

ALTAIR OIL & GAS CO.

CALGARY, ALTA.

THE PETROLEUM GEOLOGY

OF N.W.T. PERMITS

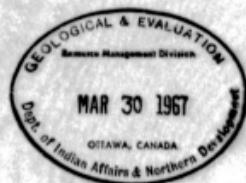
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4504, 4505,

HORN MOUNTAINS AREA

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THE PETROLEUM GEOLOGY

of

N. W. T. PERMITS NO. 4500 to 4505 Inclusive

HORN MOUNTAIN AREA

for

ALTAIR OIL & GAS CO.  
CALGARY, ALBERTA

by

GALLUP EXPLORATION AND SERVICES LTD.

TABLE OF CONTENTS

	<u>Page</u>
INDEX MAP	
INTRODUCTION	1
HISTORY OF EXPLORATION and ACCESS	2
GENERAL GEOLOGY	4
STRATIGRAPHY	7
STRUCTURE	10
CONCLUSIONS and RECOMMENDATIONS	11
 ENCLOSURES	
APPENDIX I	- PLATES NO. 1 to 21 Inclusive
APPENDIX II	- BIBLIOGRAPHY

FRONTISPICE



N. T. C. L. Tug "Marjory H" and tow at  
Bear Rock, Fort Norman is just above  
Bear Rock at the mouth of Bear River  
where the "Marjory H" will pick up  
further tow and take on fresh water.

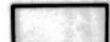
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**PERMIT AREA**



**MAPPING AREA**



FIG. NO. 1

This historical map highlights the Klondike Gold Rush route, which originated in the South and followed the Yukon River northward. Key locations marked along the route include Dawson, Fortymile, Whitehorse, Carcross, and Skagway. The map also shows the locations of early mining centers such as Fort Reliance, Fortymile, Fort Selkirk, Fort Verde, Fort Franklin, and Fort McPherson. The Northwest Territories are shown to the west, and the Yukon River is depicted flowing into the Arctic Ocean. The map is labeled 'YUKON' and 'NORTHWEST TERRITORIES'.

THE PETROLEUM GEOLOGY  
N. W. T. PERMITS NO. 4500 to 4505 INCLUSIVE  
HORN MOUNTAIN AREA

ALTAIR OIL & GAS CO.  
CALGARY, ALBERTA

The above Permits, comprising of 353,880 acres, lie on the North slope of the Horn Mountains at Lat. 62 deg. 30' N. Long. 120 deg. 45' W. Their regional location is shown on the Index Map, Fig. 1. This land was acquired for the purpose of exploring for petroleum in Paleozoic reefs.

Surface exploration was carried out in the summer of 1966 by the writer as follows; an airplane reconnaissance was made of the Permits and adjacent areas; on the basis of this, helicopter traverses were made along the West shore of Great Slave Lake from Slave Point to Windy Point, up the Horn River to Long. 119 deg. W, throughout the Horn Mountains and the Permits themselves, throughout the Ebbutt Hills and to the Franklin Mountains and up Willow River into Permit No. 4501. Following this stage, a boat traverse was made from Fort Providence to Fort Norman and up the Bear River to Mount St. Charles. The purpose of this traverse was to study Paleozoic facies changes. The entire operation afforded knowledge of the area immediately adjacent to the Permits, the Permits themselves and the region surrounding them. No outcrops were found within the Permit area.

## HISTORY OF EXPLORATION and ACCESS

The first white explorer to travel the West shore of Great Slave Lake and descent of the Mackenzie was Alexander Mackenzie in 1794. His was not a scientific exploration, but his journal does note oil seeps, burning coal beds and certain mountain ranges, and is often vague as to his whereabouts. He was travelling by canoe on a river over 1,000 miles long and in places 5 miles wide, with no maps. There was no way for him to identify topographic features in terms of our present knowledge. This journey opened the route to the fur trade and numerous other explorers associated with that trade left journals and maps on which were based our earliest understanding of the geography and, to some extent, the geology of the Mackenzie Valley. On their findings, was based the initial efforts of the Geological Survey of Canada and the discovery of the Norman Wells oil field. 1.

Subsidiary to the fur trade, was the development of a transportation system on the river; there are now thirteen diesel tugs serving the Mackenzie River posts and the Arctic Coast out of Hay River and Fort Smith. (Frontispiece).

During the Second World War, the Norman Wells field was fully exploited and is still producing 3,000 barrels per day from the Upper Devonian Kee Scarp Member of the Fort Creek formation.

During the past five decades, there has been a continuing increase in the overall exploration picture. Numerous wells have been drilled in the region of the Permits, most of them shallow structure test holes.

Access to the region and the Permits themselves is by the Mackenzie Highway via Peace River, the P. G. E. Railroad via Fort St. John to Hay River, the head of navigation for the Mackenzie. The region is also well served by scheduled airlines to Hay River, Fort Simpson and Norman Wells. There are also subsidiary feeder lines. All types of charter aircraft are available.

The Mackenzie Highway, which goes to Yellowknife via Fort Providence, runs about 150 miles East of the Permits. The old Imperial Oil road to Norman Wells (now somewhat overgrown) goes through Permit No. 4503. This latter connects with the Mackenzie Highway - water use only - at Fort Providence; it also provides winter access to Fort Simpson. The telephone line to Inuvik along which there is winter access, lies about 50 miles West of the Permits. The Permits themselves are largely covered by muskeg, but the forest cover is generally not heavy. The numerous lakes provide landing possibilities for float and ski-equipped airplanes. There is some access provided by drilling roads and seismic lines developed immediately adjacent to the Southeast corner of the Permits connecting with roads at Fort Providence; this too, is winter access.

Equipment may be transported to Fort Providence by barge or truck. It is about 100 miles, airline, from Fort Providence to the Permits.

The terrain of the Permits is shown in the photomosaic, Fig. 2, and in Plates No. 1 and 2.

## GENERAL GEOLOGY

The geologic column of the Permit area is shown on the Geologic Map, Fig. 3 and the Geologic Cross-Sections, Figs. 4 and 5. The formations involved in the section and their various facies will be discussed in detail under "Stratigraphy." With reference to the Geologic Map, Fig. 3, it will be noted that the Permit area itself, as well as the entire region, displays a series of broad gentle anticlines and synclines which express themselves as gently dipping plateaus or cuestas. South of the Mackenzie, the Upper Paleozoic Hay River and Wabamun formations dip southward to form the Paleozoic escarpment which is continuous from Hay River on the East to West of the Liard River, Plates No. 3 and 4. This South dip and facies change both serve to introduce and bring the soft Fort Simpson shale to surface. The Mackenzie River flows along this outcrop of the Fort Simpson shale from about the vicinity of Long. 119 deg., where the facies begins to develop, to Camsell Bend. At Camsell Bend, the river makes a right angle turn to follow a northerly course nearly down to Fort Norman. Throughout this reach of nearly 180 miles, the river bed is still mostly in a Fort Simpson shale down-fold between the parallel Mackenzie Mountains on the West and the Franklin Mountains on the East. The Paleozoics of the massive Mackenzie range are far back from the river. The Franklin Mountains lie close to the right bank and, in fact, the vicinity of Wrigley, Devonian Ramparts formation, form both banks.

The Franklin Mountains constitute the only fold belt within the map area, Fig. 3, Plates 5 and 6, but it may also be that the Ebutt Hills are a function of the South plunge of that anticlinorium.

It will be noted that we have interpreted the younger beds of the Horn Mountains as appearing there as a function of structure as well as elevation. This synclinal interpretation is developed from the occurrence of what certainly appear as dip slopes, Plates 7 and 8, as well as the development of scarps all around the Plateau. There is also the juxtaposition of sediments of different ages as shown on the Geologic Map. There is no real evidence that the plateau has any fault scarps. However, in the construction of a North-South section, the presence of normal faults appears most probable, particularly since they most certainly seem to occur in subsurface further South. This interpretation is used in Section A-A', Fig. 4. Where the South side of the Horn Plateau is presented as a fault scarp, the throw of this fault is not great and it certainly does not appear to extend as far East as the West shore of Great Slave Lake, where the almost continuous Devonian bluffs show no evidence of dislocation. It is however, notable that Laferte Creek at Lat. 61 deg. 50' between Long. 117 deg. 45' and Long. 119 deg. does run parallel to the escarpment in an unusually straight line and occupies a position in plan and strike that would be expected of such a fault were it present; there seems no other reason why Laferte Creek should not flow directly South to the Mackenzie River. Such a fault could also extend as far West as Camsell Bend.

Horn River and Willow Lake River, Plate No. 8, in the vicinity of Lat. 62 deg. 30', also display a similar lineation and occasional angularity of course, possibly due to a like fault control. This is brought up here to point up the possibility of fault traps in the Permit area.

Along the West shore of Great Slave Lake from Slave Point to Lonely Bay, there is a low line of bluffs, Plates No. 10, 11, 12 and 13. This is the locale of the famous seeps at Windy Point. The sequence here (downwards) is Slave Point, Presqui'le, Lonely Bay and Pine Point. Beyond Lonely Bay, lies the Chinchaga formation to Mirage Point and beyond that the Ordo ?-Silurian sequence onlapping the Shield. These older beds appear as beach rubble detritus and scattered outcrops inland. The Slave Point-Lonely Bay traverses, including nearby outcrops inland, display a bewildering interfingering of facies and lithologies. The Lonely Bay Member, for example, occurs as an argillaceous tongue on Lonely Bay between Slave Point and Pine Point outcrop next to a Presqui'le outcrop, Fig. 3. These facies and formation changes are presented almost diagrammatically in the Cross-Section A-A'.

Overlying the Windy Point carbonate complex is the Horn River formation, Plates No. 14 and 15, the Lower part of which may be a facies of the Slave Point formation. Near Fawn Lake (at Lat. 62 deg. 10', Long. 117 deg. 40'), there is a small klint displaying reefal limestone.<sup>2</sup> This reef occurs at the contact of the Horn River formation and the overlying Fort Simpson formation, it may be a Slave Point build-up.

Overlying the Horn River formation, and the Horn Plateau formation, are the shales of the Fort Simpson formation which form much of the lowland around the Horn Mountains, and other highlands and occupy much of the Mackenzie Valley.

The Cretaceous of the map area seems to be confined to the Horn Mountains and possibly two other highlands as shown on the Geologic Map. However, a traverse up Willow Lake River showed the banks of that stream to be a fairly continuous exposure of Fort Simpson and possibly the younger Imperial shale up to Long. 141 deg. 45'. Above this point, the banks are low and sandy and display little boulder till. It is possible that this material is residual Cretaceous and thus shale of that age may occur over much of the Permit area rather than being restricted to the southern portion. It may be, however, that this sand is simply derived from the Horn Mountains or even roughly lineates the former extent of that plateau.

Banks of streams in the region show surprisingly little overburden on the bedrock, although how much glacial material there is over the Permits can not be estimated as the streams there are not sufficiently incised to expose the bedrock. We believe it will be found to be moderate.

#### STRATIGRAPHY

CAMBRIAN - not known in the map area.

ORDO?-SILURIAN - Ronning Group - Plates 16 and 17. Well bedded silts and dolomites. This group, with respect to petroleum exploration, overlies Pre-Cambrian, but may not occur even as far East as midway on Horn Mountain 300 feet  $\pm$  is exposed at Bear Rock.

SILURIAN (and MIDDLE DEVONIAN) Bear Rock Formation (Niagran) Plates 16, 18 and 19 consists of evaporites overlain by brecciated dolomites having a reefoid appearance. Equivalent to Silurian reefs of the Arctic and the Niagra escarpment. Occasionally petrolierous at top at Bear Rock. The upper part is more crystalline and may be Middle Devonian. The Bear Rock formation was originally confined to the anhydrites and breccias at Bear Rock, but has been redefined to include overlying crystalline and somewhat crystalline dolomites which include some Middle Devonian. We have not mapped this in the map area of this report, nor included the Middle Devonian in the formation in Cross-sections, but have, for convenience and to segregate it from the Windy Point sequence, correlated it with the Mirage Point.

MIDDLE DEVONIAN - (Pine Point Formation) Plates 12 and 16.  
 Limestone, grey, argillaceous. Overlies the evaporitic Chinchaga formation which is 50 - 100 feet thick in the map area and is gradational with it. The Pine Point and the Chinchaga are important in that, to a varying degree, they encase the Presqui'le Reef. It may even be demonstrated at some future date, that the three formations are in a sense contemporaneous in that the reef, the argillaceous shale and the evaporites (Chinchaga) have a common tectonic environment.

PRESQUI'LE FORMATION - Dolomite, fragmental, reefoid. Yields oil and sulphur water at Windy Point - Plate No. 12 - and on Horn River near Fawn Lake. It apparently overlies the Pine Point formation and the Lonely Bay Member of that formation, but may in part be a facies of those lithologies. West and Southwest of Windy Point, the Presqui'le becomes evaporitic in subsurface and loses its porosity accordingly. Westward and northwestward, it becomes the Ramparts formation. The Presqui'le is probably up to 150 feet thick.

RAMPARTS FORMATION - mainly limestones with some shaly beds, in the middle part it is slightly porous and usually in part petroliferous along the Mackenzie Valley. Plates 20 and 21. At the type outcrop - Plate 20 - it is somewhat cavernous, a phenomenon apparently due to solution by meteoric waters in porous strata. At Bear Rock (Frontispiece and Figs. 16 and 21) and in the vicinity of Fort Wrigley, it is petroliferous.

Thickness is 300 feet + at Bear Rock and is probably of a similar thickness in the Permit area where it may contain Presqui'le masses in reefoid build-ups.

UPPER DEVONIAN (Frontispiece) - Slave Point Formation - Plates No. 10, 11 and 16. Limestone, somewhat shaly, porous and petroliferous. Its intimacy with the Presqui'le at Windy Point suggests that the lower part may be Middle Devonian. At Bear Rock, the dip slope near water line is Slave Point lying on Ramparts. No full section occurs within the map area, but thickness from well sections and by interpolation appears to be from 100 feet to 200 feet.

HORN RIVER SHALE - black fissile shale, overlies the Slave Point-Presqui'le formations near Windy Point. The lower part tends towards a carbonate and may be somewhat equivalent to those two formations. The upper part, that is the upper part of the outcrops along Horn River, is probably equivalent to the Fort Creek formation which encases the Kee Scarp Member. The exposed section on Horn River is 100 feet. In subsurface, it is probably about 150 feet. (Fig. 5).

HORN PLATEAU FORMATION - a yellowish buff reef displaying depositional dips. It occurs in outcrop near Fawn Lake where about 30 feet of reef, actually an eroded klint, is exposed. On Horn River, just above Fawn Lake, there are sulphurous springs which may emanate from this reef, but more probably rise from the Slave Point or Presqui'le.

The Horn Plateau formation occurs near the Horn River-Fort Simpson contact. This sequence is comparable to the Lower Fort Creek-Kee Scarp-Fort Creek sequence further North. By this comparison, the Horn Plateau reef belongs to the same tectonic environment as the Kee Scarp, and larger developments can thus be expected to the Northwest.

FORT SIMPSON FORMATION (Simpson Shale) - a black fissile shale about 700 feet thick, occurs and occupies much of the Mackenzie River bed and banks. Higher points such as the Ebbutt Hills and the North side of the Willow Lake River may contain younger beds but the plain around the Western portion of the Horn Mountains is underlain by this formation. It is the important cover rock.

IMPERIAL FORMATION - not identified in the area except that it may occur in some of the higher areas as described above.

HAY RIVER and WABAMUN FORMATIONS - these are carbonates occurring South of the Mackenzie River only. North of the river, they become the shale facies - Simpson and Imperial Shale.

CRETACEOUS - Fort St. John Group - shale and sandstone occurs in Horn Mountain escarpment and on the plain to the North and possibly in other highlands - Fig. 3. Where present, provides excellent additional cover or cap rock. Forms dip slopes in Horn Mountains. Plate No. 7.

TERTIARY-QUATERNARY - here identified as the Beaufort formation of the Arctic region. Composed of unconsolidated sands and gravels. Forms the high rolling "peaks" of the Horn Mountains. Plate No. 8.

The Pine Point (with the Lonely Bay tongue-Presqui'le-Slave Point sequence, because of their intimate association, that is their occurrence at the same elevation in the Windy Bay region, appear to some extent to be facies relationships and not entirely a vertical geologic column. In making this statement, we are not losing sight of the regional Southwest dip.

However, further evidence of rather rapid facies changes is demonstrated in subsurface by wells off to the West and Southwest and by the development of the Ramparts lithology to the Northwest. This same phenomenon apparently applies to Horn Plateau-Kee Scarp relationship. While these two lithologies are not necessarily exact equivalents, they occur in similar position in the section and occur through similar tectonic events or environments. The Horn Plateau should perhaps be designated as a member as is the Kee Scarp, rather than a formation. At any rate, the Horn Plateau may be expected to develop northwestward toward the Kee Scarp on Mackenzie River.

The Slave Point is porous, petroliferous, widespread and occurs in the Franklin Mountains, including Bear Rock, in gradational contact with the underlying Ramparts as it does at Windy Point with respect to the Presqui'lle.

The Bear Rock or Mirage Point formation is brecciated fragmental and somewhat cavernous. Occasional specimens emitting a faint petroleum odor may be found.

#### STRUCTURE

The regional structure is displayed in Figs. 2, 3, 4 and 5. From these illustrations, it may be seen that the Permits occupy a position on a regional monocline dipping Southwest. Information regarding local structures is sparse. The Ebbut Hills and the Horn Mountains are apparently due to the axial position of a broad cyncline striking West-East. On Horn River - Plate No. 15 - there is a slight flexure probably indicative of what might happen elsewhere. This may also be draping over a Horn Plateau reef due to differential compaction.

On the lower part of Willow Lake River, the Horn River shale is phyllitic, the metamorphism being due to compression by tectonic forces. No bedding survives, so that structure can not be determined but such structure as occurs will be associated with the Franklin Mountains and the fault on their East flank, Fig. 5, Section B-B'.

It is quite probable that structures within the Permit area will be associated with Horn Plateau reef and possibly Presqui'ille. Any tectonic features will most probably be found in the Western Permits.

#### CONCLUSIONS and RECOMMENDATIONS

The Altair Oil & Gas Company N. W. T. Permits No. 4500 to 4505 Inclusive, are in a readily accessible area. They afford an excellent opportunity to prospect for reservoirs in the Horn Plateau reef (or Ramparts formation), the Presqui'ille reef and the Bear Rock breccias at depths not exceeding 1,500 feet, 2,000 feet and 2,500 feet respectively. These horizons are listed in what we consider order of attractiveness. If the Ramparts facies is developed, then a tectonic structure must be sought. The same applies to Bear Rock prospecting. However, the problem must be approached in the manner of seeking out a bioherm. This, of course, implies geophysics. We recommend a fracture analysis study as a guide to subsequent locally concentrated seismic surveying. The search is for bioherms or biostromes, Presqui'ille, Horn Plateau, Ramparts, and Kee Scarp known to occur in the region and known to be petroliferous throughout and highly productive in one instance - Norman Wells.

It is also a certainty that oil seeps, Carcajou Ridge, Rond Lake and Carnwath River, to name three - there are others - must arise from this sequence. The Windy Point seeps occur right in the Presqui'lle outcrop. Thus, the property affords most attractive prospecting at shallow depth.

It is probable that the most northerly and northwesterly portions of the acreage are most attractive. This is away from the known evaporitic facies in the Presqui'lle and Bear Rock in wells along the Mackenzie and towards the petroliferous carbonates on the Mackenzie Mountains. Seismic surveying should be directed accordingly.

Respectfully submitted,

GALLUP EXPLORATION AND SERVICES LTD.

W. B. Gallup

W. B. Gallup, P. Geol.

APPENDIX I

PLATES NO. 1 to 21



PLATE NO. 1 - Looking Southwest across  
Permit No. 4503. Timber is sparse  
and small. Fire is from lightning  
strike.



PLATE NO. 2 - Looking South across  
Willow River in Permit No. 4504.  
Horn Mountains on left; Ebbut Hills  
on right.



PLATE NO. 1 - Looking Southwest across  
Permit No. 4503. Timber is sparse  
and small. Fire is from lightning  
strike.



PLATE NO. 2 - Looking South across  
Willow River in Permit No. 4504.  
Horn Mountains on left; Ebbut Hills  
on right.



PLATE NO. 3 - Alexander Falls (109 feet)  
at Hay River formation escarpment  
on Hay River.



PLATE NO. 4 - Whittaker Falls (47 feet)  
in Coraline Upper Devonian carbonates  
on Trout River - South of Mackenzie  
River.



PLATE NO. 3 - Alexander Falls (109 feet)  
at Hay River formation escarpment  
on Hay River.



PLATE NO. 4 - Whittaker Falls (47 feet)  
in Coralline Upper Devonian carbonates  
on Trout River - South of Mackenzie  
River.



PLATE NO. 5 - View of Southern portion  
of Franklin Mountains.

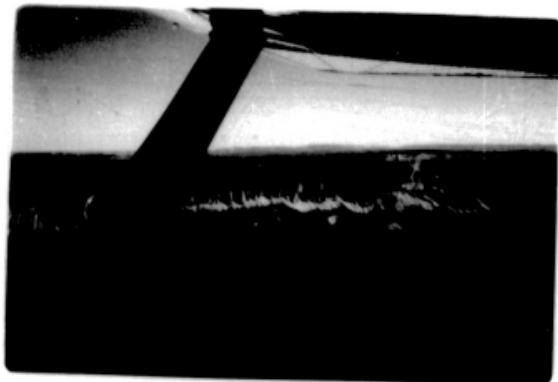


PLATE NO. 6 - Franklin Mountains at  
Norman Wells.



PLATE NO. 5 - View of Southern portion  
of Franklin Mountains.

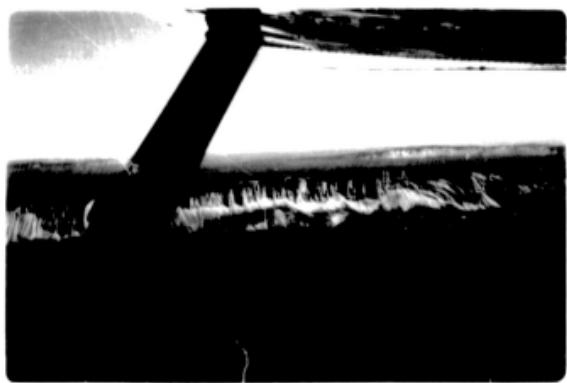


PLATE NO. 6 - Franklin Mountains at  
Norman Wells.



PLATE NO. 7 - Horn Mountains viewed from Northeast. Note dip slope on right. Synclinal axis appears to be above Central Lake.



PLATE NO. 8 - Tertiary-Quaternary? Hills on top of Horn Mountains.



PLATE NO. 7 - Horn Mountains viewed from Northeast. Note dip slope on right. Synclinal axis appears to be above Central Lake.



PLATE NO. 8 - Tertiary-Quaternary 2 Hills on top of Horn Mountains.



PLATE NO. 9 - Willow Lake River in  
Permit No. 4502 - view shows nature  
of remarkable East-West stretches and  
subdued topography. Possibly Lower  
Cretaceous plain, but probably Upper  
Fort Simpson or Imperial formation.

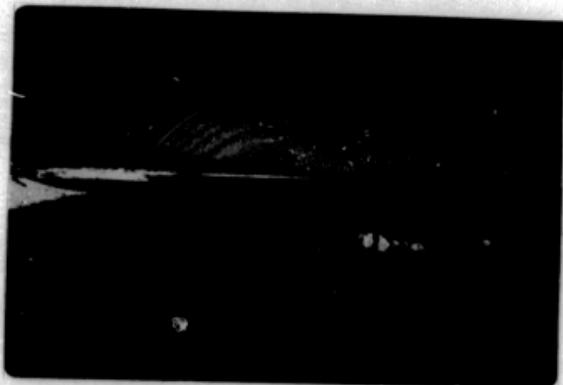


PLATE NO. 10 - Slave Point beach near  
Windy Point.



PLATE NO. 9 - Willow Lake River in  
Permit No. 4502 - view shows nature  
of remarkable east-West stretches and  
subdued topography. Possibly Lower  
Cretaceous plain, but probably Upper  
Fort Simpson or Imperial formation.



PLATE NO. 10 - Slave Point beach near  
Windy Point.



PLATE NO. 11 - Petroliferous Slave Point-  
Presqui'ille ? cliffs near Windy Point.



PLATE NO. 12 - Presqui'ille, light buff, over-  
lying Pine Point. (Lonely Bay Member),  
dark grey, at Lonely Bay.



PLATE NO. 11 - Petroiferous Slave Point-  
Presquille Member near Windy Point.

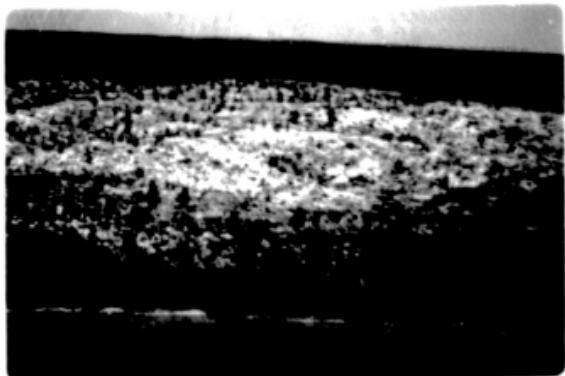


PLATE NO. 12 - Presquille, light buff, over-  
lying Pine Point (Lonely Bay Member),  
dark grey, at Lonely Bay.

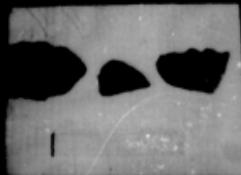


PLATE NO. 13 - Specimens of Presqu'ile  
formation from Windy Point showing oil  
filledvugs.



PLATE NO. 14 - Horn River shales on Horn  
River - type locality.



PLATE NO. 13 - Specimens of Presqui'II formation from Windy Point showing oil-filled vugs.

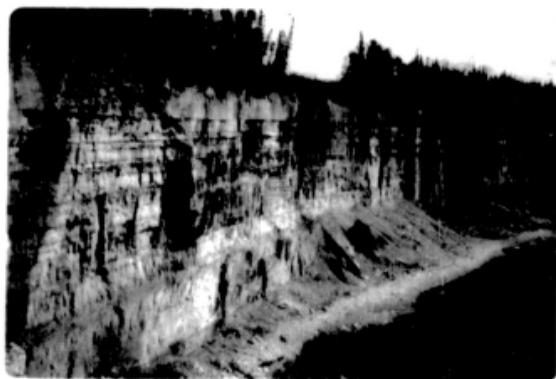


PLATE NO. 14 - Horn River shales on Horn River - type locality.



PLATE NO. 15 - West flank of flexure in  
Horn River shales just below Horse  
Shoe Rapids on Horn River.



PLATE NO. 16 - Bear Rock viewed from South.  
Slave Point and Ramparts dark beds on dip  
slope at left overlying Bear Rock. White  
beds centre to right are Ronning group.  
(back reef facies?)



PLATE NO. 15 - West flank of flexure in  
Horn River shales just below Horse  
Shoe Rapids on Linen River.



PLATE NO. 16 - Bear Rock viewed from South  
Silver Point and Raumperts dark beds on up-  
slope at left overlying Bear Rock. White  
beds (centre to right) are Ronning group  
(back reef facies?).

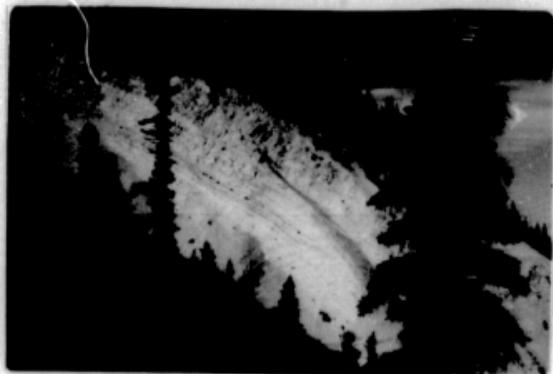


PLATE NO. 17 - Ronning Group, silty dolomites and dolomites at Bear Rock.

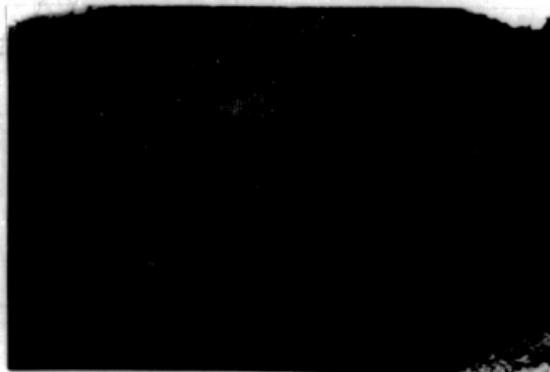


PLATE NO. 18 - Circular timber groups are in Bear Rock evaporite masses, probably in such masses due to compressive stresses; they are actually reddish. Bear Rock carbonate breccias overlying.

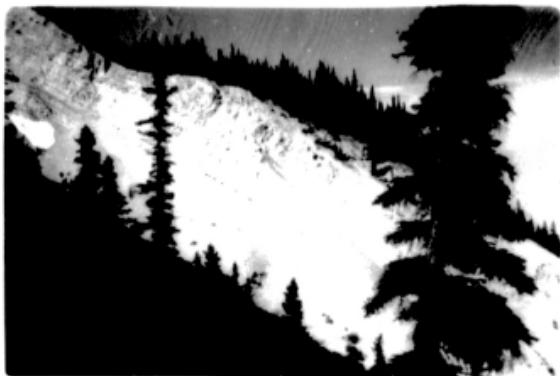


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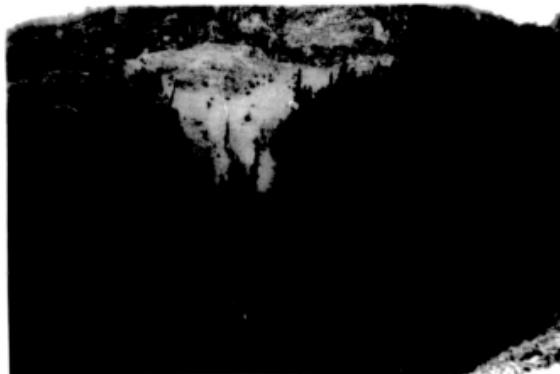


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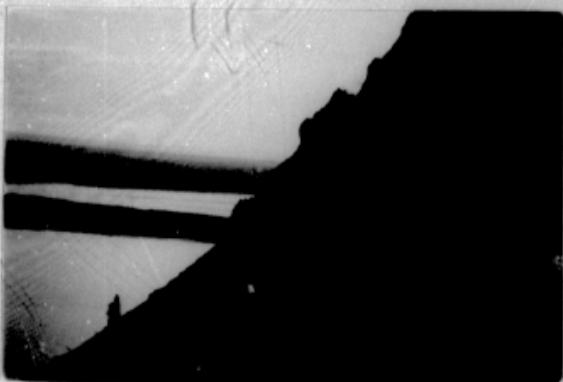


PLATE NO. 19 - Bear Rock (Niagran)  
brecciated carbonates.



PLATE NO. 20 - Ramparts formation at  
type locality.



PLATE NO. 19 - Bear Rock (Niagran)  
brecciated carbonates.



PLATE NO. 20 - Ramparts formation at  
type locality.



PLATE NO. 21 - Slave Point dip slope and  
Slave Point in foreground. Lighter beds  
in lower right hand corner are at gradational  
contact with Ramparts formation.

NOTE : All above photographs were taken by  
the Author during the field season of  
1965 and 1966.



PLATE NO. 21 - Slave Point dip slope and  
Slave Point in foreground. Lighter beds  
in lower right hand corner are of gradational  
contact with Ramparts formation.

NOTE: All above photographs were taken by  
the Author during the field season of  
1965 and 1966.

APPENDIX II

BIBLIOGRAPHY

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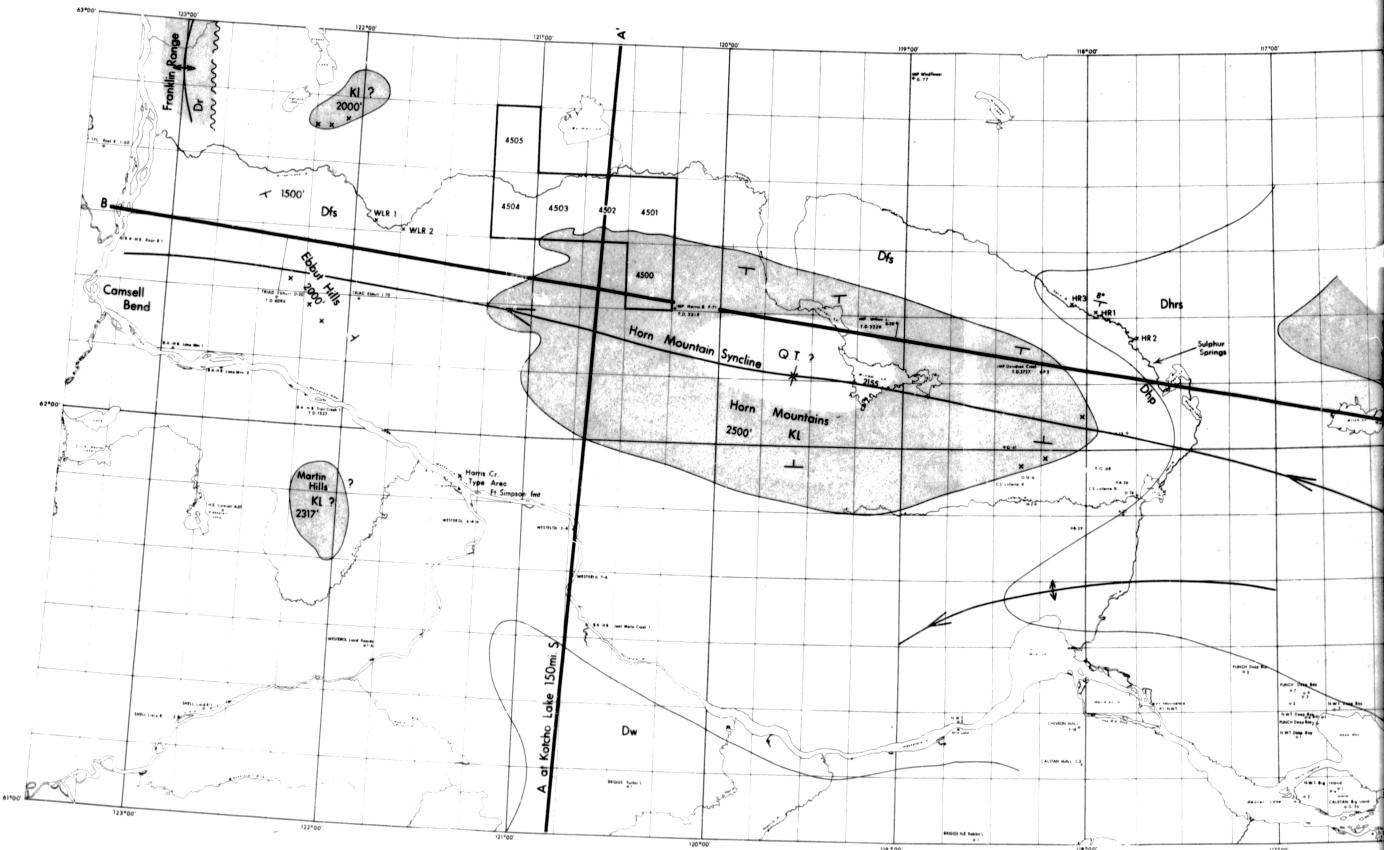
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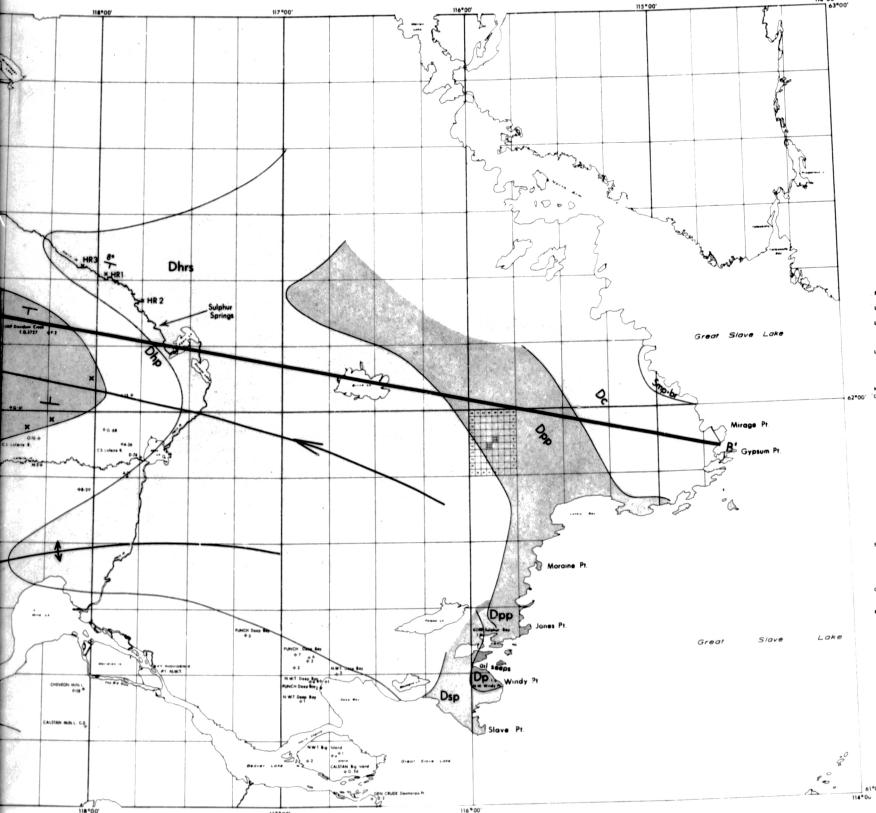
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CONSULTANT





272

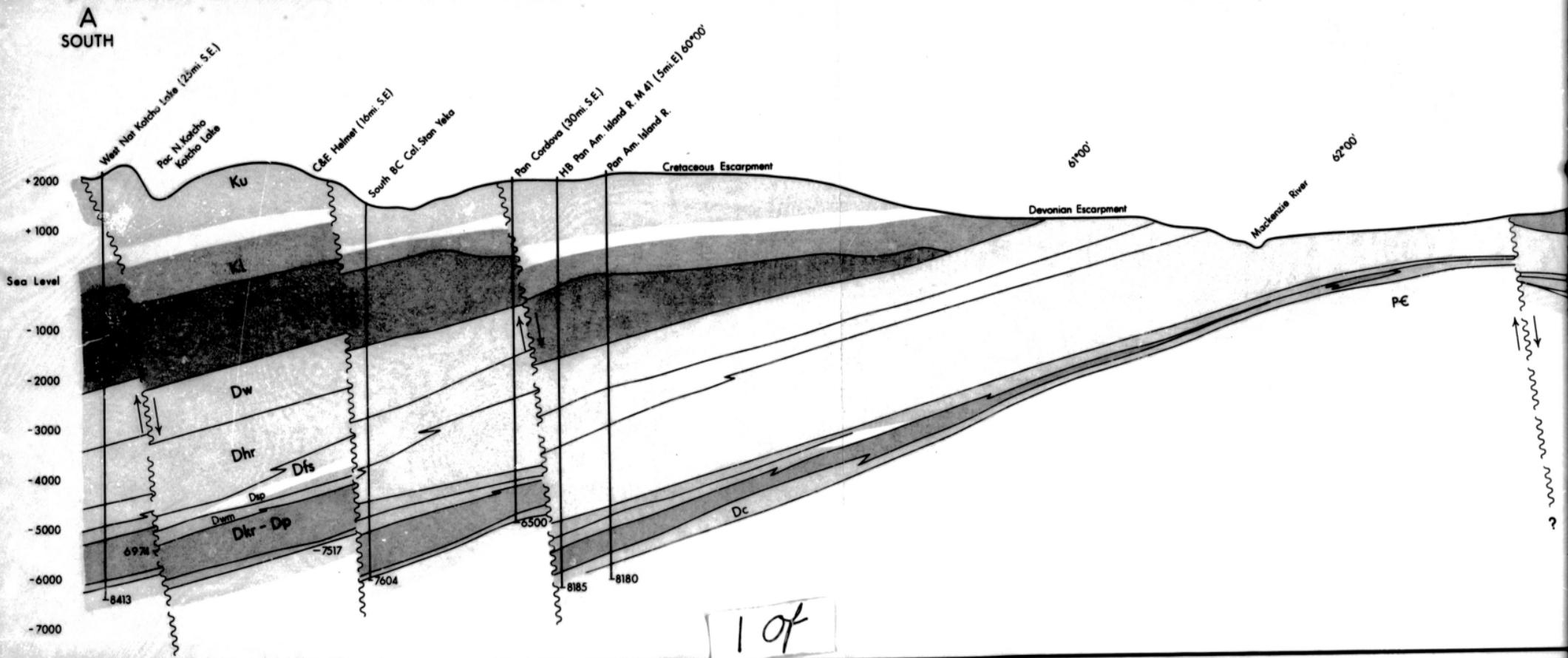
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**GEOLOGIC MAP  
PERMITS 4500-4505 INCL.  
HORN MTS. AREA  
NORTHWEST TERRITORIES**

FIGURE 3

GALLUP EXPLORATION and SERVICES LTD.  
CALGARY ALBERTA  
SEPT 1966

PORT ORGATEOUS	Q-1	BRUNDTON FMT. - MEDIUM ALLOCHTHON	
UPPER ORGATEOUS	K-1	SHALE AND SILTSTONES, DILUVIUM TO SOUTH	
LOWER ORGATEOUS	P-1	PT. ST. JOHN GROUP, BROWN FELSIC X	
UPPER DEVONIAN	Q-1	PT. BISHOP FMT. - MEDIUM, SANDY FELSIC, MAY BE DILUVIUM. PT. IN WILLOW LAKE N. ME IN ERIE HILLS.	
MIDDLE DEVONIAN	Q-1a	HORN RIVER FMT. - MEDIUM, BLACK TO GREEN, LOWER PART MAY BE BLACK FELSIC - PREMIER CRYSTALLINE	
	Q-1b	BLUFF POINT FMT. - LIMESTONE, DILUVIUM MAY BE IN PT. HORN RIVER AND FACES OF THE DILUVIUM AT BLUFF POINT AND BEAR ROCK.	
	Q-1c	Possible FMT. - LIMESTONE AND CALCIANITE, VARIOUS, REEFING, PETRIFIED WOOD AND BIVALVIA, MAY BE EQUIVALENT TO LOWER BLUFF POINT FMT.	
	Q-1d	PT. RIVER FMT. - LIMESTONE SERIES OR, IN PART CRYSTALLINE, CALCARENOS.	
	Q-1e	CHINAHAN FMT. - CLAYSTONES AND EXHUMATES.	
SILURIAN	S-1	BRAN ROCK - MEDIUM PT. SILURIAN, DILUVIUM, THE SILURIAN, THE CALCIANITE, THICK, IRIDIUM, CONTAINS IRIDIUM AND IRIDIUM, IRIDIUM, IRIDIUM, IRIDIUM, IRIDIUM AND IRIDIUM IN THIS PART.	
ORDO 1 - SILURIAN	O-1-1	RAVINS FMT. - WELL BEDDED LIMESTONES AND CALCIANITES.	
PRE - CAMBRIAN	PC	IMBREE ROCK.	
			DIP & STRIKE
			8° OBSERVED X PHTHOGRAPHIC LOG SIGN
			FMT. BOUNDARY
			PERMIT BOUNDARIES
			OUTCROP TAMED & DESCRIBED X HZ 2
			OUTCROP X
			ELEVATION 2000'
			BORE HOLE □



A'  
NORTH

ALTAIR OIL & GAS CO.  
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GEOLOGIC CROSS SECTION A-A'  
PERMITS 4500-4505 INCL.  
HORN MTS. AREA  
NORTHWEST TERRITORIES

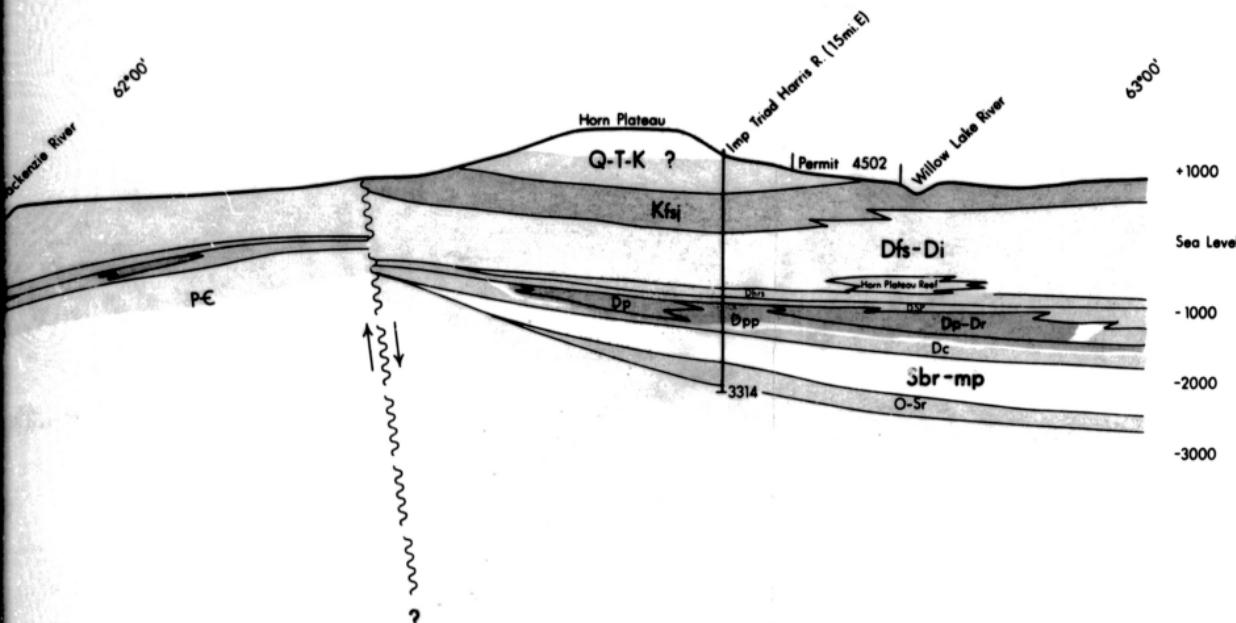
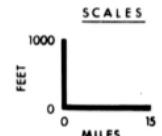


FIGURE 4

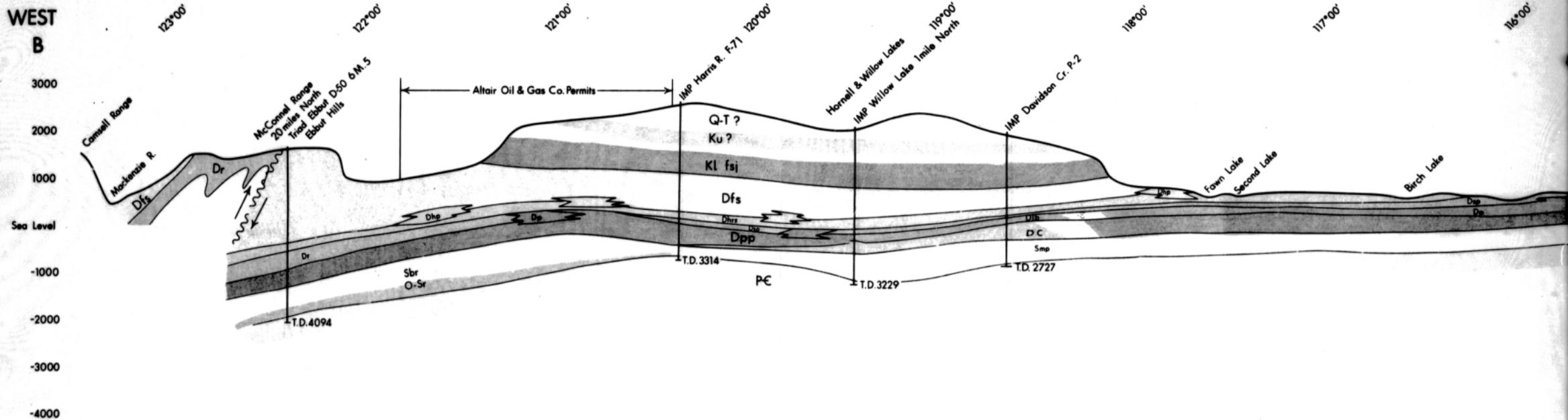
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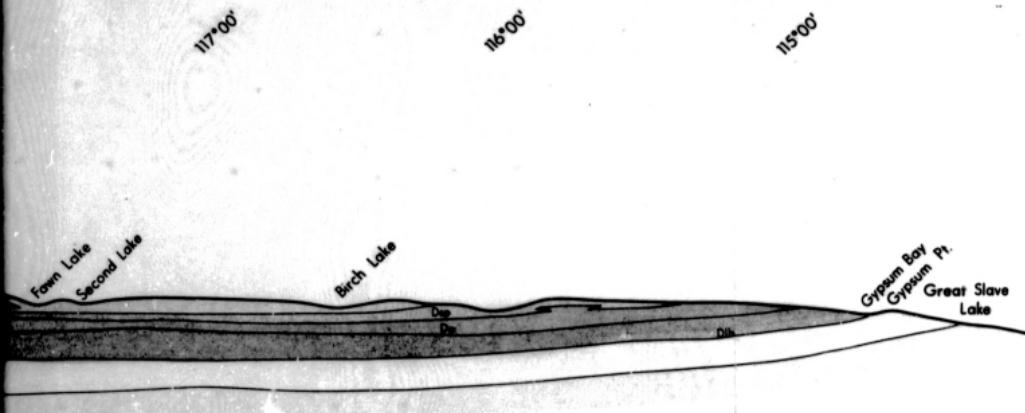
Q-1	BEAUFORT FMT. - RECENT ALLUVIUM
KU	SHALE AND BRITTLESHALE, IRREGULAR TO WARTH
Elu	PT. BY. JOHN GROUP - SHALE, BLACK FISSILE + GREY BUFF WEATHERING SE.
Dm	WABAMUN FMT. - DOLOMITE AND LIMESTONE IN PART ARGILLACEOUS. SOUTH OF MACKENZIE R.
Dm	HAY RIVER FMT. - CARBONATE FACIES OF PT. SIMPSON SHALE. SOUTH OF MACKENZIE RIVER.
Dm	HORN PLATEAU FMT. - CARBONATE, REEFDIS, POROUS, OCCURS ON FERDSON CR. DRAINAGE ON EAST FLANK OF HORN MOUNTAINS - REEF FACIES AT Dm CONTACT. PROBABLE EQUIVALENT TO MIDDLE DEVONIAN CARBONATES, HUME + RAMPART; D&D FMT OF THE FAMILIAR RANGE.
Dm	SLAVE POINT FMT. - LIMESTONE, GREY ARGILLACEOUS MAY INCLUDE SOME IMPERF. PT. IN WILLOW LAKE R. AND IN SOUTHERN HILLS.
Dm	HORN RIVER FMT. - SHALE, BLACK TO GREY - GREEN, LOWER PART MAY BE SLAVE POINT - PREBRAILLE EQUIVALENT.
Dm	SLAVE POINT FMT. - LIMESTONE, GREY ARGILLACEOUS MAY INCLUDE SOME IMPERF. PT. IN WILLOW LAKE R. AND IN SOUTHERN HILLS.
Dm	PREBRAILLE FMT. - LIMESTONE AND DOLOMITE, VUGGY, REEFDIS, PETROLIFEROUS AND BIVALVIF. MAY BE EQUIVALENT TO LOWER HORN RIVER FMT.
Dm	PINE POINT FMT. - LIMESTONE DENSE GR. IN PART CRYSTALLINE ARGILLACEOUS.
Dm	CHINCHAGU FMT. - CLASTICS AND EVAPORITES.
Dm	BEAR ROCK - MIRASS PT. FMTS. LIMESTONE AND DOLOMITE, VUGGY, BITUMINOUS, CONTAINS CONSIDERABLE COLLAPSE BRECCIA. INCLUDES RED SEEDS, SYNTHITE AND ANHIDRITE IN LOWER PART.
Dm	RUNNING FMT. - WELL REDED LIMESTONES AND DOLOMITES.
PC	INHIBIT ROCKS.



WEST

B





EAST  
B'

2000

1000

Sea Level

-1000

-2000

-3000

POST CRETACEOUS

UPPER CRETACEOUS

LOWER CRETACEOUS

UPPER DEVONIAN

MIDDLE DEVONIAN

SLATE POINT FMT. - LIMESTONE, GREY ARBILLACEOUS MAY BE IN PART UPPER DEVONIAN AND FACIES OF Dip BITUMINOUS AT SLATE POINT AND BEAR ROCK.

PRESQUE ISLE FMT. - LIMESTONE AND DOLOMITE, VUGGY, REEFIC PETROCALCAREOUS AND SULPHURIFEROUS, MAY BE EQUIVALENT TO LOWER HORN RIVER FMT.

PINE POINT FMT. - LIMESTONE DENSE GR. IN PART CRYSTALLINE ARBILLACEOUS.

CHISHAM FMT. - CLASTICS AND EVAPORITES.

BEAR ROCK - MIRAGE PT. FMTS. LIMESTONE AND DOLOMITE, VUGGY, BITUMINOUS, CONTAINS CONSIDERABLE COLLAPSE BRECCIA. INCLUDES RED BEDS, SULPHUR AND ANTHRACITE IN LOWER PART.

ROBINSON FMT. - WELL BEDDED LIMESTONES AND DOLOMITES. IMBIDIUS ROCKS.

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## GEOLOGIC CROSS SECTION B-B'

PERMITS 4500-4505 INCL.

HORN MTS. AREA  
NORTHWEST TERRITORIES

FIGURE 5

GALLUP EXPLORATION and SERVICES LTD.  
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SEPT. 1966

Dw HABANON FMT. - DOLOMITE AND LIMESTONE IN PART ARBILLACEOUS. SOUTH OF MAGNITUDE R.

Dw HAY RIVER FMT. - CARBONATE FACIES OF PT. SIMPSON SHALE. SOUTH OF MAGNITUDE RIVER.

Dp HORN PLATEAU FMT. - CARBONATE, REEFIC, POROUS, occurs on Ferguson Cr. drainage on east flank of HORN MOUNTAINS - REEF FACIES AT Dp CONTACT. PROBABLE EQUIVALENT TO MIDDLE DEVONIAN CARBONATES HUNE + RAMPARTS; Dp D. FMT OF THE FRANKLIN RANGE

Dp RAMPARTS FMT. - LIMESTONE, REEFIC, CRYSTALLINE, PETROLIFEROUS; IN PART POROUS (HOME EQUIVALENTS AT BASE?).

Dp LOONEY BAY FMT. - LIMESTONE, DENSE GREY BROWN ARBILLACEOUS; AN ARBILLACEOUS TURBULE OF THE PIN POINT FMT WEST OF GREAT SLAVE LAKE ONLY.

### SCALES



282