

NEW CONTINENTAL OIL COMPANY OF CANADA LIMITED

GEOLOGIC MAP

N.W. TERRITORIES PERMITS 4284-4286 & 4290-4294
and RELATED REGIONS in ALBERTA & B.C.

SCALE: 1" = 8 Miles

LEGEND

MESOZOIC

CRETACEOUS

UPPER CRETACEOUS
LOWER CRETACEOUS

PALEOZOIC

UPPER DEVONIAN
MIDDLE DEVONIAN

Ku Shales and Sandstones
Kl Shales and Sandstones with Glauconitic basal sand
Du Carbonates (with shale facies to NW)
and Carbonaceous shales
Dm Carbonates (in part reefal) & equivalents
with some shales

DIP & STRIKE 3°

NEW CONTINENTAL PERMIT

4286

W.B. GALLUP, Geol. 1963

88-1-7-1

NEW CONTINENTAL OIL COMPANY
OF CANADA LIMITED

GEOLOGY OF

NORTHWEST TERRITORIES

PERMITS NO. 4284 - 4286 and 4290 - 4294



Enclosures :

Four Photo Mosaics.

- | | |
|--------|--------------------|
| Fig. 1 | Index Map |
| Fig. 2 | Geologic Map |
| Fig. 3 | Cross-section A-A' |
| Fig. 4 | Cross-section B-B' |

Three Topographic Maps

W. B. Gallup, P. Geol.

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GEOLOGICAL REPORT

NEW CONTINENTAL OIL COMPANY OF CANADA LIMITED

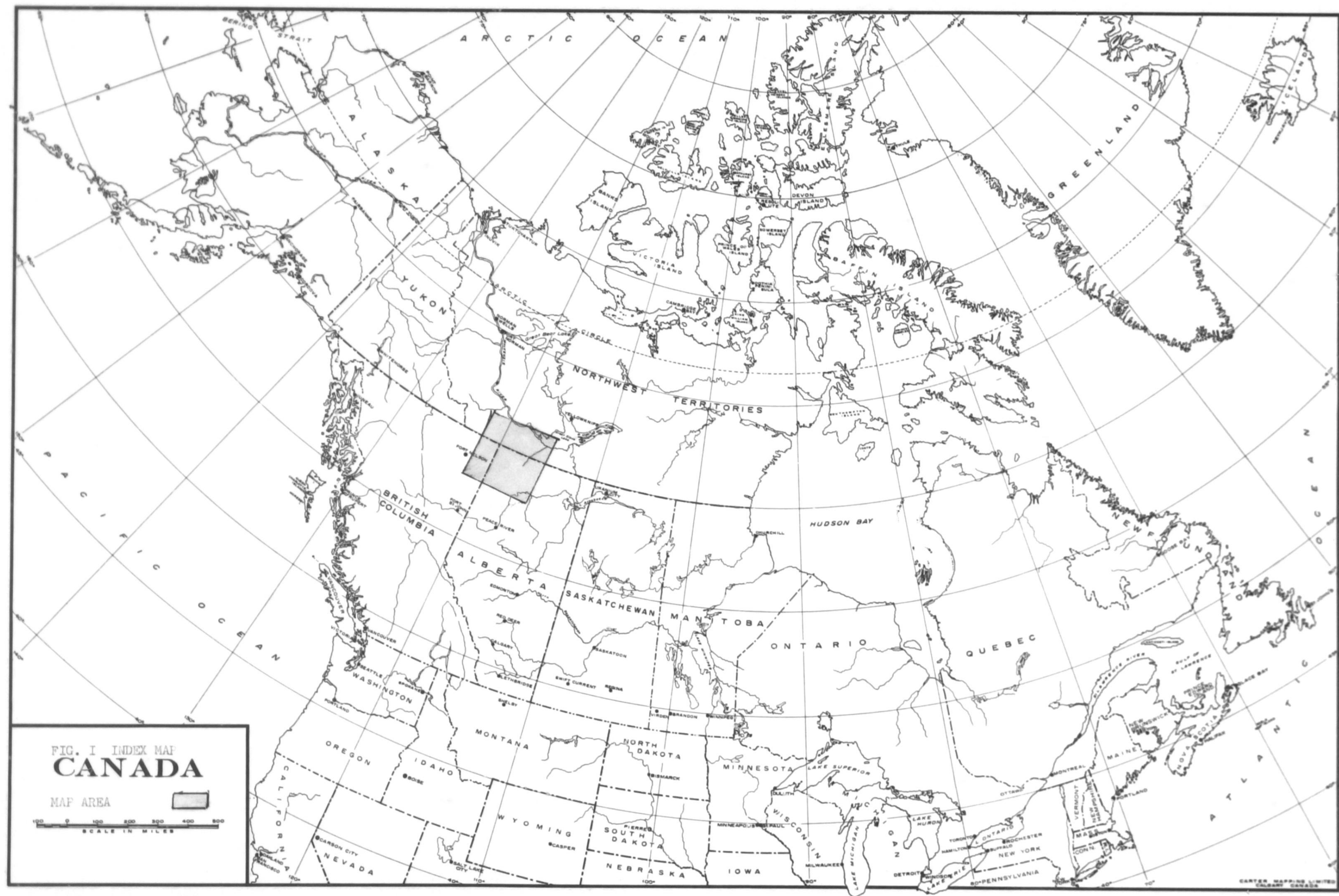
NORTHWEST TERRITORIES PERMITS NO. 4284 - 4286 and 4290 - 4294

INTRODUCTION

The petroleum geology of all the above Permits is discussed in this one report and one geological map supported by two cross-sections. The Permits themselves, however, are covered by four separate photo mosaics.

The Index Map, Fig. 1, shows the map area which includes the Kotcho Lake, Rainbow Lake and Zama Lake fields and which have some relationship to the oil and/or gas potentialities of these Permits.

Access is by the Mackenzie Highway to Permits No. 4284 and 4285, which crosses the East corner of the latter and by the near-by Pine Point railway. Permit No. 4286 straddles the Mackenzie River about 25 miles below Fort Providence and the Great Slave Highway. Excellent river transportation service is available, both by NTCL, a Crown Company, and a private concern based at Fort Simpson. Summer access is thus excellent and good Winter road from Fort Providence to Fort Simpson crosses the Mackenzie within the Permit boundaries. This road is kept open during the Winter.



Permit No. 4292, the most northerly of a group of three, is traversed by the Mackenzie River; the other two, No. 4290 and 4291 which lie in line to the southward are in a well drained area except for the flats about 4 miles wide just adjacent to the Mackenzie River. The rest of these Permits are relatively good ground being underlain by the Devonian Plateau and drained by Trout River and its tributaries.

Permits No. 4293 and 4294, South of Fort Simpson, are traversed by the Fort Nelson-Fort Simpson Winter road. The Liard River is about 20 miles Northwest of Permit No. 4294 so that equipment and supplies for Winter use could be stockpiled by river transport from Fort Nelson, via the Alaska Highway and the Nelson-Liard River routes, or at Fort Simpson via the Mackenzie Highway and boat from Fort Providence. It is 50 miles by Winter road from Permit No. 4293 to Fort Simpson and only 20 miles to the nearest point on the Liard to Permit No. 4294. Both routes should be considered in the light of type of equipment and supplies required, and their availability either at Fort St. John, Fort Nelson or other points along the Alaska Highway. The Mackenzie Highway route is much longer, but may be better suited to a program involving some of the other Permits. There should be no problem involved in any move from one group of these Permits to another.

The writer examined these lands by automobile and foot traverse, boat traverse down the Mackenzie, a short boat traverse (as far as possible) up Trout River, where float containing fossil specimens from the Devonian escarpment were collected and an aerial reconnaissance of Permits No. 4293 and 4294; 4290, 4291 and 4292 was made.

Photo mosaic, geologic maps and cross-sections showing relationship of the Permits to the Devonian oil and gas fields in Northern Alberta and British Columbia have been prepared and are discussed under the Section entitled "GENERAL GEOLOGY."

Aside from the gorge of the Trout River, there are virtually no outcrops in any of the Permits with the exception of the region adjacent to the North and East of Permit No. 4285.

However, the Cretaceous and Devonian escarpments shown on Figs. No. 2, 3 and 4, delineate the bedrock configurations which are described under the Section - "GENERAL GEOLOGY."

The stratigraphy of the entire map area is not yet completely understood in detail, therefore some liberty in the form of generalizations in the matter of certain, and as yet not completely understood formations. Accent has been placed on the broader sequences and their lithologies and facies changes for such are the phenomena, together with structure, which are the anomalous conditions that bring about the accumulation of petroleum.

At Zama Lake, Rainbow Lake and Kotcho Lake fields, ancestral and contemporaneous structures seem to be associated with the oil and gas accumulations.

GENERAL GEOLOGY

The General Geology of the region is discussed with reference to the following Table of Formations, three illustrations mentioned above and photographic plates (see Table of Contents).

Reference to that part of the map area lying within the Province is made only with respect to certain oil and gas fields pertinent to the general Permit areas.

TABLE OF FORMATIONS

SOUTH

NORTH

Age	Rock Unit	Thickness	Lithologic Description	Age	Rock Unit	Thickness	Lithologic Description
PLEISTOCENE		0 - 500'	Till, silt and clay.	PLEISTOCENE			Till, silt and clay with some boulder plains.
CRETACEOUS				CRETACEOUS	- Mississippian sequences eroded.		
Upper	Fort St. John Group and Dunvegan equivalents.	500' - 0	Sandstone and silt marine and continental.	DEVONIAN			
Lower	Loon River equivalents.	500' - 0	Shales, marine. Well developed basal sand occurs.	Upper	Hay River Fmt. Wabamum equivalents.	1500' - 0	Limestones and shales (becomes shale to NW)
PALEOZOIC				Middle ?	Slave Point	200' +	Limestone, thinly bedded, argillaceous and in part bituminous.
Mississippian	Banff Formation and Rundle Group	1000' - 0	Dolomites, limestones and shaly carbonates.	Middle	Watt Mountain	155' - 0	Clastics and some evaporites, pinches out against Presquille.
DEVONIAN					Presquille	600' +	Dolomites and limestones, reefoid and bituminous.
Upper	Wabamum Group	1500' +	Dolomites, limestones lining shales and silts.		Pine Point	1000' +	Limestone, well bedded dark grey, bituminous.
Middle ?	Slave Point Formation	200' +	Limestone, thinly bedded, argillaceous and bituminous.				
Middle	Watt Mountain Formation	155' +	Clastics and some evaporites and carbonates.	Basement	Pre-Cambrian		
	Muskeg	700' +	Dolomites and some evaporites, locally reefoid.	NOTE :	Presquille reefs and underlying Pine Point Formation replace the Muskeg-Chinchaga section Northeastward, but are somewhat similar in lithology and relationship to overlying units.		
	Keg River	80' - 300'	Dolomite, vuggy somewhat fossiliferous locally reefoid.				
	Chinchaga	250' +	Mainly evaporitic with some carbonates.				

Basement ("Red Beds" and Pre-Cambrian)

The New Continental Oil Company of Canada Limited Mackenzie River Permits No. 4284 and 4285, 4286, 4290, 4291 and 4292; 4293 and 4294 are up-dip (North-East) from the Rainbow Lake oil field, the Zama Lake gas field and the Kotcho Lake fields. From this regional geologic and geographic relationship, they gain a certain amount of interest. The Geologic Map, Fig. 2, displays this relationship.

The accumulations of hydrocarbons in all three fields are in porous carbonates. These limestones and dolomites are reefoid and are apparently widespread and are of Middle Devonian age. There occurs a moderate slight reef build-up in each case, but probably not enough to bring about entrapment of important accumulations such as have been discovered, particularly since the porous strata is so widespread, "a blanket" situation in the case of the Muskeg formation, with more local build-up in the Presquille reef.

This situation suggests that ancient tectonic features that controlled the reef developments have been somewhat reactivated and accentuated in more recent times to develop structural traps involving the biohermal or biostromal Devonian sequences. Some of this deep seated tectonic control of reef development and latter formation of structural traps seems to be reflected at surface. It may be the control for the Cretaceous and Paleozoic escarpments and some of the rather spectacular drainage patterns such as the long straight stretch of the Hay River, its anomalous circumvention of the Rainbow and Zama Lake fields and the often angular drainage pattern of the region, the result of an overall arrangement of normal faults general at right angles to one another.

The major set of such faults is the East Arm fault of Great Slave Lake (N 50 deg. - 60 deg. E).

The subsequent fault pattern (or drainage pattern) is N 40 deg. - 30 deg. W. These patterns, some definitely mapped faults and others inferred from drainage patterns are somewhat arcuate in plan. It must be remembered, however, that these patterns as we see them on maps are traces of features projected from a sphere (the world) to a plane (our maps). Therefore, it may be considered that the two patterns of normal faults with which we are concerned are for all practical purposes at right angles to one another.

If this is acceptable, then individual fault blocks might be encompassed by a rectangular perimeter which could constitute an effect trap in an otherwise flat lying blanket horizon.

Please note that since the two cross-sections A-A' and B-B' are Northeast-Southwest, they can only display one set of faults in section. This direction of section was selected as most important since it displayed the stratigraphic section with respect to the fault pattern more accurately.

We are dealing with a very large area, covered only by nine Permits in four groups, totalling about .5 million acres. This is a fine land spread, but must be related to the region from which we are directly drawing pertinent information, 56 billion acres. Relatively few important wells have been drilled in the area, the Geologic Map, Fig. 2, shows a great many drill holes, yet very few have reached the Middle Devonian, the prime and only real objective North of the Cretaceous escarpment. Therefore, the area is virtually unexplored, particularly with respect to the Middle Devonian reef sequences.

The geology of the Permits will be discussed in detail in two groups as follows, but not necessarily in order of merit.

Permits No. 4284 and 4285 :

These Permits are directly up-dip from Zama Lake and Rainbow Lake. Two decent tests; NWT Desmarais Lake and Shell Alexandra No. 5 have been drilled. Both yielded small quantities of sulphurous salt water from the very top of the Presquille reef. Note that neither tested the Presquille well up-dip within the Permit boundaries. NW Heart Lake No. 1 tested the dolomites of the Watt Mountain formation apparently just above the Presquille and recovered 1,130 feet of salt water. Some porosity, probably very good porosity, is present, but this can be of interest only where occurring in structural traps.

Our cross-section A-A' shows how such a trap might occur through the regional fault pattern, this could be discovered only by geophysical and/or detailed examination of aerial photographs and the efficiency of such trap determined by drilling to about 3,000 feet.

It is of valuable note that oil seeps do occur up-dip, thus the section has been petroliferous or at least oil has passed through, but not all oil or gas has escaped up-dip as evidenced by the situation at Zama Lake and Rainbow Lake, where oil and/or gas has been entrapped by reef build-ups and structure, or both.

Both these fields had a history of dry holes around them and were discovered by a combination of the geological knowledge thus derived and a continued application of geophysical studies, mainly seismic.

This is the history of the discovery of many oil pools.

The accompanying photo mosaic displays some most interesting features. These are not evident from the topographic maps nor from the ground. In fact, the Permit lands lie in a most featureless heavily forested boulder-strewn plain. The Northeast corner of the mosaic shows a series of wandering lineations striking N 20 deg. - 30 deg. W. These are most undoubtedly surface evidence of the thickly interbedded shales and limestones which give rise to the Alexandra and Louise Falls where the Hay River traverses the Upper Devonian escarpment. Next, it must be noted how the Twin Falls Creek swings around to the South. The course of Twin Falls Creek (Enclosure - Tathlina Sheet Creek - 856) is semi-circular through a course forming a rough semi-circle Southwest of the lineations of the escarpment.

Within this semi-circle, the mosaic shows a high region, well drained, with little muskeg. The centre of this "high" is about Lat. 60 deg. 40' and Long. 137 deg. 30'.

This feature is rather unique and should be considered in all plans concerning these lands.

Its origin may be a rectangular fault block as described above, or a deep-seated igneous plug.

It is certainly anomalous and merits further investigation by geophysics and by some detailed form of photogeological study such as fracture analyses.

Permit No. 4286 :

Permit No. 4286 straddles the Mackenzie River just below Mills Lake at Long. 118 deg. 30' W. Its location is shown on the Geologic Map and on the attached Mills Lake Topographic Sheet 85E. It occupies a featureless forest covered plain (Plate No. 1 - Appendix I). It would project into Section B-B', Fig. 4, just North of the position of Permit No. 4292. Thus, the youngest sediments underlying the drift will be the Upper Devonian Hay River formation which here, will be quite shaly. Thus, the Presquille reefs which may be expected about 1,000 feet below surface, will have a shale cover.

The attached photo mosaic shows the featureless nature of the terrain, other than the Mackenzie River occupied by this Permit.

One well - NW Pete No. 2 - was drilled on the Permit to a depth of 2,231 feet finishing up in the Pre-Cambrian, and abandoned. No tests were run.

Permits No. 4290, 4291 and 4292 :

These Permits are shown on the Geologic Map and on the Mills Lake Topographic Sheet No. 85E and the photo mosaic. Lying on the Upper Devonian escarpment, they are well drained by the Trout River, Plates No. 5 and 6. There are numerous fair sized lakes but relatively little muskeg except in Permit No. 4290, which may have a thin Cretaceous cover as suggested by Section B-B', Fig. 4, but more likely lies completely North of the Cretaceous onlap on the Devonian.

Trout River has incised a small canyon in the Upper Devonian formation in the sharp bend in the North centre part of Permit No. 4291

to within 6 miles of the mouth of the river. This gorge contains some falls (see the Mills Lake Sheet and the photo mosaic), which expose Upper Devonian Wabamum limestones and dolomites which are most fossiliferous, in part reefoid.

These reefoid facies have no real significance in themselves but demonstrate a tectonic history locally favourable to the development of bioherms and/or biostromes. Thus, a good Middle Devonian Presquille reef may be present at a depth varying from 4,000 feet to 2,500 feet from South to North respectively. The type of accumulation that occurs at Kotcho Lake, but more likely to be oil than gas.

The Permits are readily accessible and occupy relatively good terrain.

Note the large number of "Briggs Tests" in Permit No. 4291. These are shallow 100 foot to 900 foot depth structure tests of little or no significance with respect to the above discussion.

Presquille reef development here is best found by geophysics and drilling.

Permits No. 4293 and 4294 :

These Permits lie in the drainage of the Poplar River, a tributary of the Liard. Plate No. 8 - Appendix I, shows the general terrain looking West toward the Liard. There is no surface expression of the bedrock other than the giant East-West glacial striae which apparently are due to coincidental movement of ice along strike, thus accentuating or at least delineating the larger features of the bedding. These lineations swing to the Southwest just South of the Permits and, if this is also a bedrock trend, it is very significant. (Plate No. 7 - Appendix II).

The youngest strata exposed here are probably those of the lower part of the Wabamum formation and are equivalent to the Hay River formation. Underlying this, is the shale facies of the Hay River formation. It is about 700 feet thick where it outcrops at Fort Simpson. It is a phase of the lower shaly portion of the Hay River shales and rests on the Slave Point formation.

The Presquille reef, even though immediately overlain by the Watt Mountain and Slave Point formations is, if and where present, thus actually encased in the Simpson shales.

The geology of these lands is not as well known as those of the other Permits.

The several drilling locations shown on the Geologic Map, Fig. 2, are shallow (less than 1,000 feet and, in some cases, a very few hundred feet) and have no significance.

Winter access to these two Permits is good, as stated. There is a Winter road connecting Fort Nelson and Fort Simpson which passes generally through the Western portion of Permit No. 4293, leaving that Permit a few hundred yards North of its Southwest corner. It is faintly visible on the photo mosaic in the Southwest corner of Permit No. 4293.

This Permit, unlike the others, which could be worked in a dry Summer, is inaccessible by any type of vehicle in Summer.

CONCLUSIONS and RECOMMENDATIONS

The eight Permits under consideration lie on the Paleozoic Plateau. This means that they occupy a position underlain by an area of Upper Devonian rocks, which are productive elsewhere, but can not possibly be here. The Permits lie up-dip from three oil and gas fields from which production is derived from Middle Devonian sediments. These latter strata outcrop at Windy Point and along that general Northwest-Southeast strike and where observed, are petroliferous. This means, simply, that the Middle Devonian carbonates are generally reefoid and sometimes petroliferous. Oil in these strata has apparently moved up-dip (North-East) to appear as seeps. Fields in the Provinces indicate that the lowermost Middle Devonian present, Muskeg, Keg River and Presquille, all fossiliferous carbonates in part reefoid can retain oil and/or gas under favourable conditions. Other such reef and structural traps will exist.

The regional surface geology is well understood. Knowledge of the subsurface geology is relatively meagre. At present, to find other reef build-ups or normal fault block traps can only be done by following up this geology with geophysics. It seems that the normal fault blocks and reef build-ups, aside from structure, might give similar geophysical anomalies.

This means that further geophysics and possibly some specialist photogeological work, such as fracture analyses, which is also a form of earth physics, is required to develop the region further.

The three notable past discoveries have all been the result of detailed geophysics based on regional geology. As drilling progresses, of course, some drilling exploration will be in part possible on the basis of subsurface geology only.

With respect to the Permits individually, we make the following recommendations based solely on our opinion as to their oil producing potentialities.

Permits No. 4284 and 4285 lie in an area where the development of the Presquille reef has been demonstrated. There is also evidence that such development is associated with the fault pattern of the region. Considering the anomalous geomorphic pattern evident in and around these Permits, they obviously merit more detailed investigation. We suggest seismic surveying and also recommend that a fracture analyses survey be made, preferably prior to any seismic investigations; in fact, this would be most useful at an early date. Any over-expenditure in the first period is automatically carried over as credit on the second period.

On the basis of present geological information and knowledge, this group is potentially quite valuable.

The Poplar River Permits No. 4293 and 4294 are a somewhat unknown quantity. They do, however, lie in a region where the reefoid Middle Devonian rocks are encased in a thick shale sequence, and this is important. The possibility of a change of strike just South of the Permits is interesting even though such a situation is merely suggested by a change in glacial lineations.

A seismic survey of the Poplar River Permits during the Winter is recommended to determine if there is a possibility that a Presquille reef build-up may occur. Access from Fort Nelson via the Winter road is no problem. The prospect is similar to Permits No. 4284 and 4285. The presence of the Simpson shale is most encouraging, but there is not yet as much evidence here of the occurrence of petroleum as to eastward, nor is the access nearly as favourable.

The Trout River group, Permits No. 4290, 4291 and 4292 are interesting. Upper Devonian reefoid carbonates are known to occur, suggesting that older (Middle Devonian) sediments may have been deposited in a similar environment. They lie in a row approximately normal to strike and constitute good coverage.

Seismic and fracture analyses surveys seem best. Permit No. 4286 could be included in this group.

The group consisting of Permits No. 4284 and 4285, in a way is drillable now. The Mackenzie Highway crosses it, the objective, the Presquille reef, will be at less than 3,000 feet and a location could be selected on the basis of the geomorphology displayed on the photo mosaic. Such a program however, might be unwise in that a dry hole resulting from a hasty selection would be most damaging to such an interesting property.

Respectfully submitted,

W. B. Gallup

W. B. Gallup, P. Geol.

APPENDIX I

PLATES NO. 1 to 8 inclusive

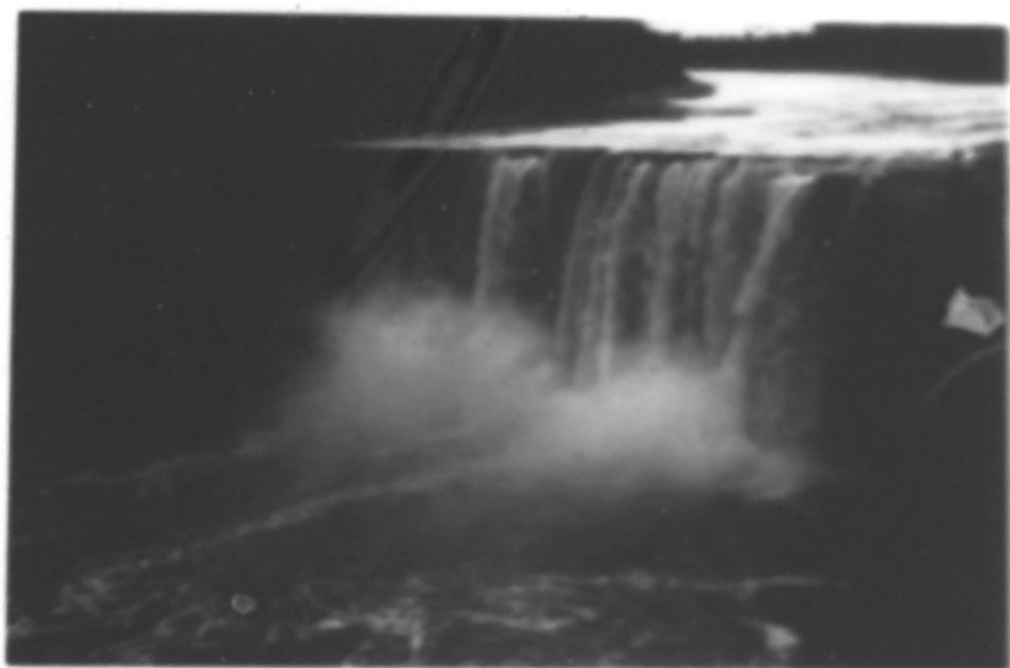


PLATE NO. 1 - Alexandra Falls (106 feet) on Hay River formed by 47 feet of massive limestones overlying a thick shale sequence of soft shales in the Hay River formation.

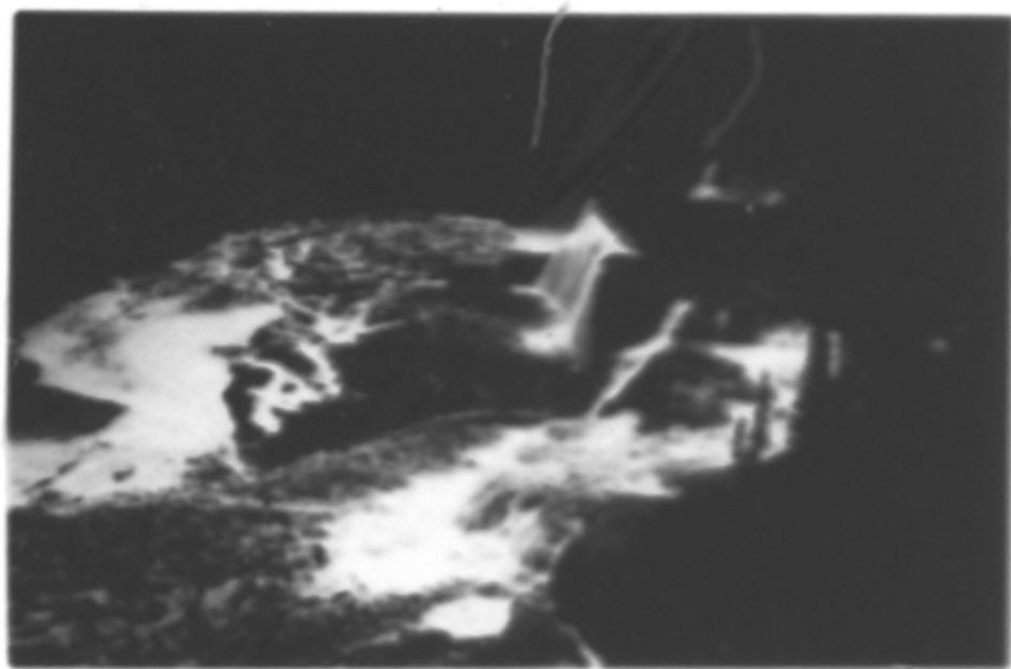


PLATE NO. 2 - Louise Falls (46 feet) on Hay River, 2.5 miles below Alexandra Falls; formed by a hard limestone ledge in the Hay River formation, 6 miles above the North edge of the Upper Devonian escarpment.



PLATE NO. 3 - The South left bank of the
Mackenzie along Permit No. 4286.



PLATE NO. 4 - Terrain across Permits
No. 4291 and 4292. Note the Cretaceous
escarpment in the background.



PLATE NO. 5 - Coral Falls on Trout River.
Due to outcrop of reefoid Upper Devonian
limestone.



PLATE NO. 6 - Looking down the canyon of
Trout River with the Mackenzie River
and Horn Mountains in the distance.



PLATE NO. 7 - Looking East from
Permit No. 4293 toward Trout River.
Lineations are probably bedrock (Upper
Devonian) strike line accentuated by
glaciation.

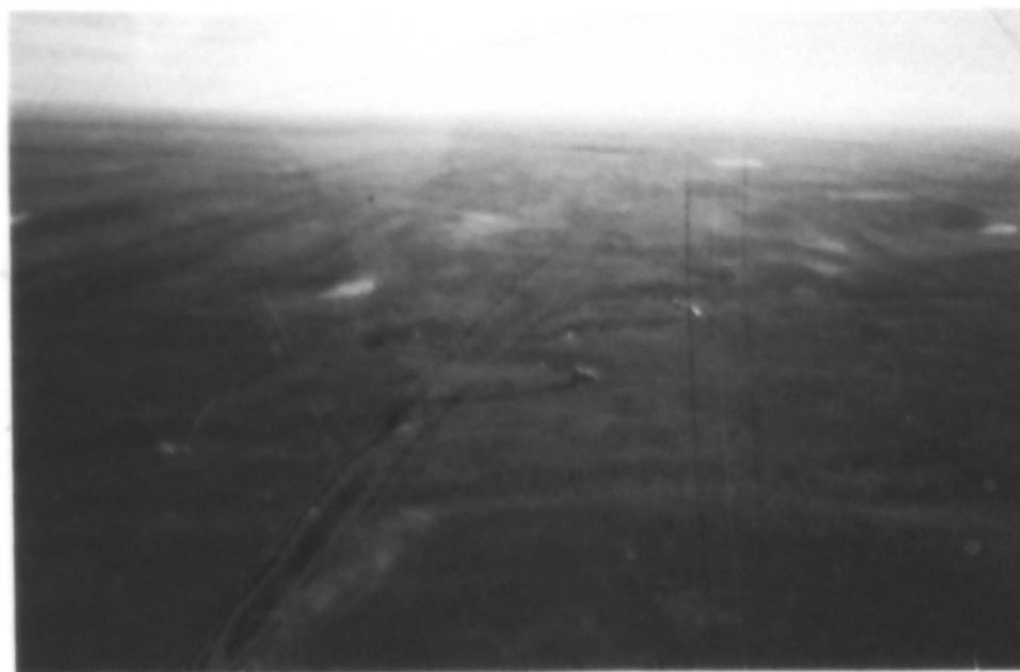
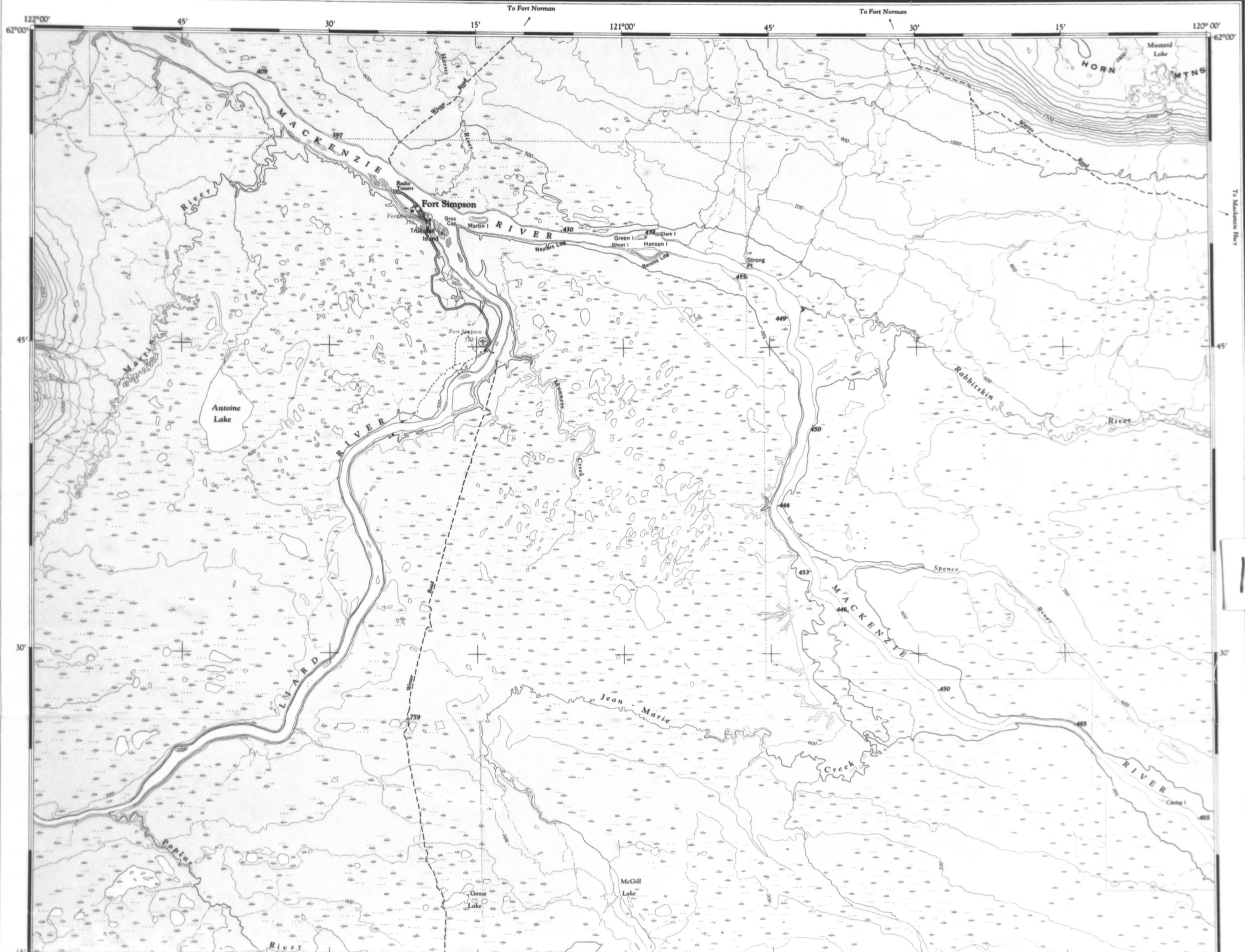


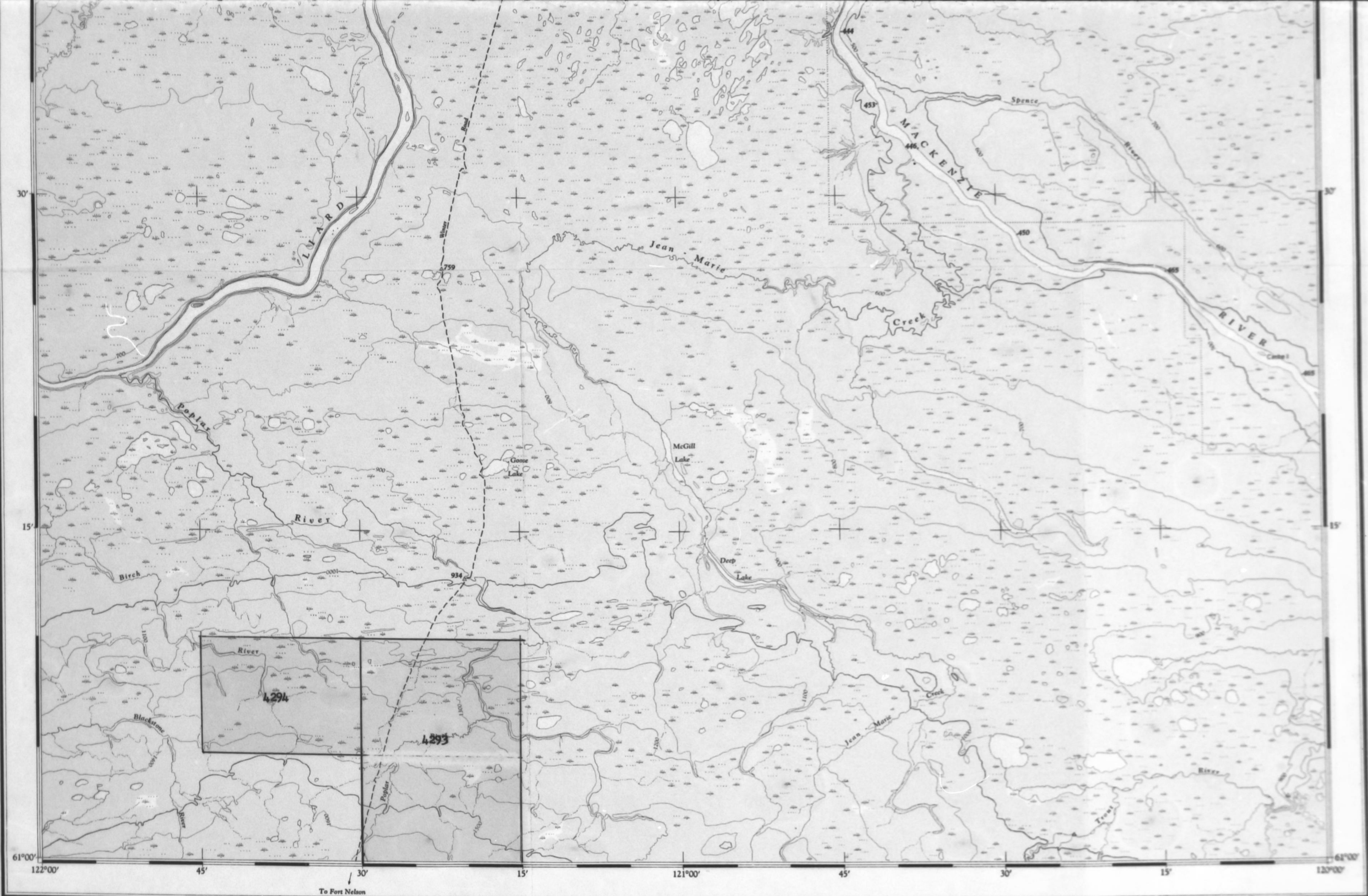
PLATE NO. 8 - View westward across Poplar
River (Permit No. 4293) toward Liard River.

APPENDIX II

REFERENCES

- ALBERTA SOCIETY OF PETROLEUM GEOLOGISTS, "Lexicon of Geologic Names in the Western Canada Sedimentary Basin and Arctic Archipelago."
- ALBERTA SOCIETY OF PETROLEUM GEOLOGISTS STUDY GROUP, 1954, "Lower Cretaceous of the Peace River," Western Canada Sedimentary Basin, Amer. Assoc. Petrol. Geol., pp. 268-78. Report prepared in 1951.
- CAMERON, A. E., 1918, "Exploration in the Vicinity of Great Slave Lake," *ibid.*, Summ. Rept., Pt. C, 1917, pp. 21-28.
-, 1922, "Hay and Buffalo Rivers, Great Slave Lake and Adjacent Country," *ibid.*, Summ. Rept., Pt. B, 1921, pp. 1-44.
- CAMPBELL, N. L., 1950, "The Middle Devonian in the Pine Point Area, Northwest Territories," Geol. Assoc. Canada, Vol. 3 (December).
- CRICKMAY, C. H., 1952, "Discrimination of Late Upper Devonian," Jour. Paleon., Vol. 26, No. 4 (July), pp. 585-609.
- DEPARTMENT of NORTHERN AFFAIRS and NATIONAL RESOURCES, "Schedules of Wells No. 1, 2, 3 and 4, 1920 - 1944."
- HUME, G. S., 1922, "North Nahanni and Root Rivers Area, and Caribou Island, Mackenzie River District," Geol. Survey Canada Summ. Rept., Pt. B, 1921, pp. 67-78.
-, 1926, "Ordovician and Silurian Fossils from Great Slave Lake," *ibid.*, Mus. Bull. 44, pp. 59-64.
-, 1932, "Oil Prospects of the Great Slave Lake and Mackenzie River Areas," Can. Inst. Min. Met. Bull. (March), pp. 92-103.
- HUNT, C. W., 1954, "Normal Devonian Sequence of Southern Mackenzie Basin, Western Canada," Bull. Amer. Assoc. Petrol. Geol., Vol. 38, No. 11 (November), pp. 2290-2301.
- LAW, J., "Geology of Northwestern Alberta and Adjacent Areas," Bull. of the A. A. P. G., Vol. 39, No. 10, pp. 1927-78.
- McLEARN, F. H., and KINDLE, E. D., 1950, "Geology of Northeastern British Columbia," Geol. Survey Canada Memoir 259.
- STEWART, J. S., 1947, "Exploration for Petroleum, Northwest Territories, 1946," *ibid.*, Paper 47-2.
- WEBB, J. B., 1951, "Geological History of Plains of Western Canada," Bull. Amer. Assoc. Petrol. Geol., Vol. 35, No. 11 (November), pp. 2291-2315.
- WHITTAKER, E. J., 1922, "Mackenzie River District between Great Slave Lake and Simpson," Geol. Survey of Canada Summ. Rept., Pt. B, pp. 45-55.





THE DECLINATION OF THE COMPASS NEEDLE 1955



The declination of the compass needle at any place along a red line is the declination given on that red line. At other places the declination is between those given on the neighbouring red lines; thus at the place marked A, the declination is between 34° 00' E. and 34° 30' E. The declination of the compass needle is decreasing 7 minutes annually.

Produced and printed by the Surveys and Mapping Branch, Department of Mines and Technical Surveys, 1957, from air photographs taken in 1948 and 1949.

Universal Transverse Mercator Projection

REFERENCE

Roads:	more than 2 lanes	2 lanes	less than 2 lanes
hard surface, all weather	.....	.....	.....
loose surface, all weather	.....	.....	.....
wagon; cart track	.....	Trail or portage	.....
Railway: normal gauge	.....	single track	.....
	.....	abandoned	.....
Boundaries:		Contours:	
international	.....	elevation	.....
provincial	.....	depression	.....
county or district	.....	approximate	.....
Indian reserve, park, etc.	.....	Spot elevation (in feet)	.....
Surveyed line	.....	Power transmission line	.....

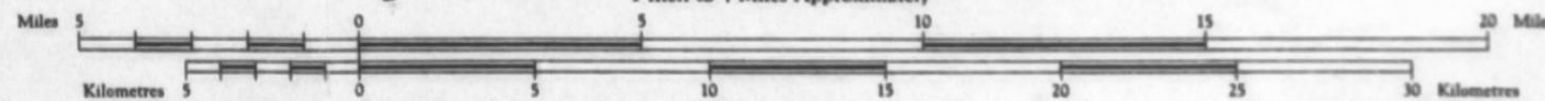
FORT SIMPSON

NORTHWEST TERRITORIES

DISTRICT OF MACKENZIE

Scale 1:250,000

1 Inch to 4 Miles Approximately



Contour interval 100 Feet
Elevations in Feet above Mean Sea Level
North American Datum 1927 (1954)

Copies may be obtained from the Map Distribution Office, Department of Mines and Technical Surveys, Ottawa, at 25 cents each.

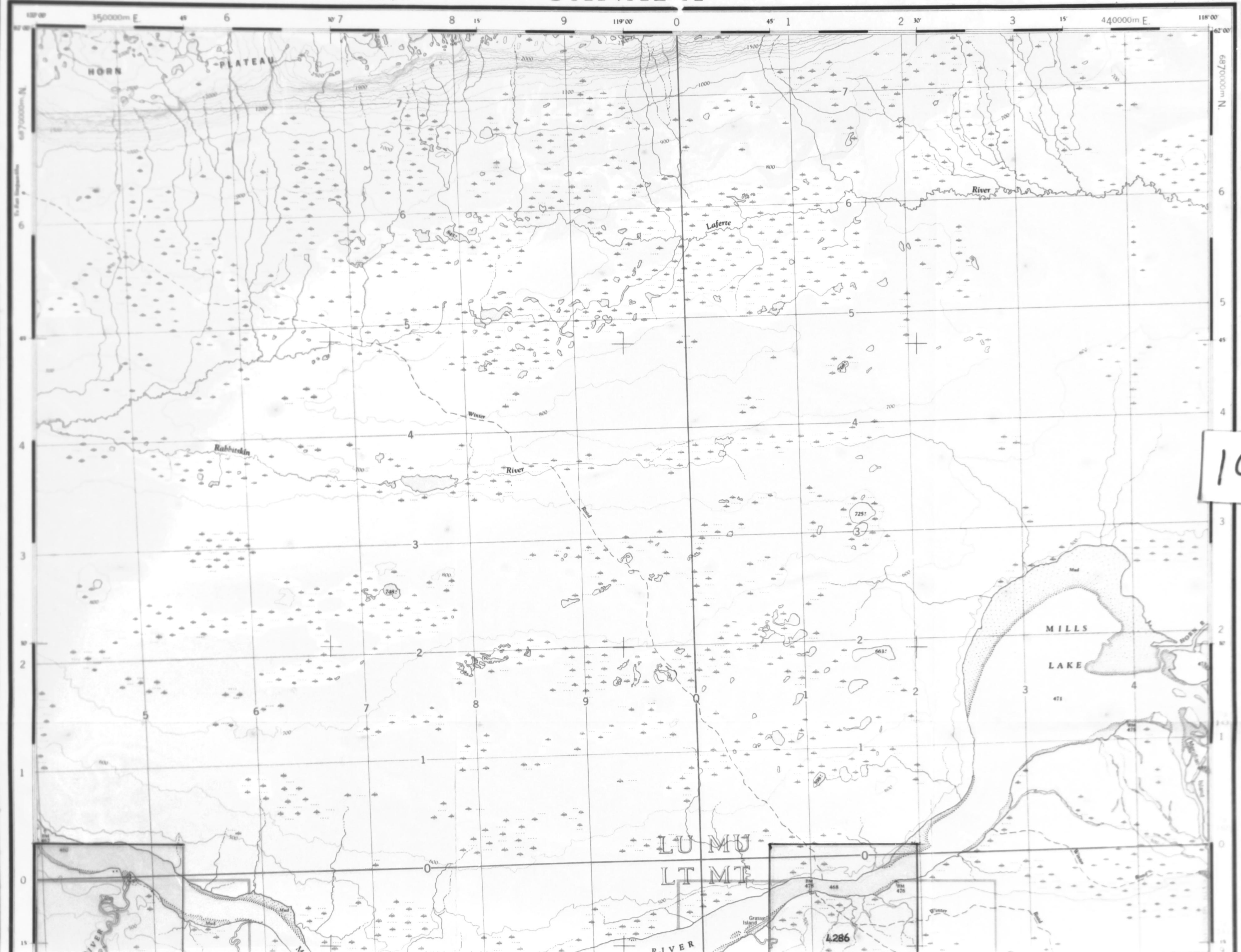
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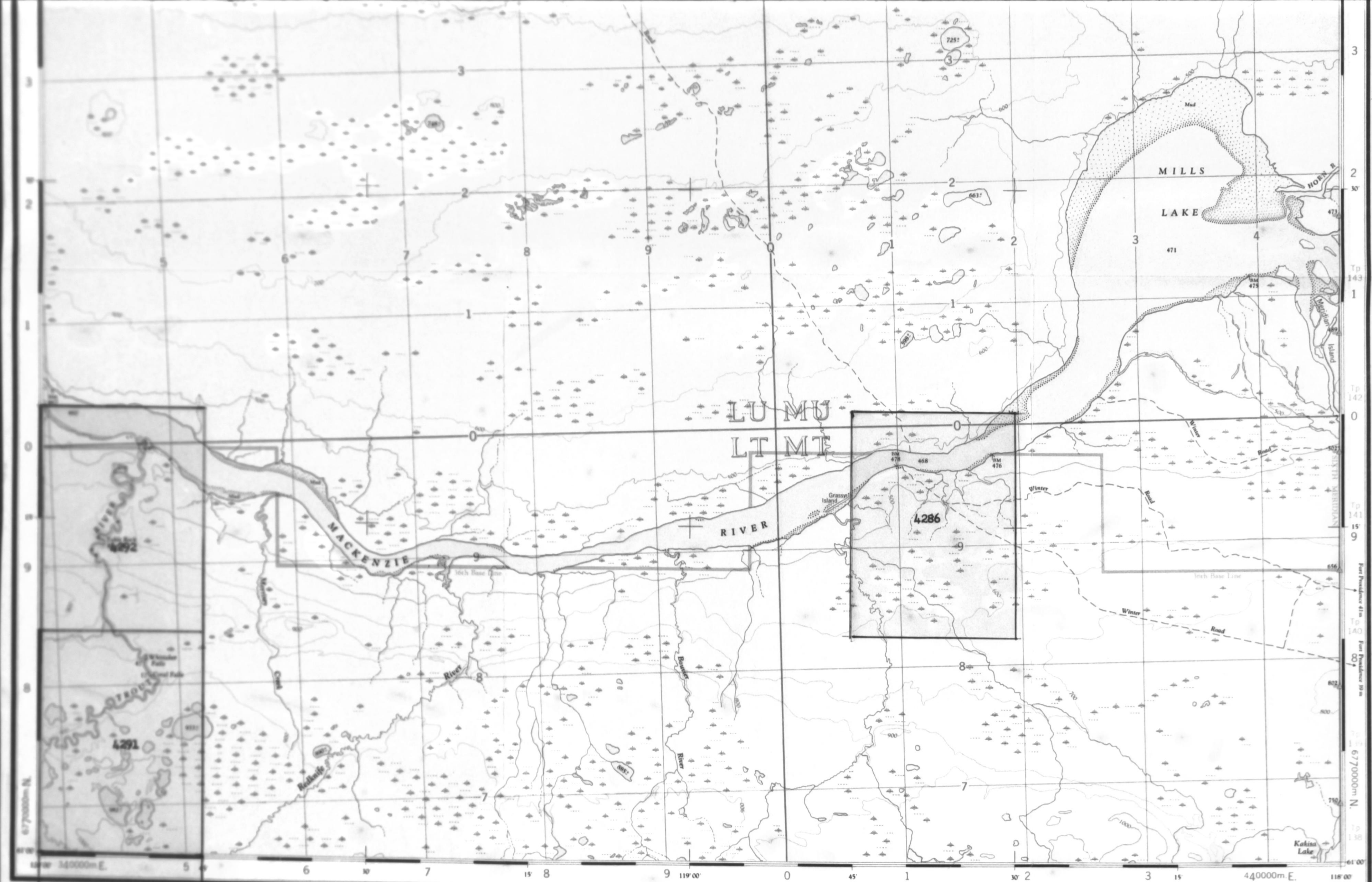
Town	School	Boundary marker
Village or settlement	Building or cabin	Astronomical position
Post office	.....	R.C.M.P. post	.....	Transportation control point	.....
Streams:		Marsh or swale	.....	
intermittent or dry	.....	Land subject to seasonal inundation	.....	
indefinite	.....	Sand, gravel or mud	.....	
Irrigation canal or ditch	.....	Ferns	.....	
Rapids, falls	.....	Wooded areas	.....	
Intermittent lake	.....	Seaplane base	.....	
Aerodrome	Seaplane anchorage		
Landing ground				



Index to Adjoining Sheets

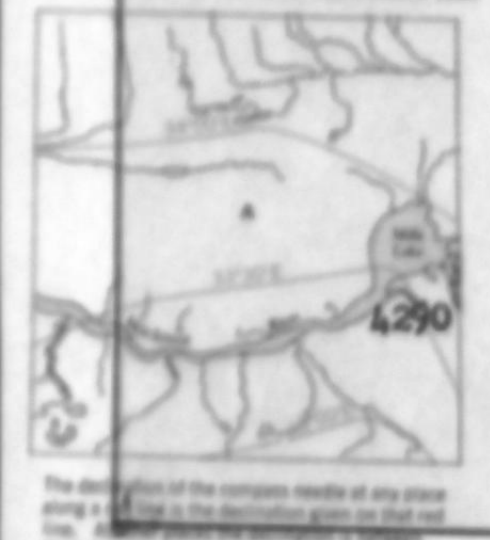
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THE DECLINATION OF THE COMPASS NEEDLE, 1960

Produced by the ARMY SURVEY ESTABLISHMENT, R.C.E. 1956-61
Aerial photography 1948

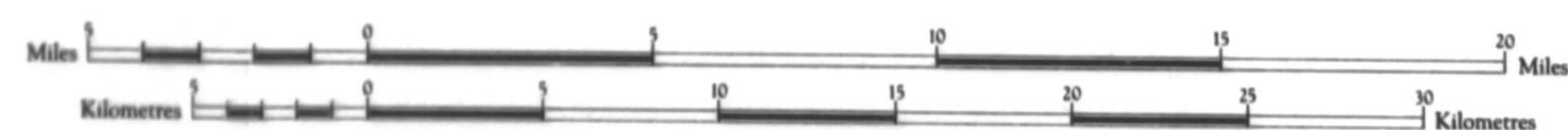


- Roads:
 paved surface, all weather
 dry weather
 cart track or winter road
 trail or portage
 Boundaries:
 provincial, with monument
 district
 township
 park, reserve, etc.
 Power line; Telephone line
 Horizontal control point, with elevation
 Astronomical monument
 Bench mark, with elevation
 Spot elevation; precise, approximate
 Spot or snow out

MILLS LAKE

DISTRICT OF MACKENZIE
 NORTHWEST TERRITORIES

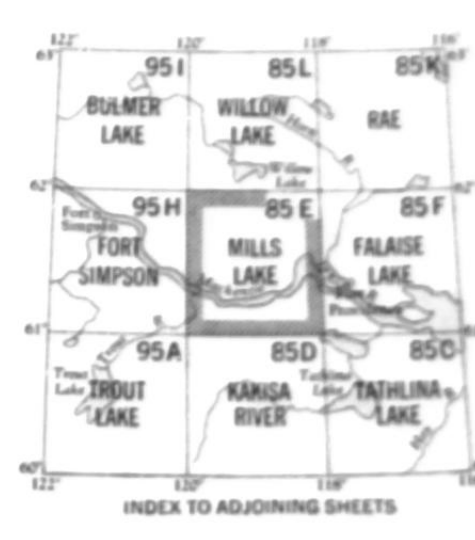
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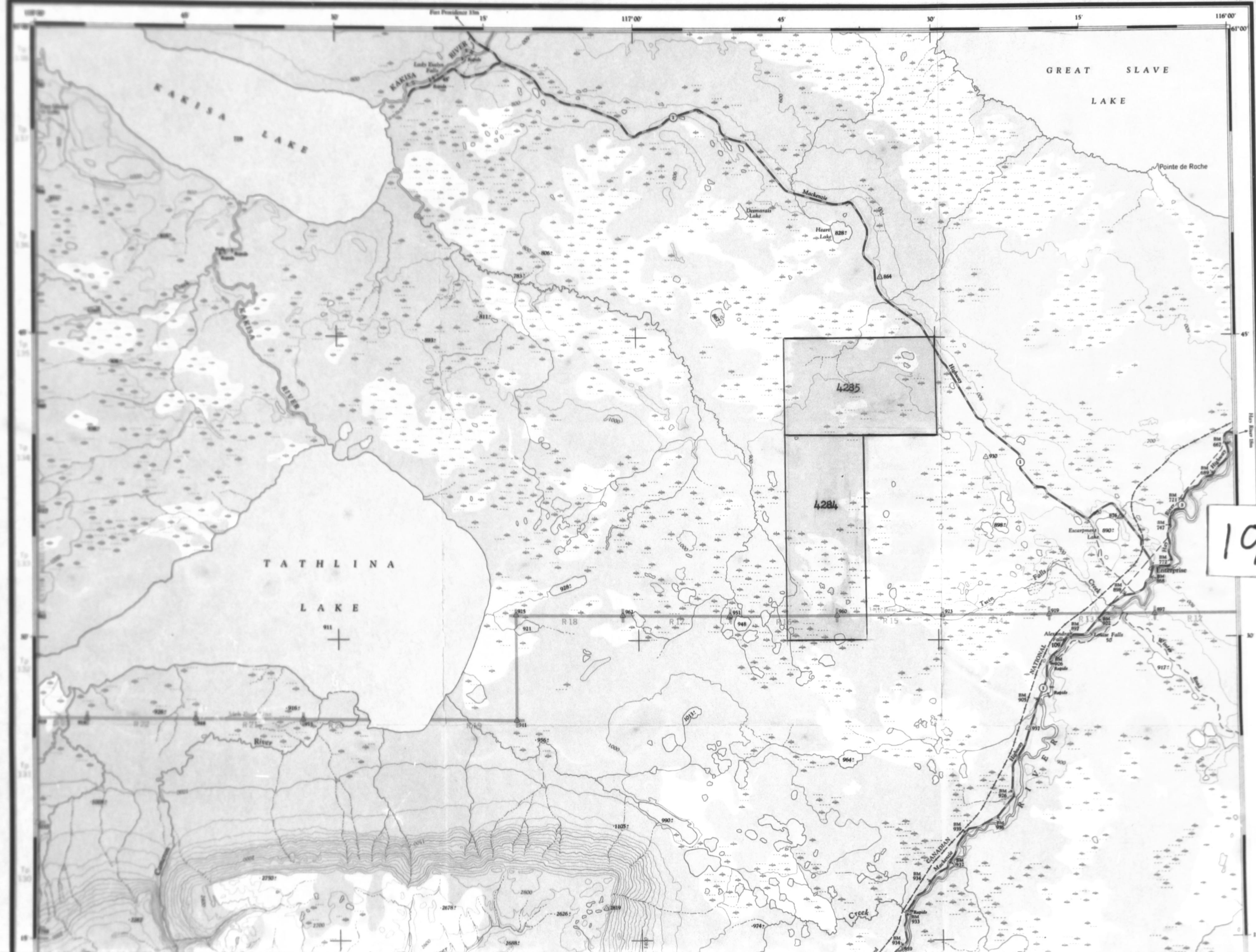


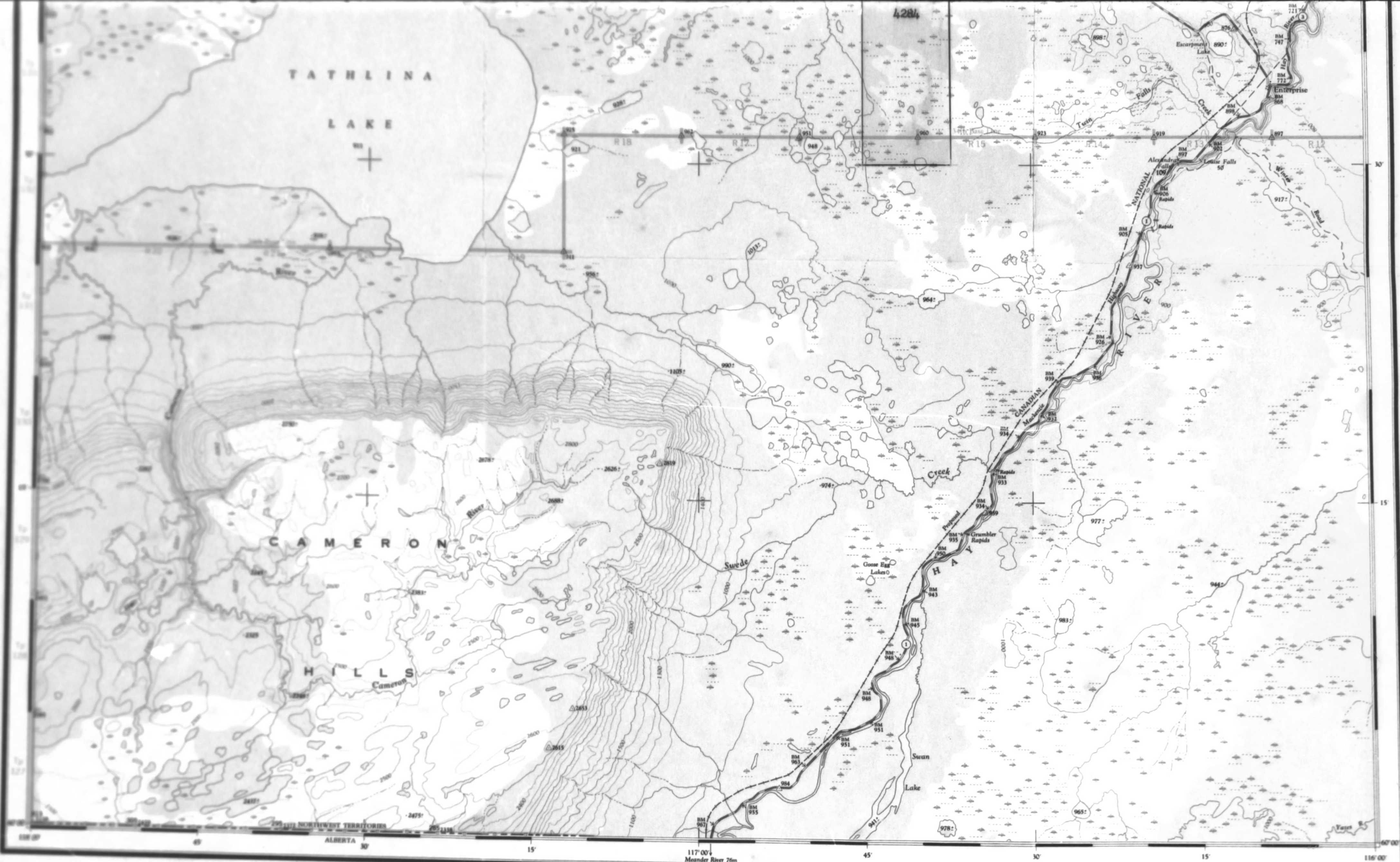
2 of 2

Contour Interval 100 Feet
 Elevations in Feet above Mean Sea Level
 Transverse Mercator Projection
 North American Datum 1927
 Preliminary 1952

- House; Building
 Post Office; School; Church
 Radio Station
 R.C.M.P. Detachment; Tower
 Cliff or low relief
 Esker; Pingo
 Swamp or marsh
 Intermittent lake, stream
 Indefinite lake, stream
 Rapids, large, small; Bridge
 Icefield or Glacier
 Dry river bed
 Contours:
 elevation
 depression







THE DECLINATION OF THE COMPASS NEEDLE, 1960

The declination of the compass needle of any place along a red line is the declination given on that red line. At other places the declination is between those given on the neighbouring red lines, then at the place marked A, the declination is between 85°00'E and 85°02'E. The declination of the compass needle is 1960.

Produced by the ARMY SURVEY ESTABLISHMENT, R.C.E. 1957-60.
Aerial photography 1950.

TATHLINA LAKE

DISTRICT OF MACKENZIE
NORTHWEST TERRITORIES

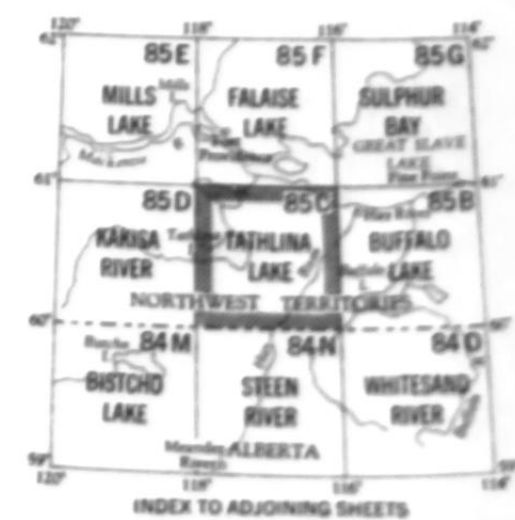
Scale 1 : 250,000



- Roads:
open surface, all weather
dry weather
cart track or winter road
trail or portage
- Boundaries:
provincial, with monument
district
township
park, reserve, etc.
- Power line, telephone line
Horizontal control point, with elevation
Astronomical monument
Bench mark, with elevation
Spot elevation, precise, approximate
Sand or gravel pit

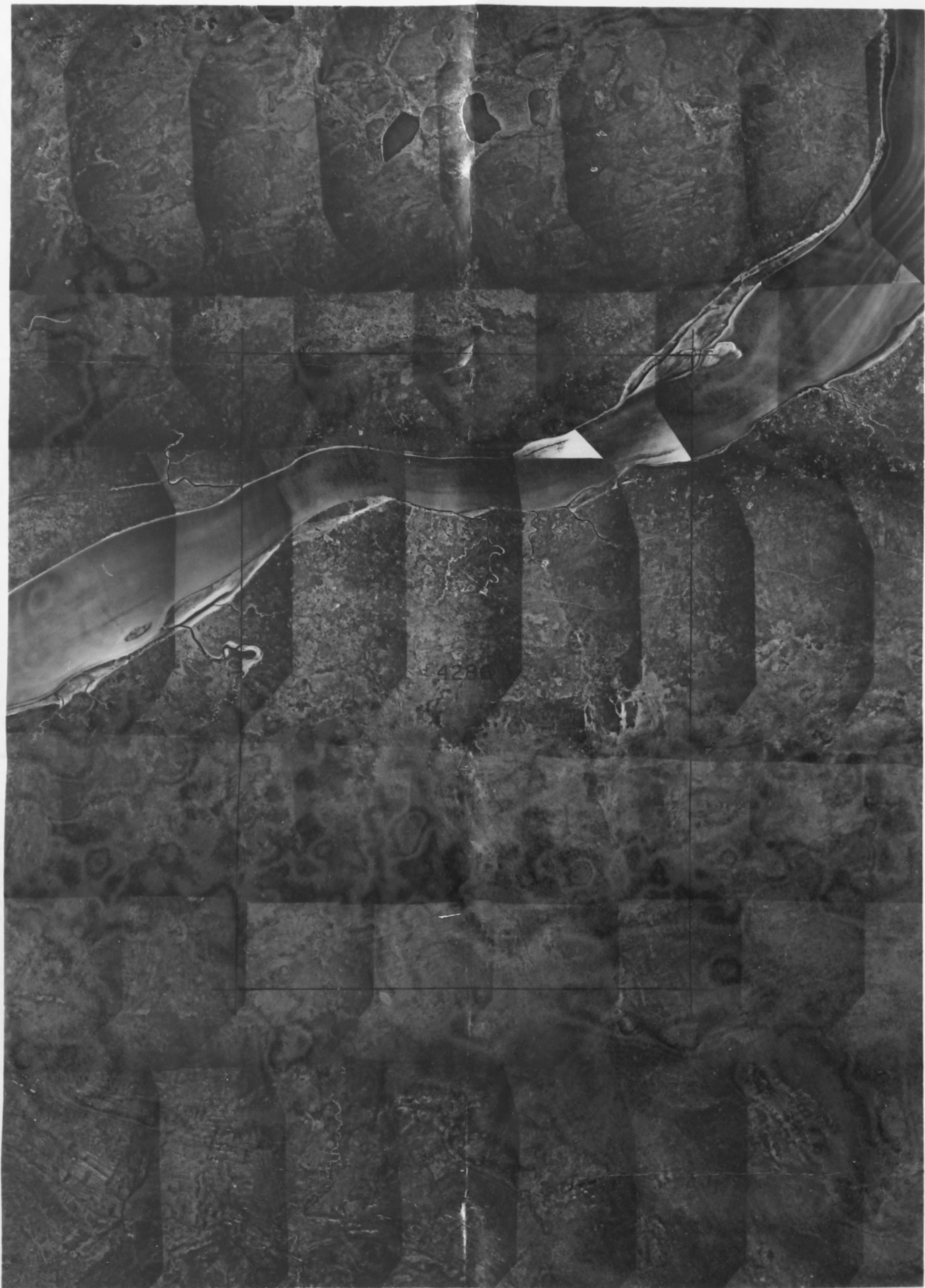
Contour Interval 100 Feet
Elevations in Feet above Mean Sea Level
Transverse Mercator Projection
North American Datum 1927

- House, Building
Post Office, School, Church
Radio Station
R.C.M.P. Detachment, Tower
Cliff or low relief
Esker, Pingo
Swamp or marsh
Intermittent lake, stream
Indefinite lake, stream
Rapids, large, small, Bridge
Icefield or Glacier
Dry river bed
Contours:
elevation
depression
Wooded area



Copies may be obtained from the
Map Distribution Office,

2 of 2



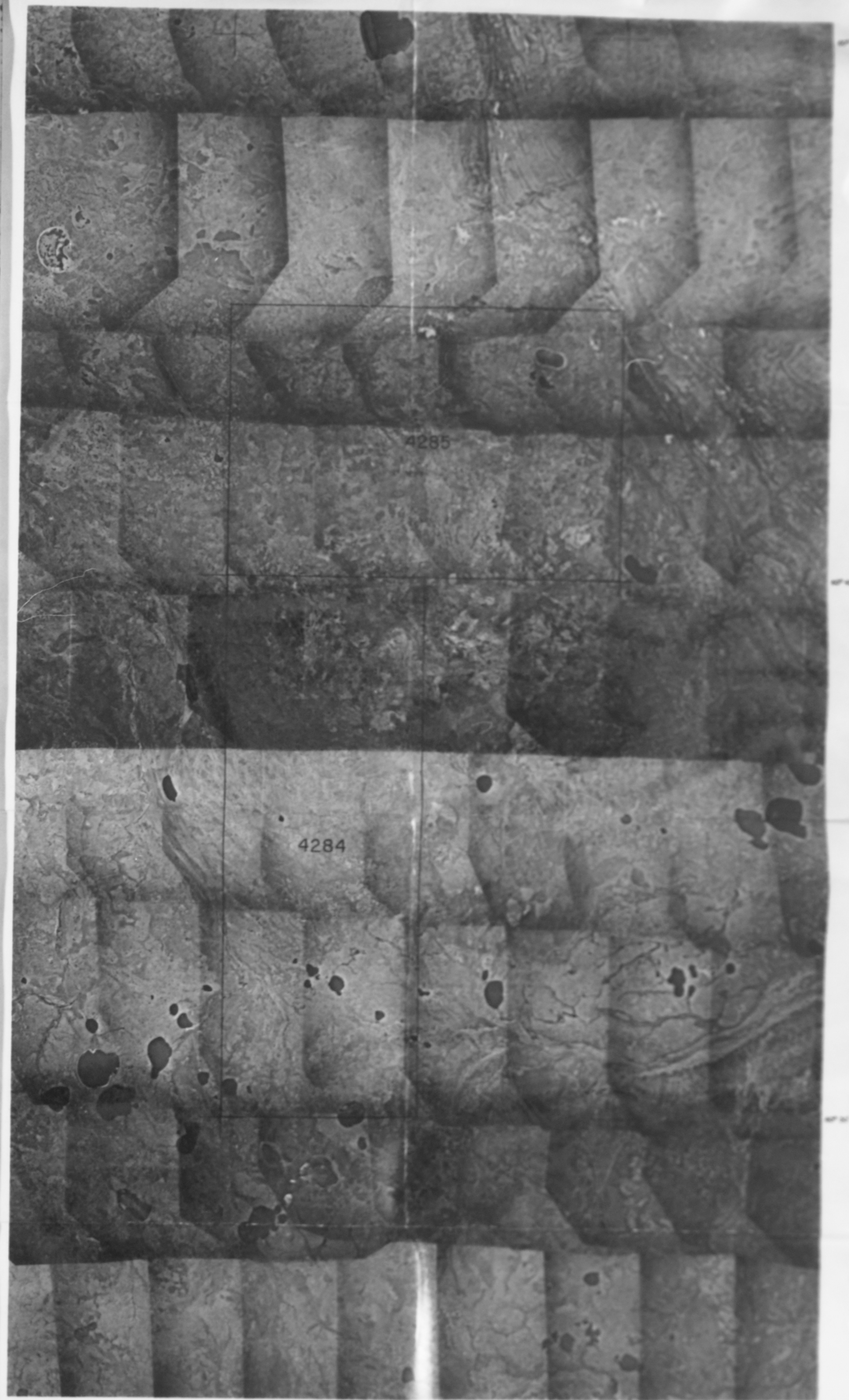
NNEW CONTINENTAL OIL COMPANY OF CANADA LIMITED

PHOTO MOSAIC

N. W. T. PERMIT 4286

SCALE: ONE INCH = ONE MILE

W. B. GALLUP
OCT 1965



NNEW CONTINENTAL OIL COMPANY OF CANADA LIMITED

PHOTO MOSAIC

N. W. T. PERMITS 4284 & 4285

SCALE: ONE INCH = ONE MILE

W. B. GALLUP
OCT 1965

6° 30'

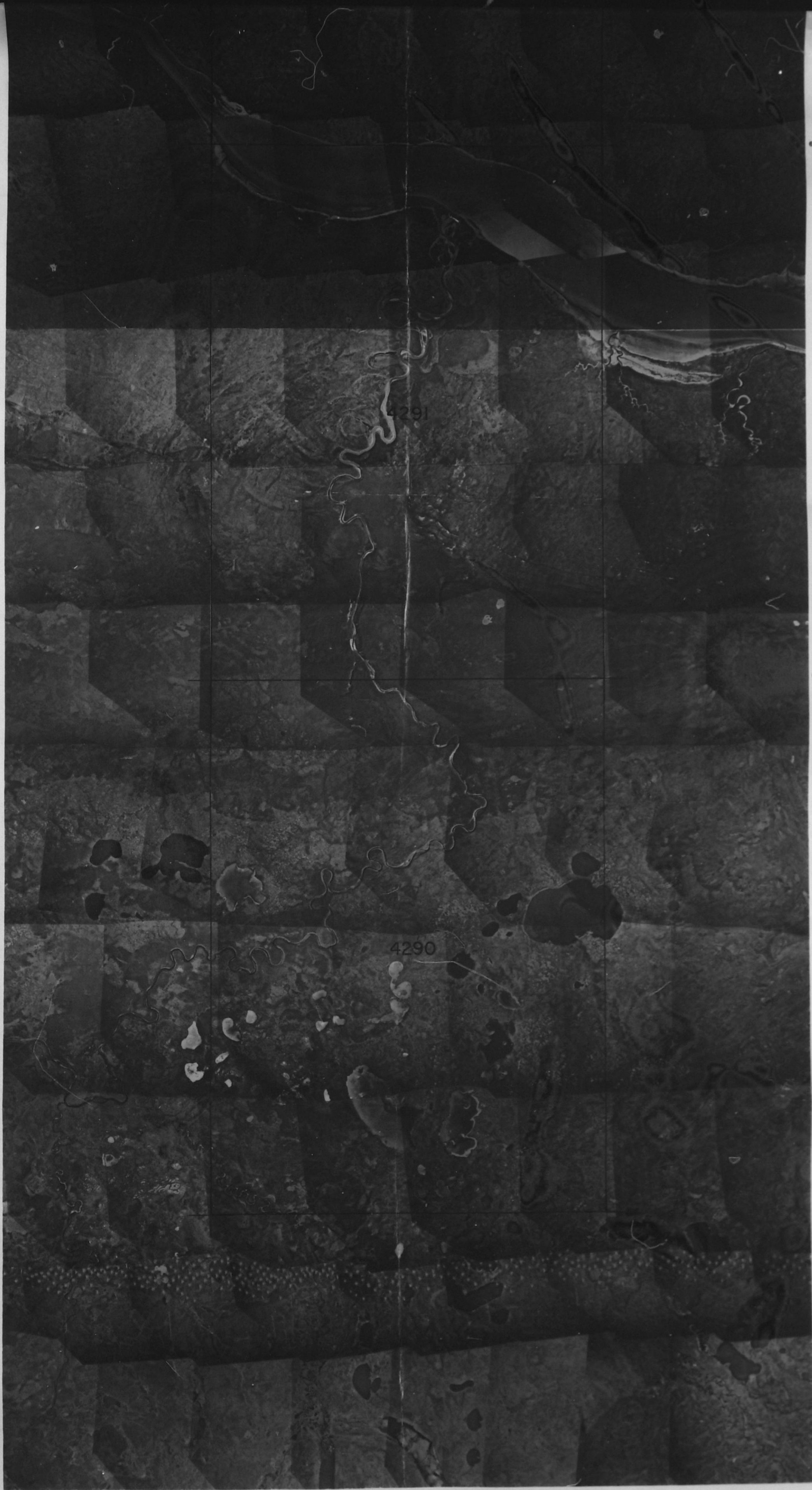
4292

6° 20'

4291

6° 10'

4290



61° 20'

61° 10'

61° 00'

120° 00'

119° 40'

NEW CONTINENTAL OIL COMPANY OF CANADA LIMITED

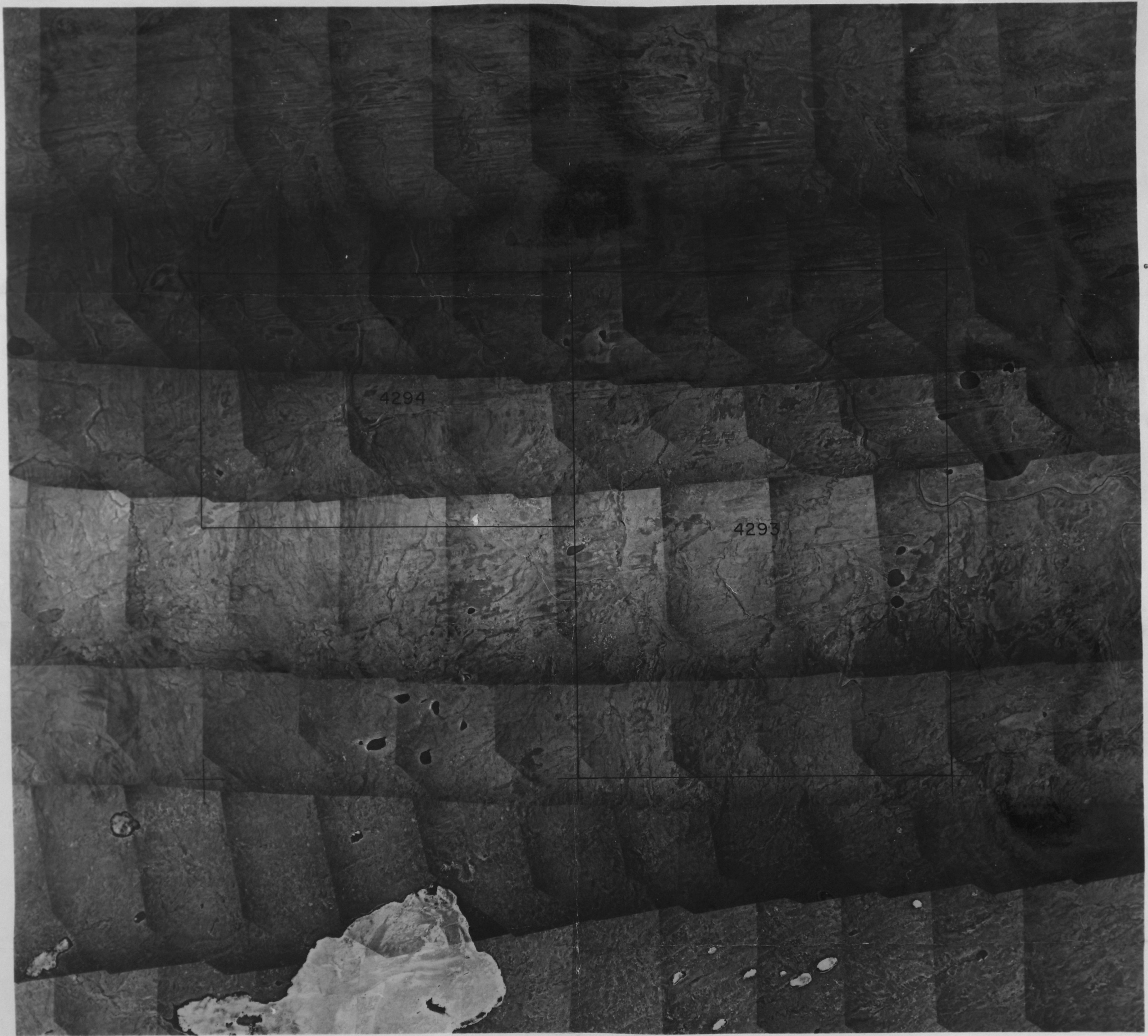
PHOTO MOSAIC

N. W. T. PERMITS 4290, 4291 & 4292

SCALE : ONE INCH = ONE MILE

W. B. GALLUP
OCT 1965

2 of 2



NEW CONTINENTAL OIL COMPANY OF CANADA LIMITED

PHOTO MOSAIC

N.W.T. PERMITS 4293 & 4294

SCALE : ONE INCH = ONE MILE

W. B. GALLUP
OCT. 1965

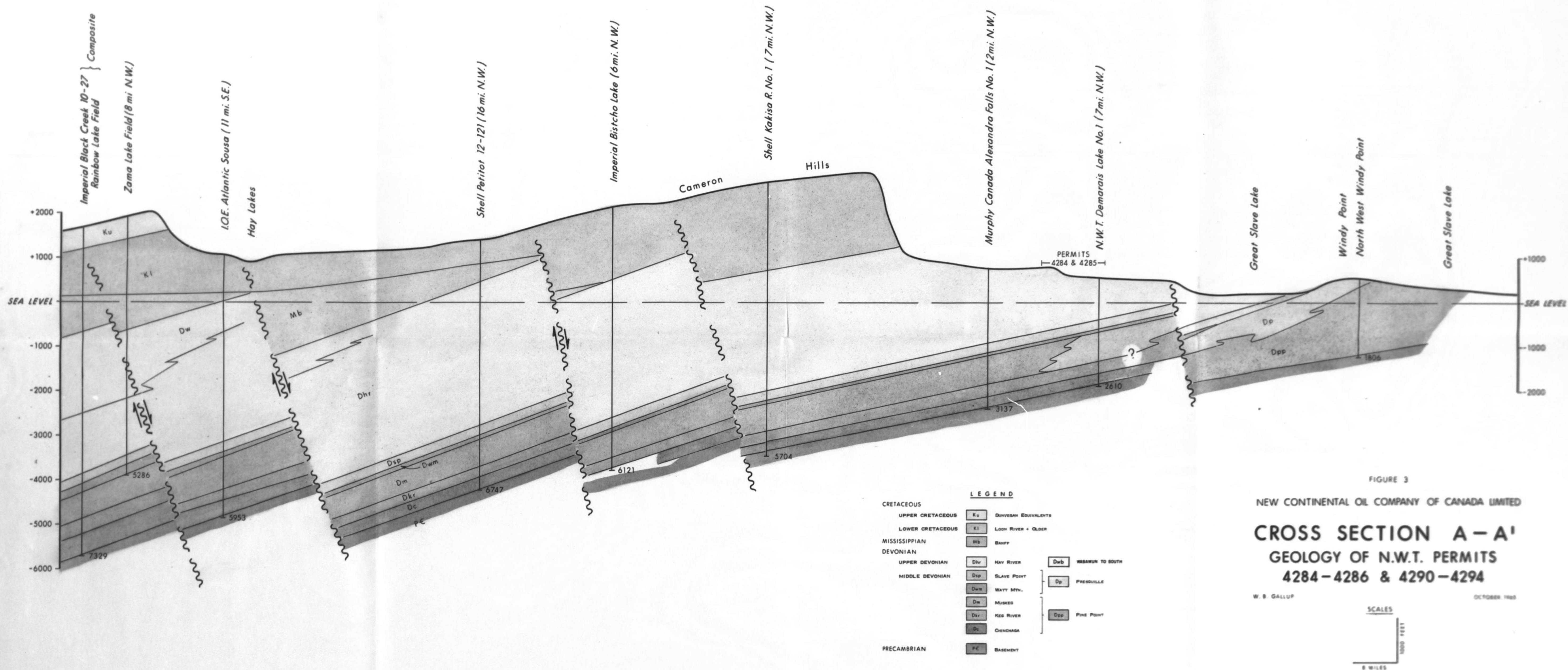


FIGURE 3

NEW CONTINENTAL OIL COMPANY OF CANADA LIMITED

CROSS SECTION A-A'

GEOLOGY OF N.W.T. PERMITS

4284-4286 & 4290-4294

W. B. GALLUP

OCTOBER 1965

