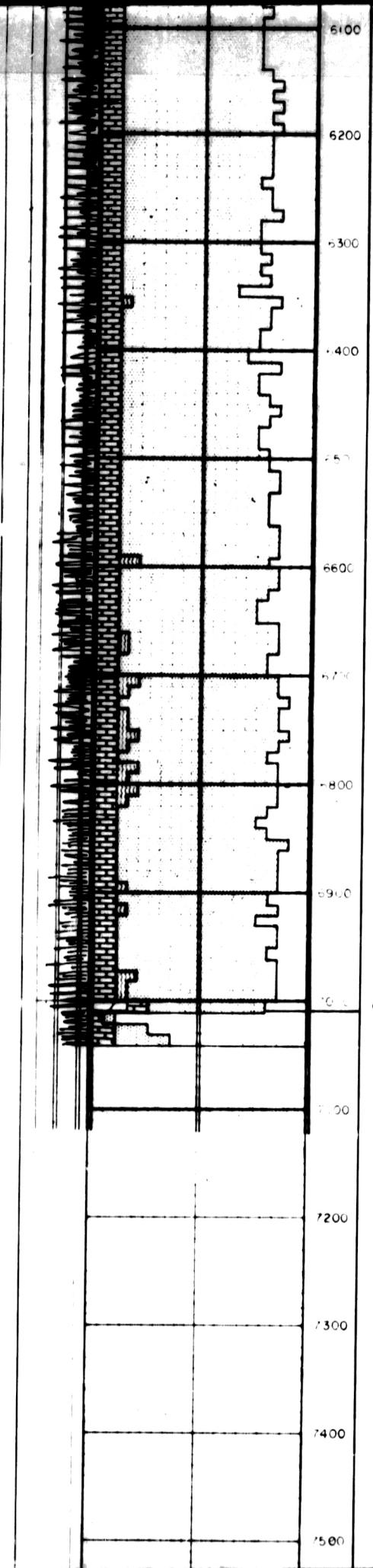




5 of



6 of



LITHOPERCENTAGE LOG OF OUTCROP SECTION

STATION NO.

ACT RIVER

LOCATION: LSD. SEC. TWP. RGE. W. M.
116 1/NE. UNIT ZONE N.T.S.
SEC. D-43 LAT 66°40' LONG 136°00'

Description of location:

ELEVATION : MEASURED
METHOD

FORMATION

TO ACCOMPANY REPORT

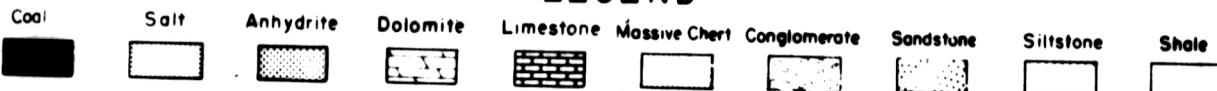
Stratigraphy of the Richardson Mountains area.

BY : Imperial Oil Limited
DATE : 1961

DESCRIBED

BY : DATE : August, 1961

LEGEND

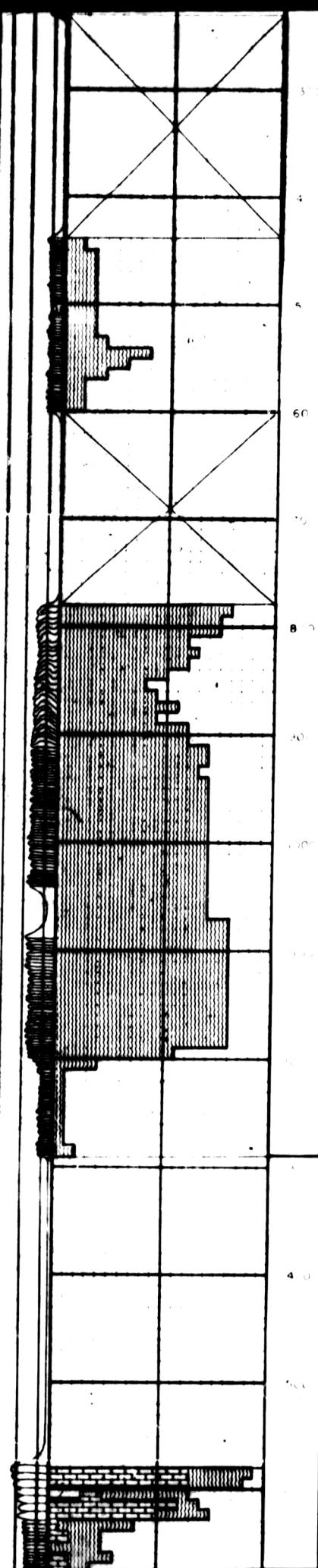


IMPERIAL OIL LIMITED

EXPLORATION DEPARTMENT

PEACE RIVER DISTRICT

Resistance	Lithopercantage	Footage	Description
			Measured with 5 foot stick and tape and compass.
		0'	0' ————— <u>UPPER DEVONIAN (1290'+)</u> Imperial Formation (1290'+) Shale, subfissile, splintery medium grey and tan weathering, medium grey color.
		0.0	
		170'	170' ————— <u>Fort Creek Formation (1120'+)</u> Shale, subfissile, dark grey weathering, dark grey color, slightly siliceous.
		300	
		400	



Concealed, probably underlain by siliceous shale.

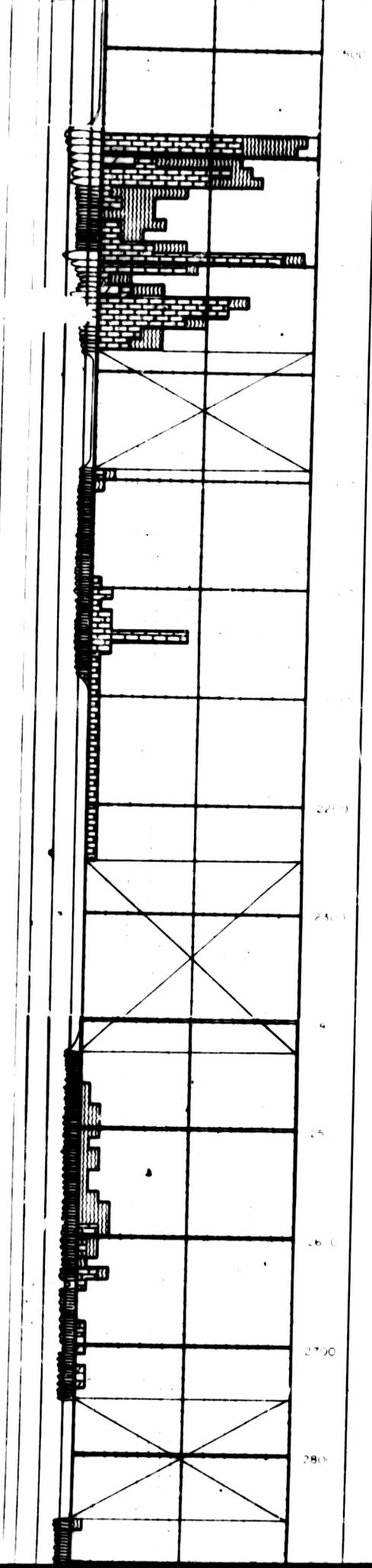
Chert, dark grey weathering, dark grey color, argillaceous, some iron staining, thin bedded; with partings of:
Shale, fissile to subfissile, dark grey weathering, medium and dark grey dolor, slightly siliceous.

2 of.

1290' ————— SILURIAN-ORDOVICIAN (9520' +)

Concealed.

Interbedded. Limestone, grey buff weathering, medium and dark grey color, trace dolomitic.
Shale, subfissile, medium and dark grey weathering and color, slightly calcareous, slightly siliceous.

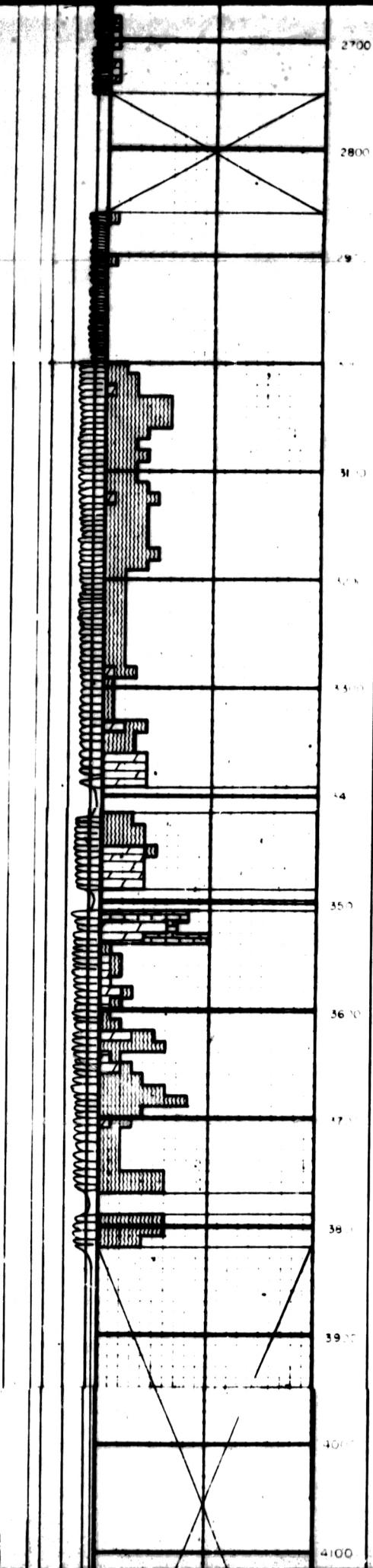


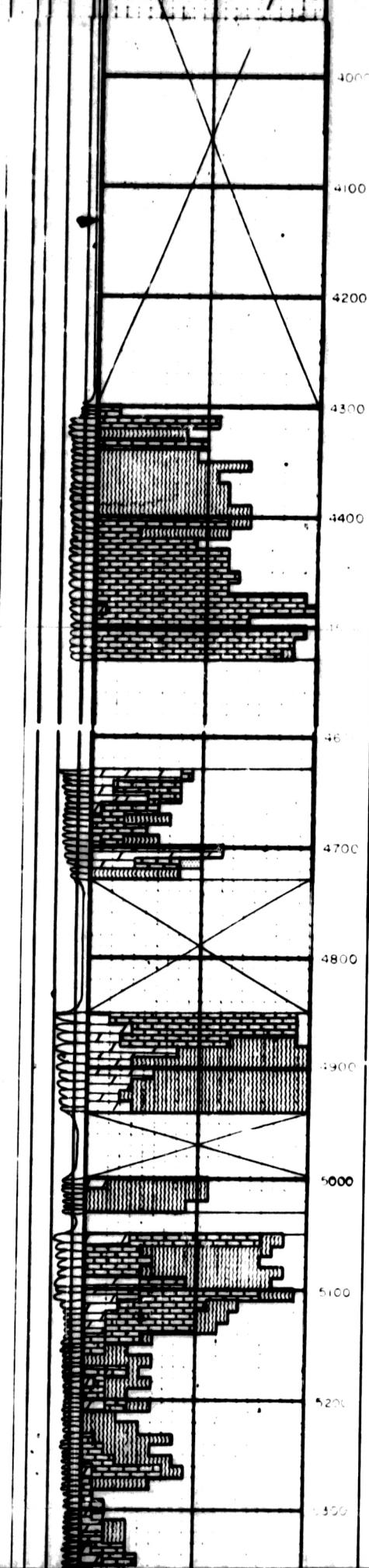
Interbedded. Limestone, grey buff weathering, medium and dark grey color, trace dolomitic.
Shale, subfissile, medium and dark grey weathering and color, slightly calcareous, slightly siliceous.

Shale, fissile to subfissile, dark yellow buff and dark grey weathering, medium and dark grey color, slightly calcareous, graptolites in part.

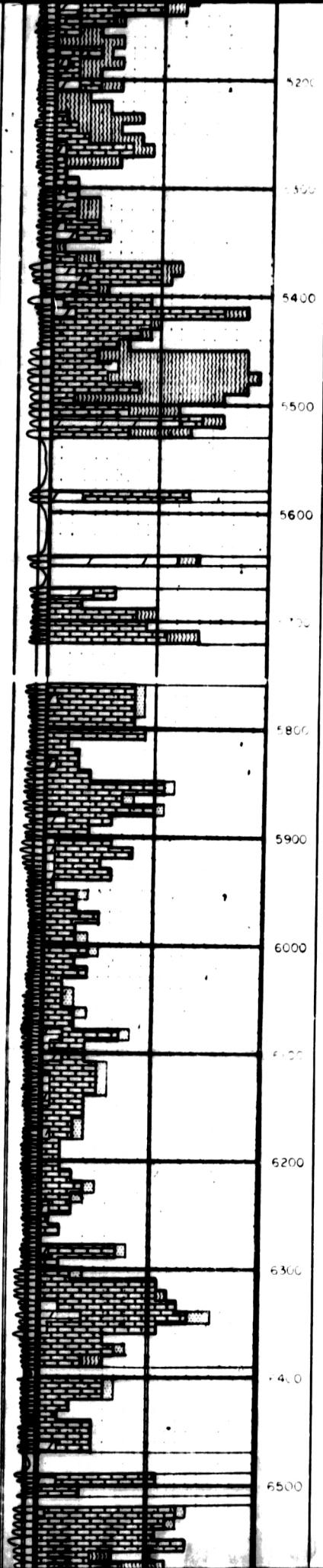
13 of

Shale, subfissile to blocky, grey buff and medium grey.





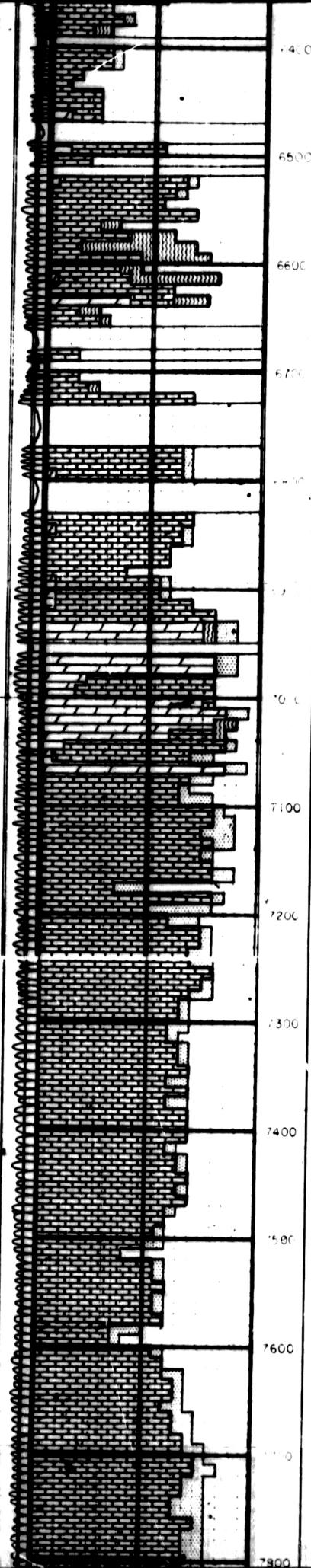
15 of



Shale, subfissile, medium to dark grey weathering and fresh color, trace dolomitic in part, slightly calcareous, pyrite, very thin to thin bedded, graptolites in part.

Limestone, grey buff weathering, medium grey weathering, rounded.

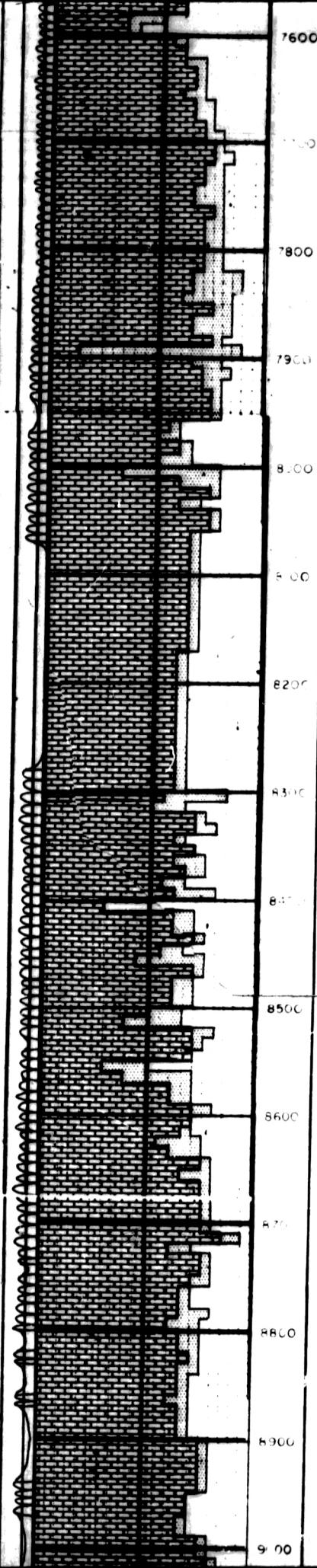
6 of



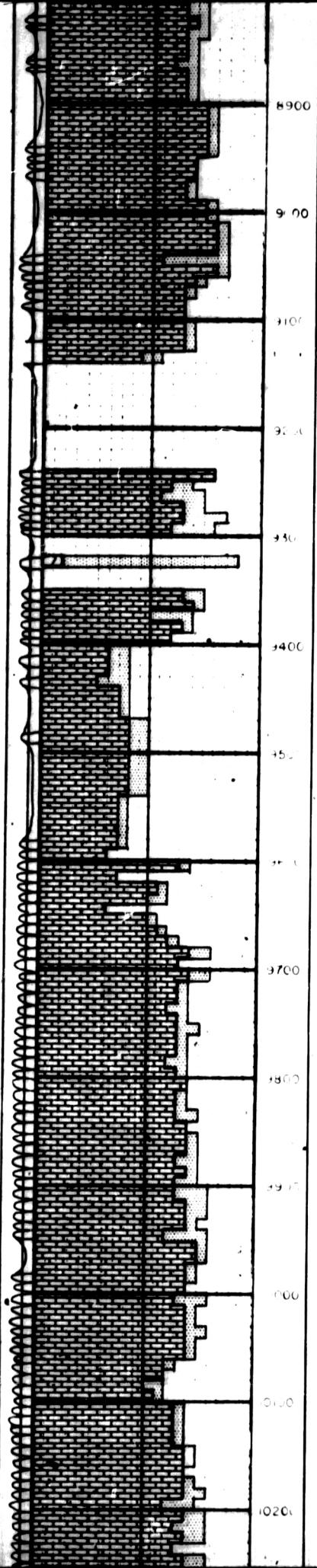
Dolomite, fine to coarse microcrystalline, medium grey weathering and fresh color.

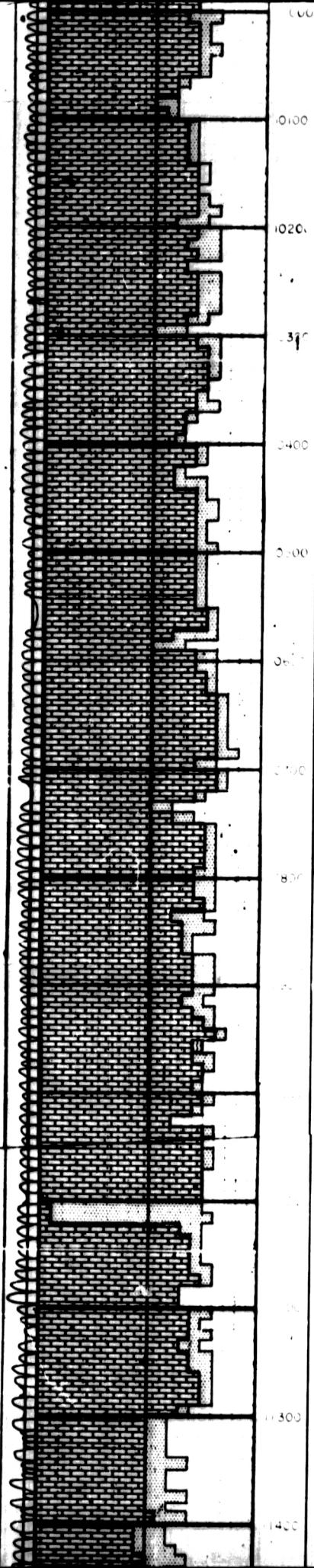
Limestone, grey buff to medium grey weathering, medium grey color, slightly silty, argillaceous, disseminated pyrite, predominantly thin bedded; in part slightly calcareous fissile to subfissile, shale.

7 of



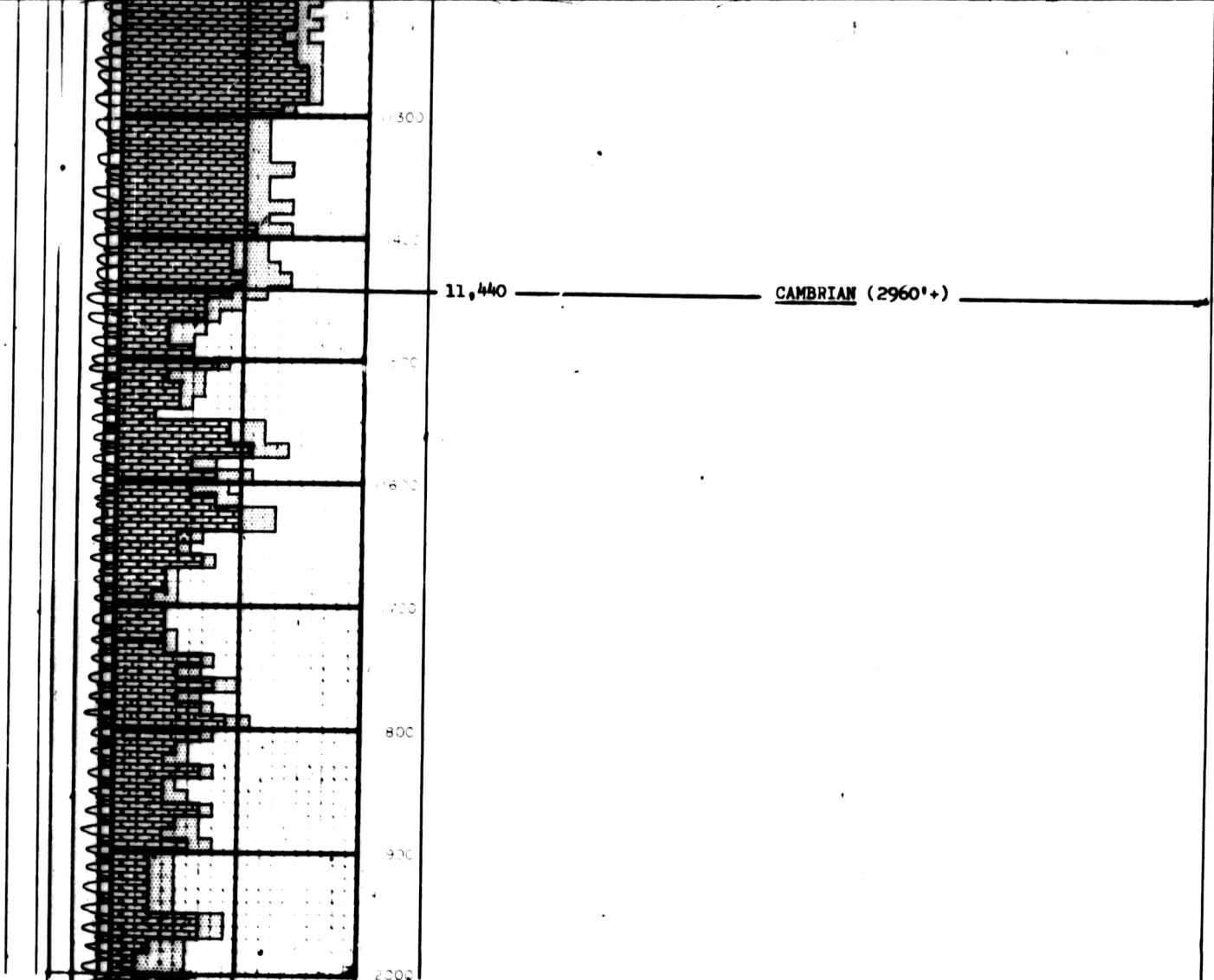
8 of





Limestone, medium to dark grey weathering and fresh color, slightly silty, argillaceous, thin to medium bedded; with occasional partings of:
Shale, subfissile dark grey weathering and fresh color, slightly calcareous, graptolites in part..

10 of 1



Interbedded:

Siltstone, grey buff to medium grey weathering, medium grey color, calcareous, slightly argillaceous, medium bedded; and Shale, subfissile, medium to dark grey weathering, dark grey color, trace calcareous, trace silty, disseminated pyrite in part.

11 of

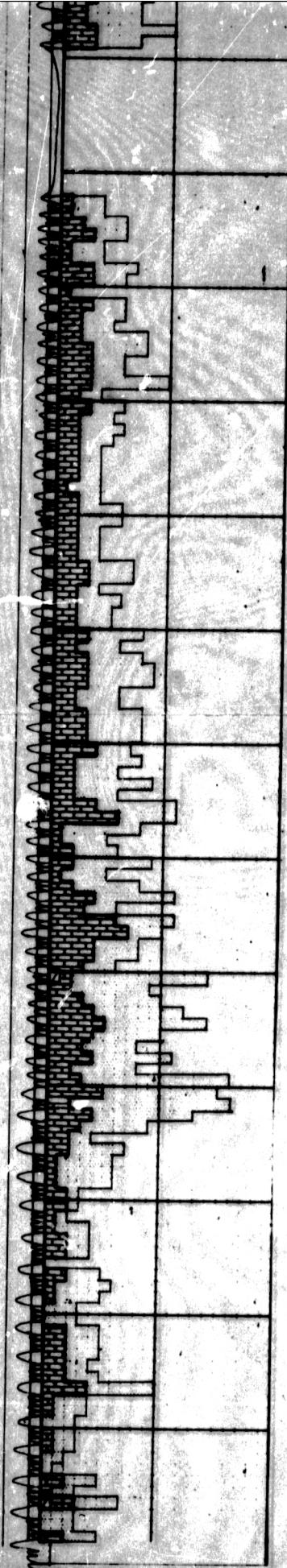
Interbedded:

Siltstone, grey buff to medium grey weathering, medium grey color, calcareous, slightly argillaceous, medium bedded; and
Shale, subfissile, medium to dark grey weathering, dark grey color, trace calcareous, trace silty, disseminated pyrite in part.

Concealed, probably as above.

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Censored, probably as shown.



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**LITHOPERCENTAGE LOG
OF OUTCROP SECTION**

STATION NO.

GRIZZLY CREEK

LOCATION: LSD. SEC. TWP. RGE. W. M.
UNIT ZONE N.T.S.
116P/N.E. SEC. 39 LAT 67°40' LONG. 136°15'

Description of location:

ELEVATION

MEASURED
METHOD

FORMATION

TO ACCOMPANY REPORT

Stratigraphy of the Richardson Mountains area.

BY: Imperial Oil Limited

DATE: 1961

DESCRIBED

BY:

DATE: July, 1961

LEGEND

Coal

Salt

Anhydrite

Dolomite

Limestone

Massive Chert

Conglomerate

Sandstone

Siltstone

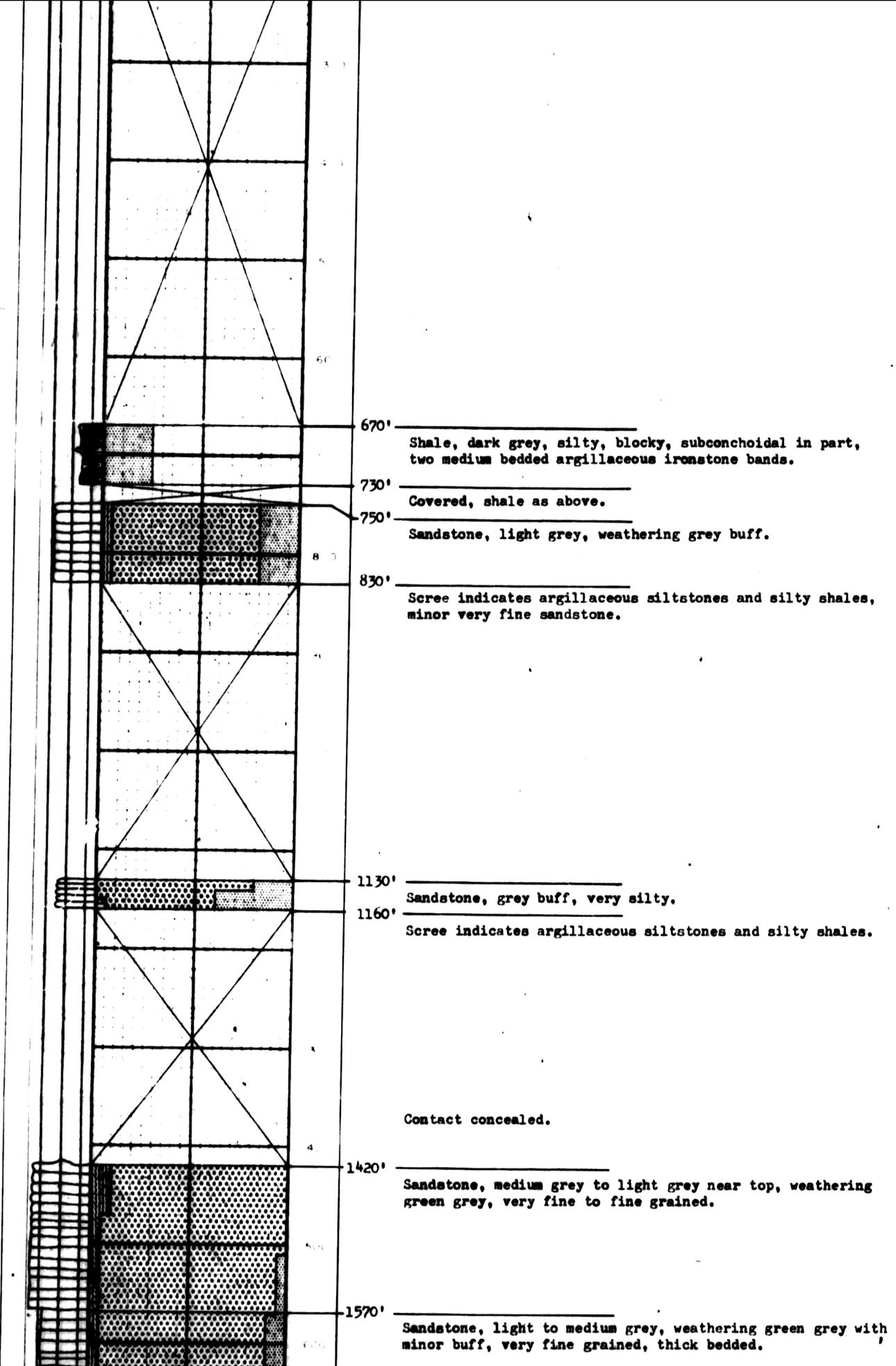
Shale

IMPERIAL OIL LIMITED

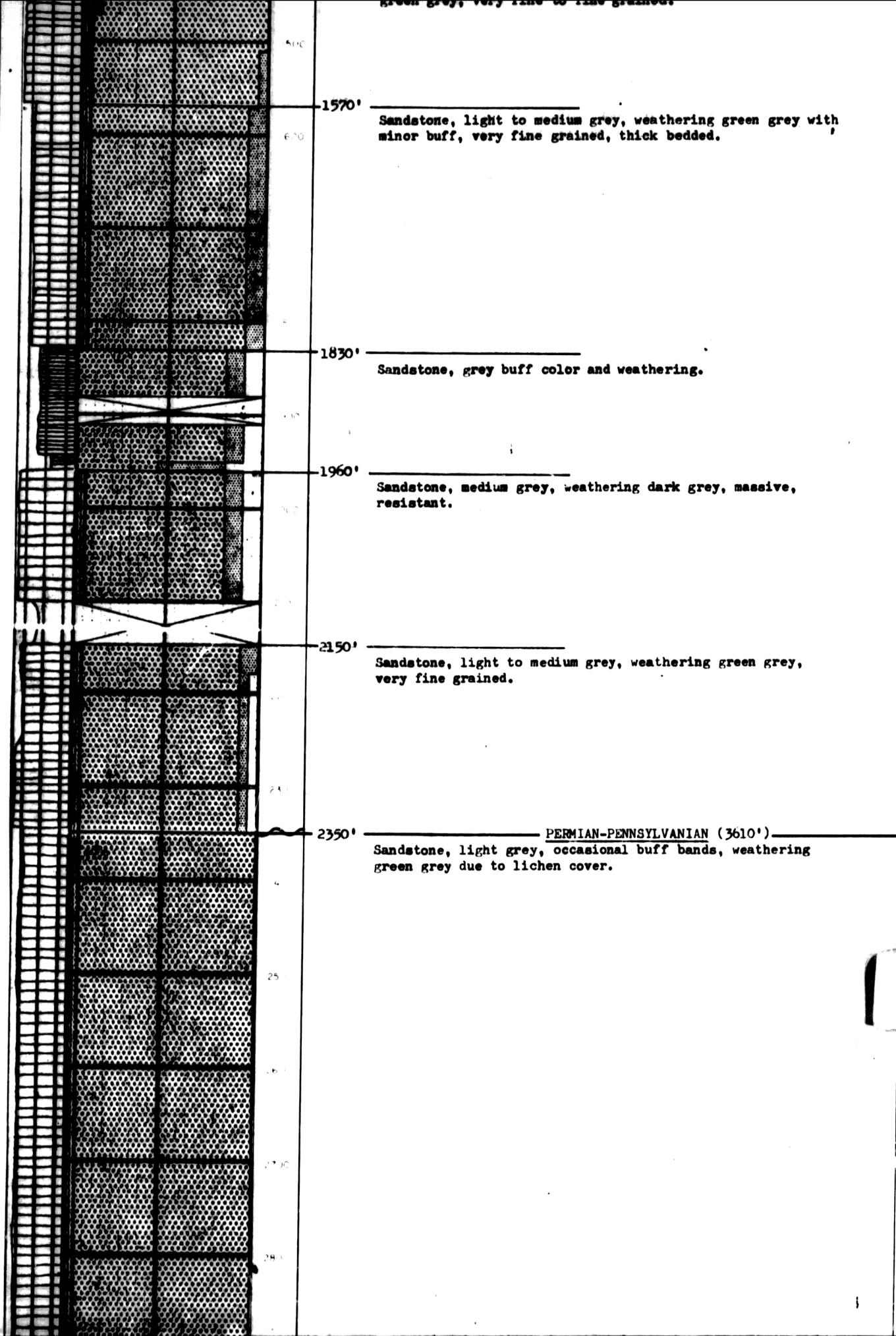
EXPLORATION DEPARTMENT

PEACE RIVER DISTRICT

Resistance	Lithopercantage	Footage	Description
			Measured with 5 foot staff and tape and brunton.
		0'	CRETACEOUS - JURASSIC (2350'+)
			Shale, dark grey, very silty, blocky.
			Shale, as above.
		100'	Siltstone, grey brown, weathering grey buff, argillaceous ferruginous, massive, jointed.
		140'	Scree in covered interval indicates mostly silty shale.

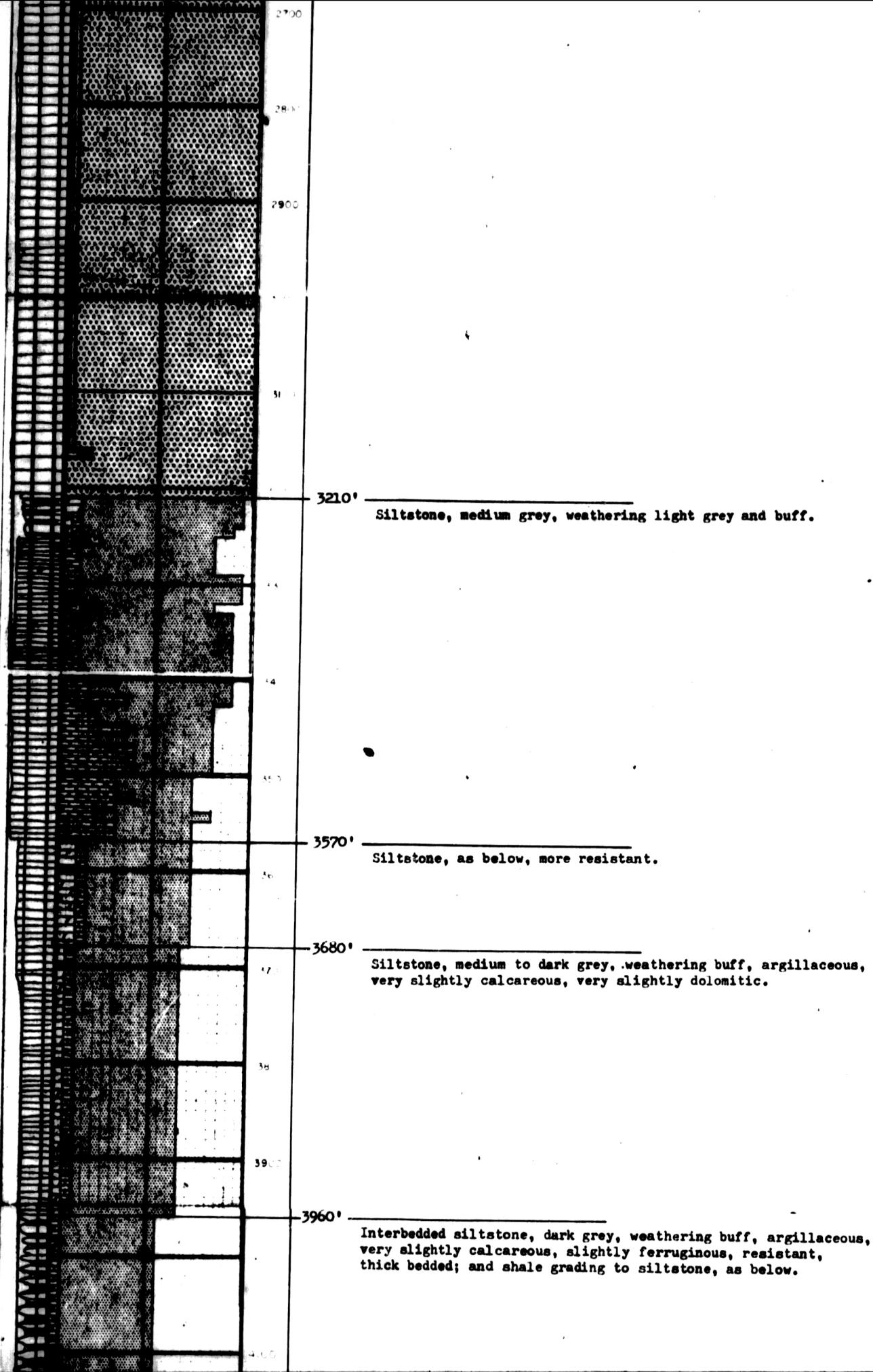


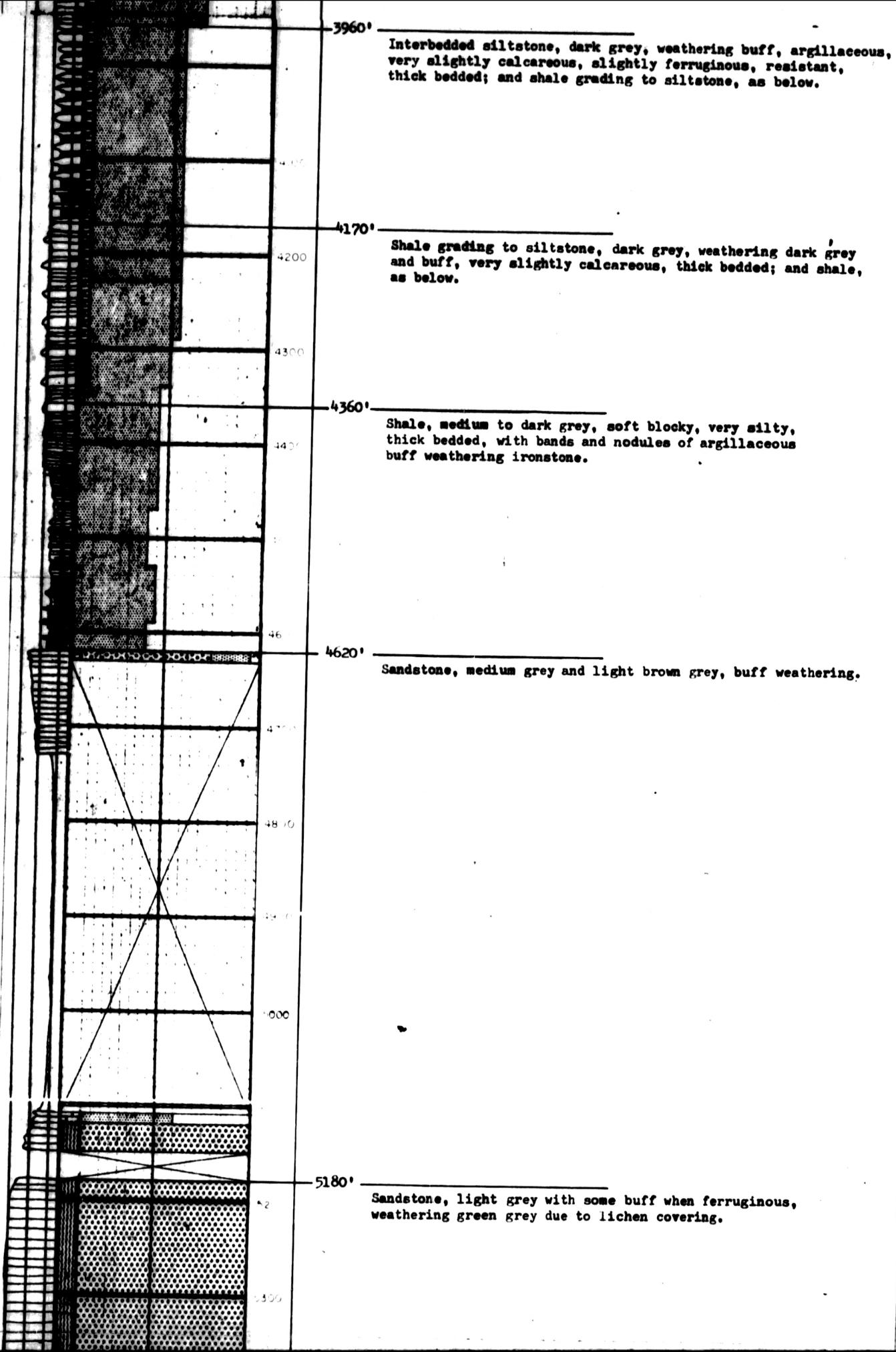
2 of



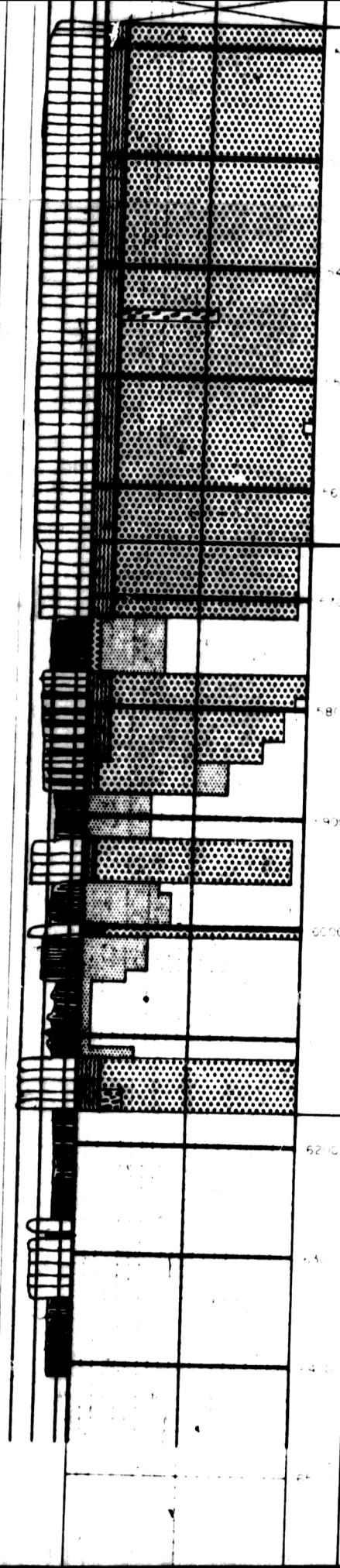
13 of

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5 of



5180'

Sandstone, light grey with some buff when ferruginous, weathering green grey due to lichen covering.

The lowermost few inches consist of a very angular grit in a predominantly siliceous matrix.

5650'

UPPER DEVONIAN (750'+)
Imperial Formation (750'+)

Thick intervals of resistant sandstone and low weathering shale. Sandstone, medium grey, weathering medium grey and grey buff.

Shale, dark grey, clean to very silty; blocky, thin platy and subfissile depending on silt content; minor interbeds of: Siltstone, dark grey, buff weathering, more resistant medium interbeds, slightly ferruginous in part, often laminated, argillaceous, tough.

6170'—End of Measurement

Section is underlain by another 400 to 500 feet of exposure which from a distance resembles the section above, consisting of dark grey, recessive weathering shale intervals with buff siltstone interbeds and thick zones of resistant, massive, grey buff sandstone or siltstone.

6 of 6

LITHOPERCENTAGE LOG OF OUTCROP SECTION

STATION NO.:

HEADWATERS STONY CREEK

LOCATION: LSD. SEC. TWP. RGE. W. M.
UNIT ZONE N.T.S.
106W.S.W. SEC.D-66 LAT 67°20' LONG. 135°45'

Description of location:

ELEVATION

MEASURED
METHOD

FORMATIONS

TO ACCOMPANY REPORT

Stratigraphy of the Richardson Mountains.

BY: Imperial Oil Limited

DATE: 1961

DESCRIBED

BY:

DATE: July, 1961

LEGEND



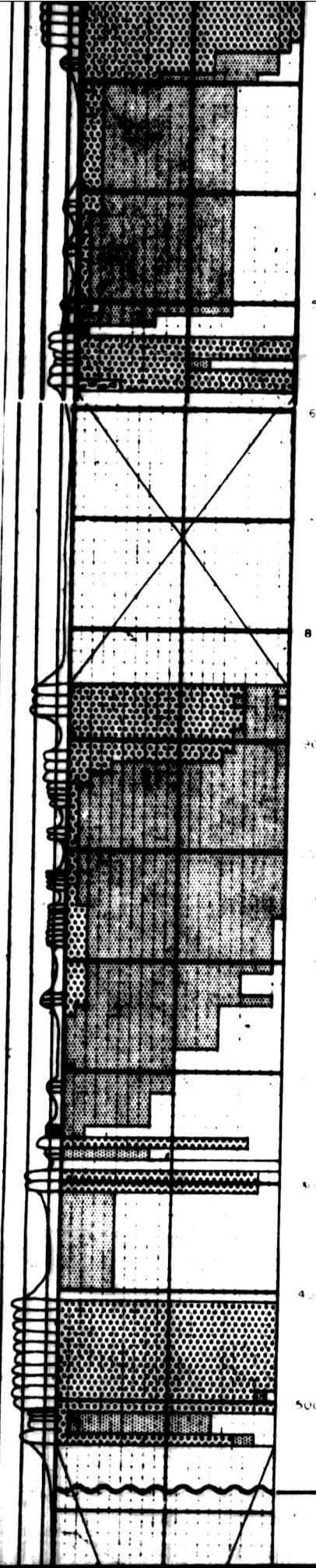
IMPERIAL OIL LIMITED

EXPLORATION DEPARTMENT

PEACE RIVER DISTRICT

Resistance	Lithopercantage	Footage	Description
Measured with Plane table, tape and compass and 5 foot stick.			
			<u>JURASSIC - CRETACOEUS (1580' +)</u>
		0	Shale, dark grey color, medium gray weathering, limonite stained.
		100	Sandstone, buff to light gray color, yellow buff weathering, iron oxide stained.
		200	Concealed.
		300	Sandstone, light gray color, buff to light gray weathering, resistant.
		400	Poorly exposed, probably mostly siltstone, medium to dark gray color, slightly sandy, very argillaceous, thin bedded.

resistant.



Poorly exposed, probably mostly siltstone, medium to dark gray color, slightly sandy, very argillaceous, thin bedded.

Sandstone, medium gray color, light to medium gray weathering, medium to thick bedded.

Concealed.

Sandstone, light gray brown color, gray buff weathering, silty, medium bedded.

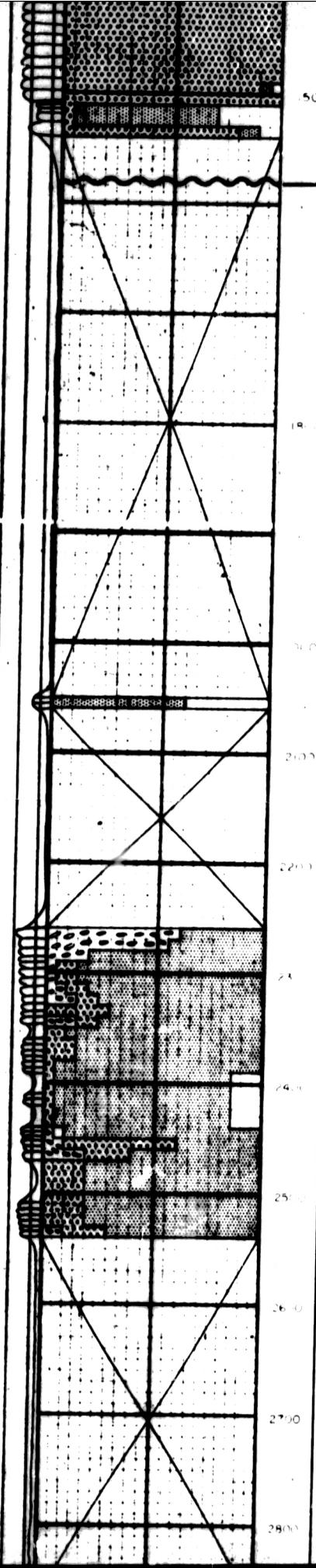
Siltstone, light brown gray color, brown gray weathering, slightly sandy, slightly argillaceous towards base, irregular thin bedding.

Very poorly exposed, probably predominantly Shale, subfissile, dark gray color, silty, very thin bedded, with basal Sandstone, buff color and weathering, slightly argillaceous, medium bedded.

Concealed, highly argillaceous lithology.

Sandstone, buff to medium gray color, gray buff weathering, Siltstone in part, argillaceous in part medium to thick bedded, resistant.

2 of



Siltstone in part, argillaceous in part medium to thick bedded, resistant.

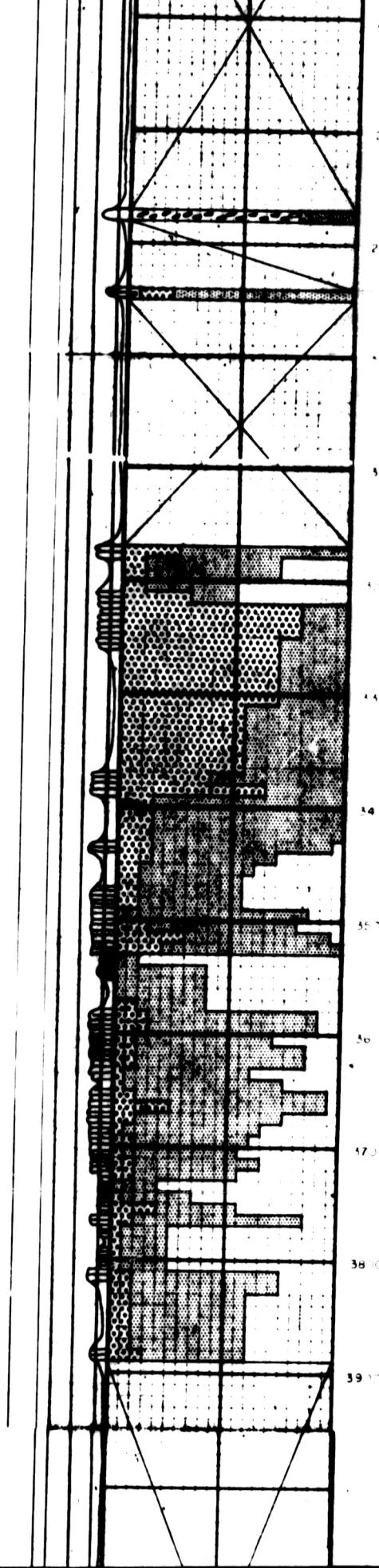
UPPER DEVONIAN (5560'+)
Imperial Formation (5560'+)

Concealed, probably predominantly siltstone.

Siltstone, medium gray color, buff weathering, slightly conglomeratic, slightly sandy, thin to medium bedded.

Concealed, probably siltstone and/or Shale.

3 of

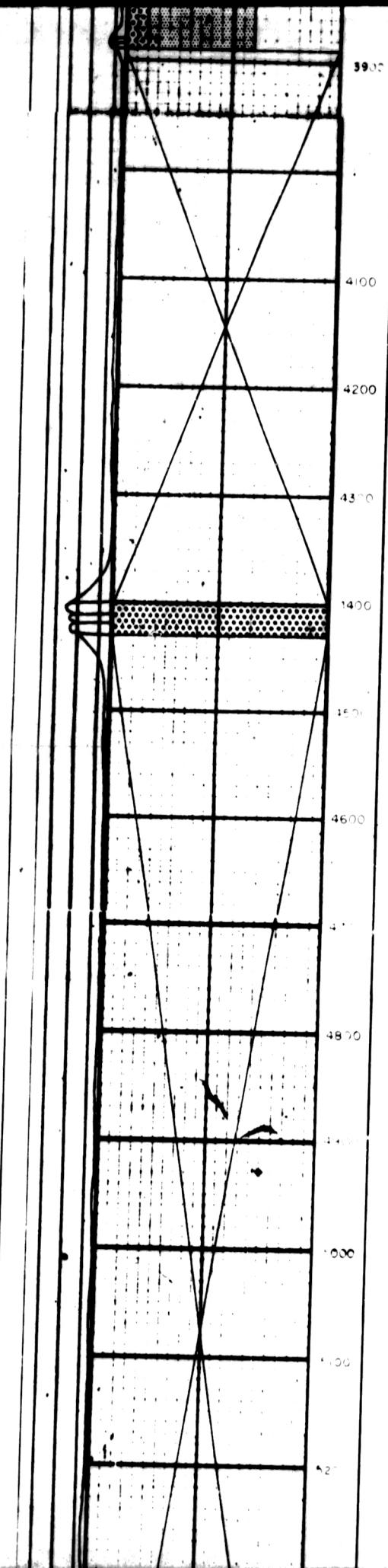


Sandstone, medium gray color, dark yellow buff weathering, silty, medium to thick bedded.

4 of

Siltstone, medium gray color, medium to dark gray weathering, slightly sandy, slightly argillaceous, medium bedded, interbedded with:
Shale, fissile to subfissile, dark gray color, medium grey weathering, slightly silty, laminated to very thin bedded.

Concealed, probably high argillaceous.

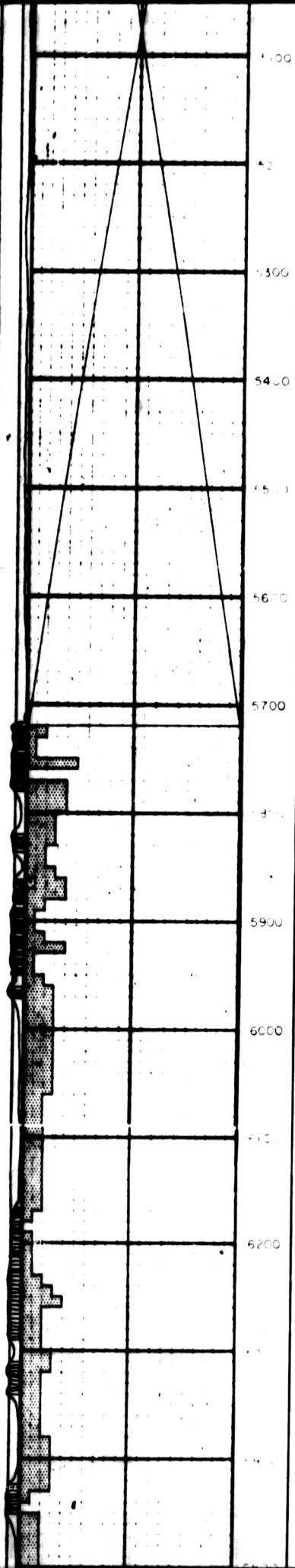


Concealed, probably high argillaceous.

Probably sandstone, medium to thick bedded, resistant.

Concealed, probably high argillaceous as below.

5 of

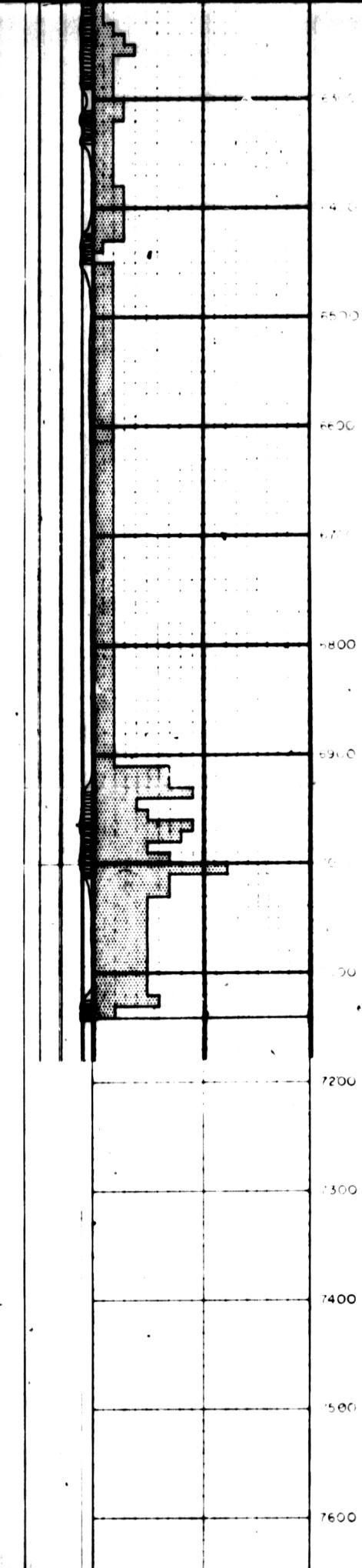


60

Shale, fissile to subfissile, dark gray color, medium gray weathering, trace silty, laminated, with minor interbeds of:

Siltstone, medium to dark gray color, dark yellow buff weathering, slightly argillaceous, medium bedded.

Shale, fissile to subfissile, dark gray color, medium gray weathering, trace silty, laminated, with minor interbeds of:
Siltstone, medium to dark gray color, dark yellow buff weathering, slightly argillaceous, medium bedded.



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LITHOPERCENTAGE LOG OF OUTCROP SECTION

STATION NO.

BUG CREEK SECTION

FORMATION

LOCATION: LSD. SEC. TWP. RGE. W. M.
UNIT ZONE N.T.S.
107B West/SW SEC. F-53 LAT 68°10' LONG. 135°15'

Description of location:

ELEVATION

MEASURED
METHOD

TO ACCOMPANY REPORT

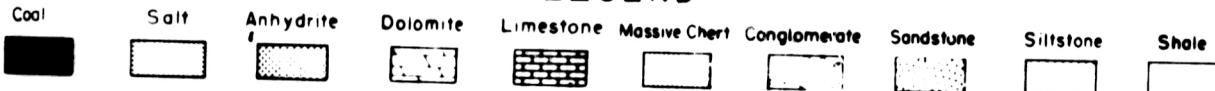
Stratigraphy of the Richardson Mountains area.

BY: Imperial Oil Limited
DATE: 1961

DESCRIBED

BY: DATE: June, 1961

LEGEND



IMPERIAL OIL LIMITED

EXPLORATION DEPARTMENT

PEACE RIVER DISTRICT

Resistance	Lithopercantage	Footage	Description
			Measured with 5 foot stick.
			Overlying beds concealed.
			<u>JURASSIC (350'+)</u>
			Sandstone, light brown grey, buff weathering, trace calcareous, slightly silty, very argillaceous in thin bands, laminated to thin bedded.
			<u>PERMO-PENN (500')</u>

Overlying beds concealed.

JURASSIC (350'+)

Sandstone, light brown grey, buff weathering, trace calcareous, slightly silty, very argillaceous in thin bands, laminated to thin bedded.

PERMO-PENN (500')

Conglomerate, chert pebble, argillaceous matrix, red color, maroon weathering.

Shale, subfissile, red brown color, maroon weathering, occasional chert pebble, trace sandy, slightly silty, very thin bedded. Poorly exposed.

CAMBRIAN (170'+)

Prominent angular unconformity noted between conglomerate and chert. Chert beds are gently undulating and are truncated at unconformity.

Chert, light gray, grey-buff weathering, thin to medium bedded, fractured.

Shale, black, dark gray weathering, slightly siliceous, laminated to very thin bedded, earthy, carbonaceous.

2 of 2

LITHOPERCENTAGE LOG OF OUTCROP SECTION

STATION NO.

HEADWATERS JOHNSON CREEK

FORMATIONS

LOCATION: LSD. SEC. TWP. RGE. W. M.
UNIT ZONE N.T.S.
117A East/SW SEC. 46 LAT 68°10' LONG. 137°30'

Description of location:

ELEVATION

MEASURED
METHOD

TO ACCOMPANY REPORT

Stratigraphy of the Richardson Mountains area.

BY: Imperial Oil Limited

DATE: 1961

DESCRIBED

BY:

DATE: July, 1961

LEGEND

Coal	Salt	Anhydrite	Dolomite	Limestone	Massive Chert	Conglomerate	Sandstone	Siltstone	Shale

IMPERIAL OIL LIMITED

EXPLORATION DEPARTMENT

PEACE RIVER DISTRICT

Resistance	Lithopercantage	Footage	Description
			All thicknesses estimated.
		0'	PERMO-PENN (100'+)
			Chert, light gray to gray buff weathering, thin bedded.
		100'	SILURIAN - CAMBRIAN (480'+)
		300	Limestone, buff weathering, slightly argillaceous, ver. thin bedded.
			Sandstone, slightly siliceous; with interbeds of: Shale, medium gray to buff weathering.
		400	

**LITHOPERCENTAGE LOG
OF OUTCROP SECTION
STATION NO.**

WEST FLANK RAINBOW MOUNTAINS

FORMATION

LOCATION: LSD. SEC. TWP. RGE. W. M.
UNIT ZONE N.T.S.
117A West/NE SEC 54 LAT 68°40' LONG. 138°15'

Description of location:

ELEVATION:

MEASURED:
METHOD:

TO ACCOMPANY REPORT

Stratigraphy of the Richardson Mountains area.

BY: Imperial Oil Limited

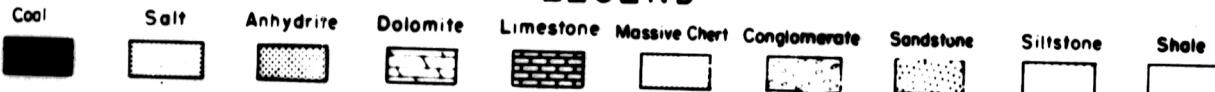
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BY:

DATE: July, 1961

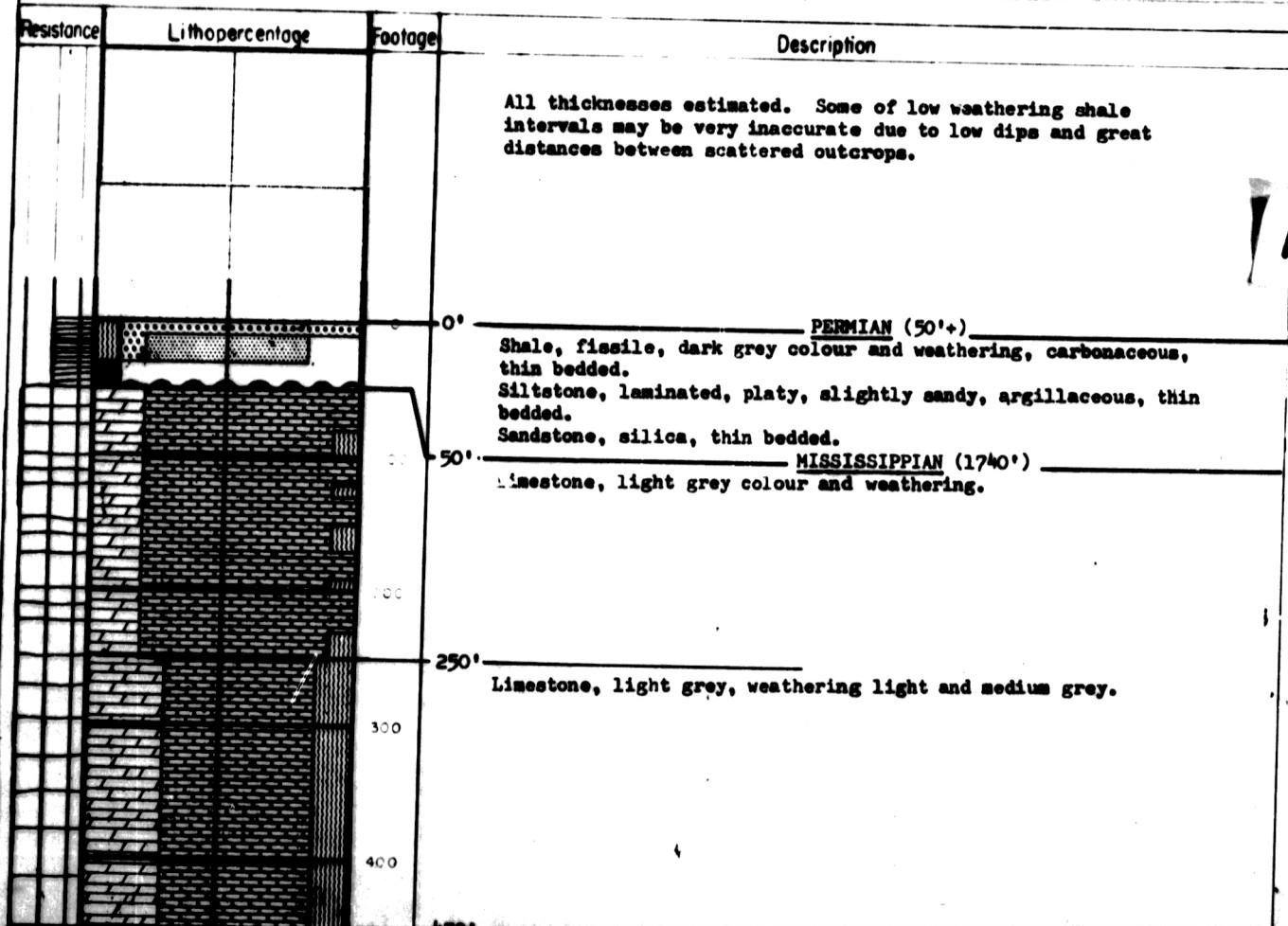
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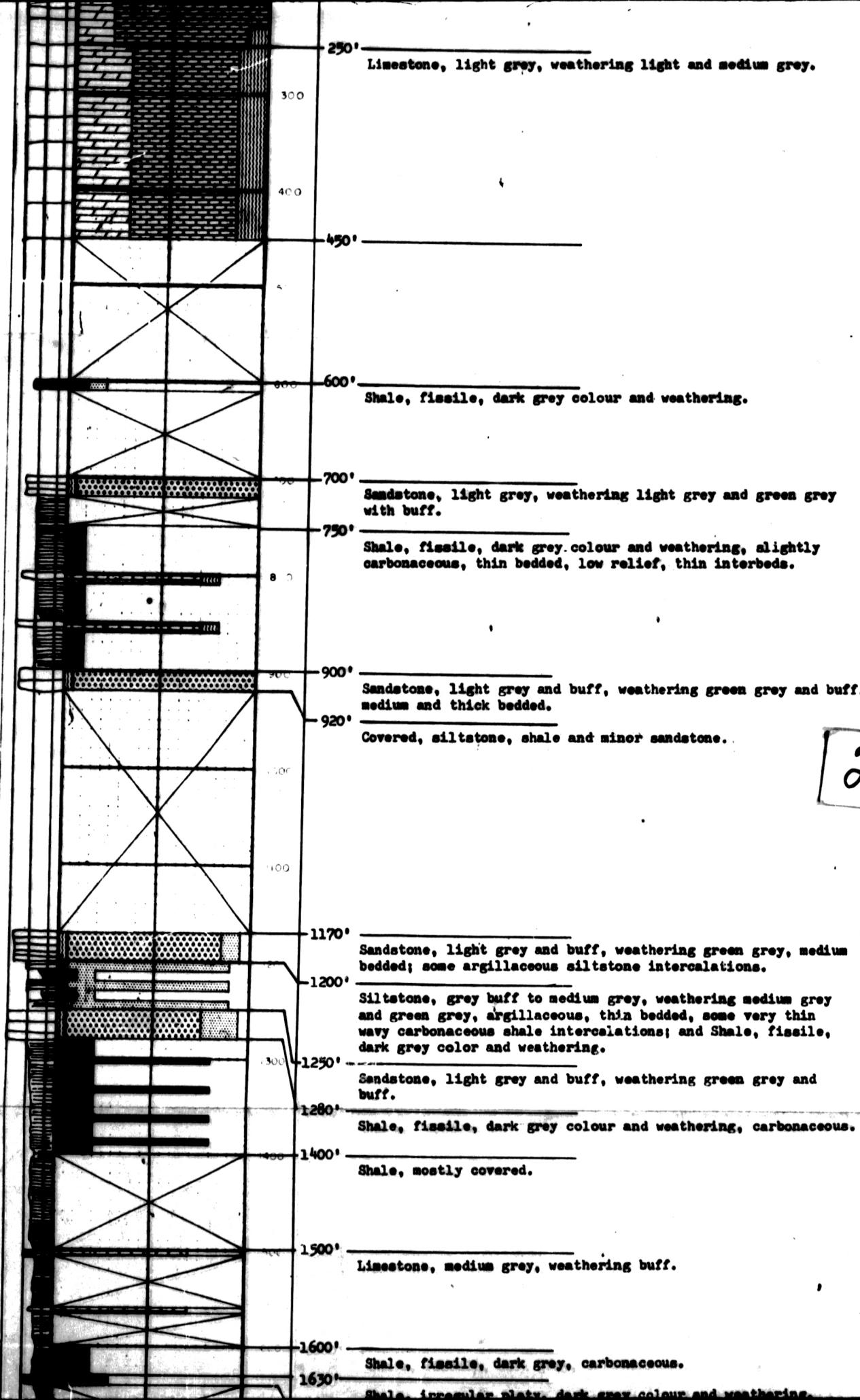


IMPERIAL OIL LIMITED

EXPLORATION DEPARTMENT

PEACE RIVER DISTRICT





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