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SUMMARY GEOLOGIC REPORT,  
BEAVERTAIL PERMITS,  
NORTHWEST TERRITORIES.

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Calgary, Alberta.  
April, 1960.

E. H. Vallat.



SUMMARY GEOLOGIC REPORT, BEAVERTAIL  
PERMITS, NORTHWEST TERRITORIES.

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The area with which this report deals is that covered by Permit Numbers 1559 to 1563 in the grids from Latitude  $66^{\circ}50'$  to  $66^{\circ}$  and from Longitude  $128^{\circ}30'$  to  $129^{\circ}$ , and Latitude  $66^{\circ}$  to  $66^{\circ}10'$  and Longitude  $128^{\circ}15'$  to  $129^{\circ}$ , designated the Beavertail permits. These are south of Fort Good Hope and partly along the Mackenzie River, Northwest Territories, which cuts the southwest and northwest corners of the group.

This report is compiled with information from the files of Peel Plateau Exploration Consolidated Ltd., unpublished data on work by other geologists and reports published by Canadian Geologic Survey. Special reference is made to a "Geologic Report South Fort Good Hope Area" by William F. Wuest, March 1959. Much background data of fundamental character was obtained by Peel geologists during the surface mapping seasons from 1953 through 1959. Airplane reconnaissance was done for these permits in 1958 and 1959. Surface mapping with helicopter support had to be abandoned the last half of August 1958 on account of weather. In 1959 weather again forced postponement of work during the part of the season when men and air support was available. Considerable guidance has been obtained from photogeologic studies by the several Peel geologists who have worked in the vicinity of these permits as well as some geomorphic interpretation done by Frank A. Melton.



### TOPOGRAPHY

Except for the southern part of this group of permits, in the Beavertail Anticline area which physiographically is a spur of the Franklin Mountains to the southeast, the area is typically low relief except where the Mackenzie River has incised itself as it cuts the southwest and northwest corners of these permits. The surface is grooved by glaciers and is covered by the numerous small lakes, ponds and muskegs characteristic of the Mackenzie delta region. The major drainage is to the southwest and west, but there are many anomalous patterns developed, which require further analysis as to possible structural significance. Outcropping bedrock is practically non-existent, except for Beavertail Anticline and along the banks of the Mackenzie River.

### STRATIGRAPHY

Cambrian. Approximately forty miles south of the boundary of the Beavertail permits, about 4000 feet of strata consisting of quartzitic sandstone, quartzite, shale, and siltstone with a minor amount of limestone, are accepted as belonging to the Cambrian era. This sequence should underlie the Beavertail permits.

Ordovician. Some sixty miles to the southwest of these permits on the upper part of Arctic Red River, about 400 feet of black and red argillite, sandstone, and siltstone with some limestone has been identified as of Ordovician age.

These beds may or may not be present in the subsurface under the area of this report.

Silurian. Along Mountain River, Powell Creek and west, forty miles south of the report area, up to 2000 feet of cherty limestone and dolomite is identified as Silurian age. These strata are in localities abundantly fossiliferous with some vuggy intervals. It is most likely they will occur in the subsurface of the Beavertail area. Some potential reservoir capacity is indicated for these stratigraphic units.

Devonian. The oldest rock exposed in the area is locally classified as Bear Rock formation, a brecciated limestone and dolomite which occurs in the core of the Beavertail Anticline and is generally classified as Devonian. Overlying the Bear Rock formation on the flanks and west plunge of Beavertail Anticline is Ramparts formation, an alternating limestone and shale sequence which is widely accepted as being Middle Devonian in age. A questionable occurrence of undifferentiated Devonian occurs in the northeast portion of the permits in an area which seems to be anticlinal.

Cretaceous. The balance of the area is undoubtedly underlain by Cretaceous. These strata are marine and non-marine siltstones and sands.

Quaternary. Alluvium, terrace material, and glacial debris mantle the bedrock of most of the permit area and are most definitely Quaternary or more recent in age.

### STRUCTURE

The Quaternary deposits of glacial material, river terrace deposits, possible ancient lakeshores and alluvium combine to obscure the structure of the area, with the exception of Beavertail Anticline, which, within the area studied, is a dominant feature plunging continuously towards the west. Since Bear Rock formation is exposed in its core, strata of Silurian and Cambrian eras should exist in the sub-surface. However, occurrence of Ordovician is questionable. In the central part of the most north-easterly permit, there is a lower relief, westerly plunging, anticlinal feature, which may expose some Devonian south of the Tsintu River. Otherwise, there are many alignments characteristic of glacial gouging, which, however, could be related to jointing or faulting. More careful appraisal and detailed study of these features should be undertaken in the next season of work.

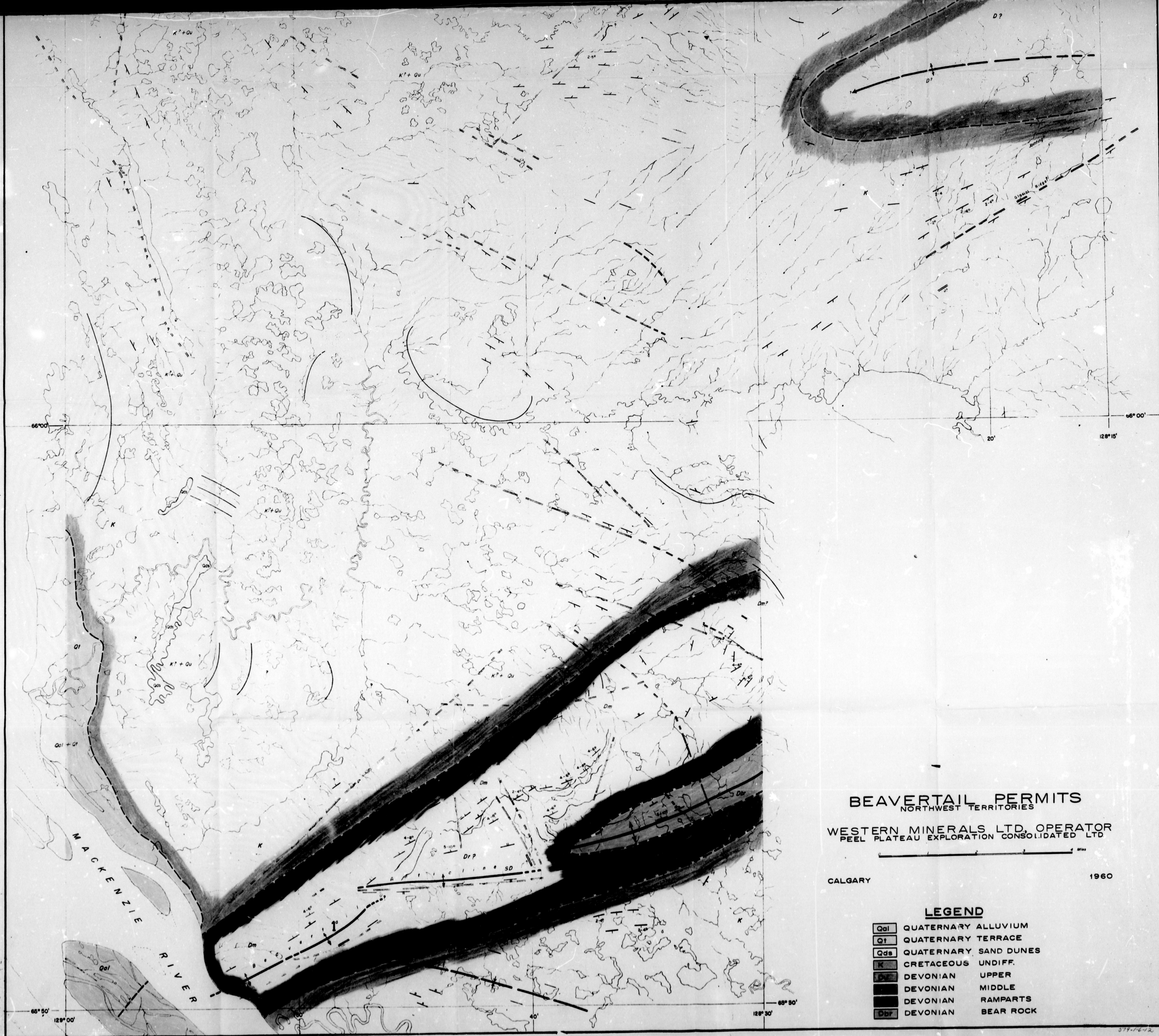
### GENERAL

It is difficult to assess petroleum and natural gas possibilities of the Beavertail permits at this stage until more data are assembled. Further surface mapping should be done followed by appropriate geophysical studies. Decision as to drilling might then be made. Regionally, the whole block is synclinal in aspect and has only the west plunge of Beavertail Anticline as an obvious structural feature with

some accumulation possibilities. Stratigraphic trapping of oil and gas is possible but not necessarily of very high order of promise on basis of present information. A well drilled eight miles south of the boundary of these permits on the west bank of Mackenzie River reported no showings.

*L. J. Vallat*





# BEAVERTAIL PERMITS NORTHWEST TERRITORIES

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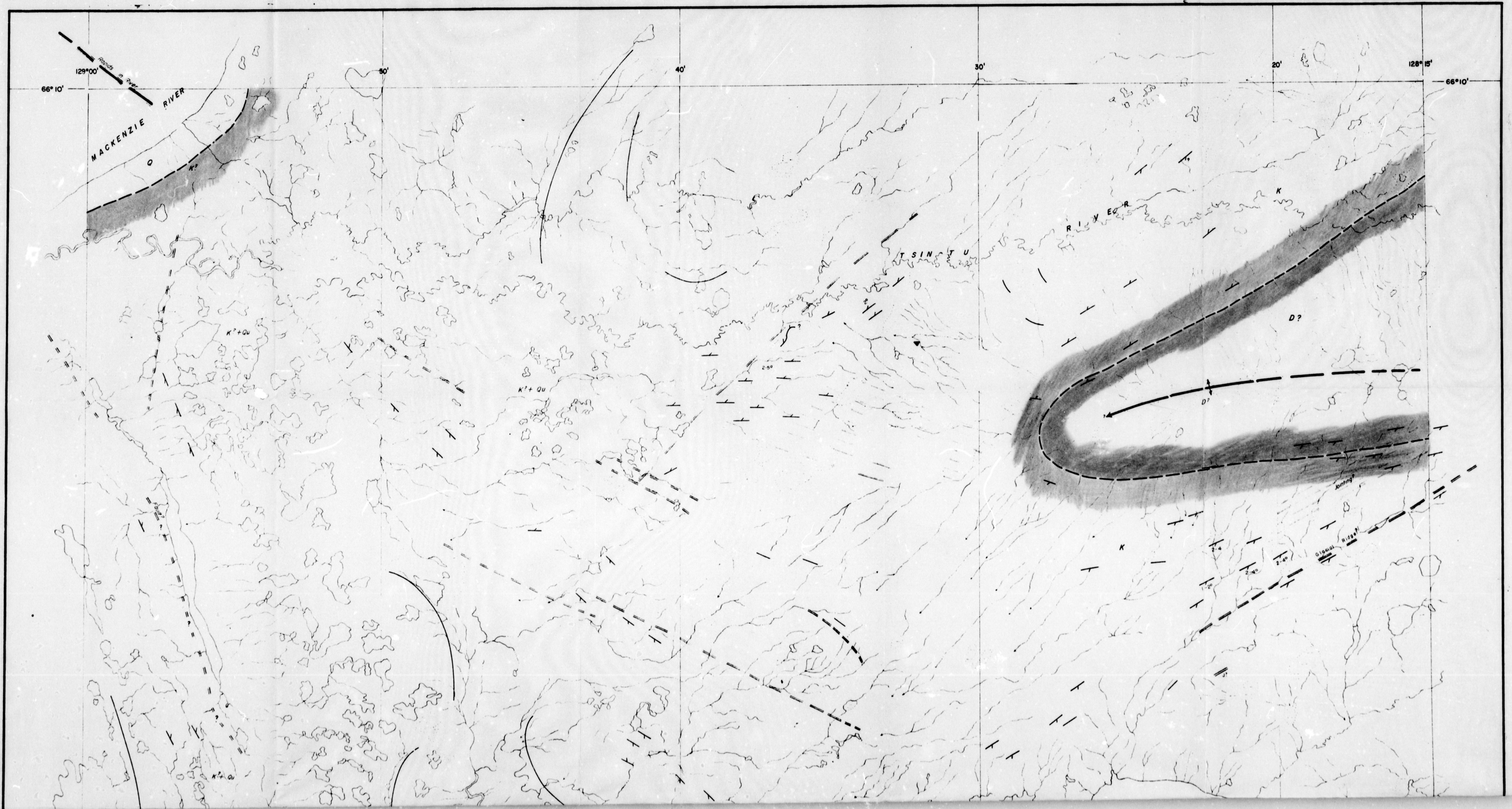
CALGARY

1960

## LEGEND

Qal	QUATERNARY ALLUVIUM
Qt	QUATERNARY TERRACE
Qds	QUATERNARY SAND DUNES
K	CRETACEOUS UNDIFF.
Dm	DEVONIAN UPPER
Dm	DEVONIAN MIDDLE
Dm	DEVONIAN RAMPARTS
Dbr	DEVONIAN BEAR ROCK







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SUMMARY GEOLOGIC REPORT,  
GILLIS RIVER PERMITS,  
NORTHWEST TERRITORIES.

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Calgary, Alberta,  
April, 1960.

By E. H. Vallat.



SUMMARY GEOLOGIC REPORT, GILLIS  
RIVER PERMITS, NORTHWEST TERRITORIES.

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April, 1960.

This discussion is a compilation of geologic studies carried on intermittently from 1953 through 1959 in the vicinity of Permits 1564 to 1567 extending from Longitude  $129^{\circ}30'$  to  $130^{\circ}$  and from Latitude  $66^{\circ}30'$  to  $66^{\circ}50'$ , northwest of Fort Good Hope. The Mackenzie River flows through the two northerly permits.

Background data for this geologic appraisal is taken from the files of Peel Plateau Exploration Consolidated Ltd. as well as Canadian Geologic Survey reports and considerable unpublished data available to the project from other geologists interested in the area. Direct reference is made to an accompanying report entitled "Summary Geologic Report, Beavertail Permits, Northwest Territories", April 1960, as well as a report prepared by William F. Wuest, March 1959, entitled "Geologic Report, South Fort Good Hope Area". To this original control, aeroplane reconnaissance in connection with these particular permits was also done in 1958 and 1959, at the same time it was carried on for the Beavertail permits. Surface mapping, using helicopter transportation, had to be abandoned on this project as well during 1958 and 1959 for the reasons cited in the other report. The same type of photogeologic treatment was given to these permits.



### TOPOGRAPHY

The terrain is one of low relief, except where the Mackenzie River has cut into the old glacial surface. It is largely covered by small lakes, ponds and muskegs, and exhibits the characteristic alignments associated with glacial grooving. Drainage is essentially parallel to the flow of the Mackenzie - that is, northwest, with numerous local anomalous developments which may or may not have some structural significance.

### STRATIGRAPHY

Except for the very southwest corner, and possibly the northeast corner, the area of this report has as bedrock Upper or Middle Devonian sediments. The extreme southwest corner has Cretaceous sediments immediately beneath a veneer of Quaternary glacial debris and alluvium, and the same may possibly be true of the extreme northeast corner. The Ramparts formation of Middle Devonian appears to be the oldest rock exposed, and that occurs along the banks of the Mackenzie River. The bulk of the rest of the area is considered to have Upper Devonian shale covered by a relatively thin mantle of Quaternary glacial debris, river terrace material and alluvium.

Control as to strata that might underlie Devonian Ramparts, the oldest rock exposed, must necessarily be projected a considerable distance, but it is expected that

a reasonable thickness of Silurian formations should be encountered and that these beds have some likelihood of containing sediments in which reservoir capacity is present.

Ordovician strata are less likely to be found, although some may have occurred in a drilling operation to the northwest.

It seems fairly certain that some of the Quartzite, Shale, Siltstone, Limestone and Quartzitic Sandstone characteristic of Cambrian era would be found above Pre-Cambrian. Reference, in respect to these older age rocks, is again made to the report on Beavertail permits.

#### STRUCTURE

A synclinal area seems quite evident in the west central part of this group of permits, with a low relief anticline indicated along the eastern part of the south boundary. Otherwise, the low relief and Quaternary mantle obscure all other leads except that which might be taken from the glacial grooving which is generally aligned in a northwest-southeast trend, but does show some variations that might have structural significance. Further investigation of these possible leads should be undertaken in the coming season.

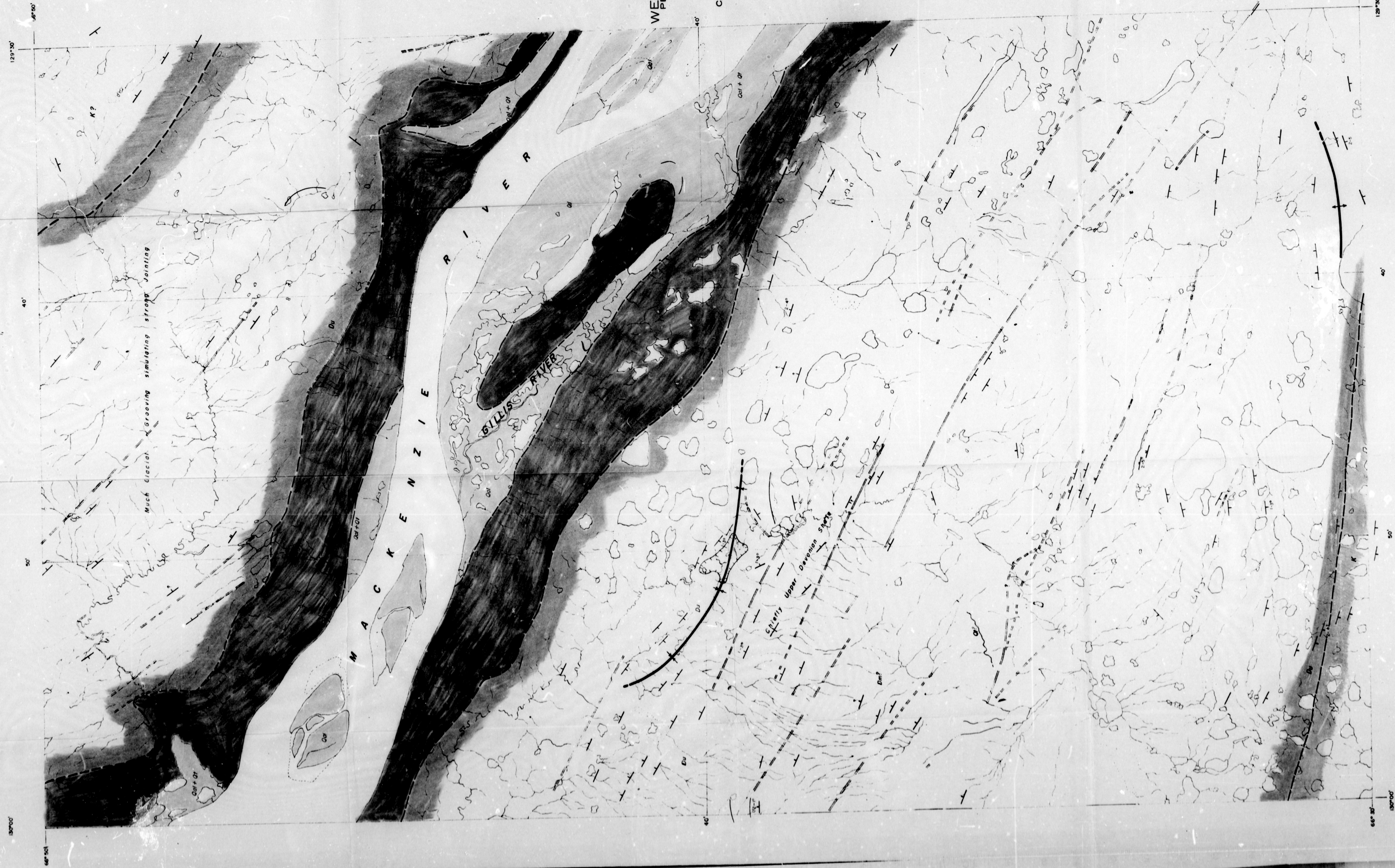
#### GENERAL

Petroleum and natural gas possibilities within these permits have some appeal, although it is impossible to develop very much positive evidence in support of this. It is known

that fairly extensive seepage areas are found to the northeast and that the rocks from which these seepages issue should underlie the area of these permits. Furthermore, drilling in the region, even though some miles away from the permits, is reported to have encountered evidence of oil and gas, although no producible accumulations are known. There is little to develop a great deal of enthusiasm for structural entrapment, but the possibility of such certainly does exist. Furthermore, stratigraphic trapping of oil and gas deserves consideration, although we have insufficient data to develop much of a picture in respect to this.

*Ervallet*





**GILLIS RIVER PERMITS**  
NORTHWEST TERRITORIES

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**LEGEND**

Qd1	QUATERNARY ALLUVIUM
Q1	QUATERNARY TERRACE
Q9	QUATERNARY GLACIAL
K	CRETACEOUS UNDIFF
Du	DEVONIAN UPPER
Dr	DEVONIAN MIDDLE
Dbr	DEVONIAN RAMPARTS
	BEAR ROCK