

MEMORANDUM PHOTOGEOLOGIC REPORT
OF THE
KAMISA RIVER AREA, NORTHWEST TERRITORIES

Prepared For
MOBIL OIL OF CANADA, LTD.
Calgary, Alberta

By
GEOPHOTO SERVICES, LTD.
Calgary, Alberta

June, 1957

MEMORANDUM PHOTOGEOLOGIC REPORT
OF THE
KAKISA RIVER AREA, NORTHWEST TERRITORIES

Location

The project area is bounded by latitudes $60^{\circ}00'$ and $60^{\circ}25'$ north, and longitudes $119^{\circ}07\frac{1}{2}'$ to $120^{\circ}07\frac{1}{2}'$ west. The area is entirely within the Northwest Territories and comprises approximately 1,000 square miles.

Photography

The air photographs used in this evaluation were obtained from the Royal Canadian Air Force. The cameras used were equipped with six-inch focal length lenses, and the scale of the photography is approximately 1:36,000. The quality of the photography is generally good. Stapled, uncontrolled mosaics of the project area were constructed by Geophoto Services, Ltd. by carefully matching photo detail of alternate prints along flight lines. Scale control for these mosaics was afforded by identification on the air photographs of hydrographic and geographic features shown on published topographic and geographic maps of the area. The mosaics were then copied photographically and reduced to the scale of the base map, 1 inch to 1 mile. All information derived from the stereoscopic examination of the air photographs was transferred to the acetate overlays of the mosaic prints. The acetate overlays served as the medium of transfer of information to the base map.

Geology

Nature of Outcrops

The entire area is covered with a variable thickness of glacial drift with no bedrock apparent on the air photographs.

Regional Geomorphology

The project area is in the Interior Plains physiographic province. It is about 130 miles east-southeast of the Liard Range, which is the southernmost extension of the Franklin Mountains (Bostock, Geol. Surv., Canada, Memoir 247, 1948, page 13), and about 220 miles west-southwest of the Canadian Shield. A study was made of the stream patterns shown on the Fort Nelson-Kotcho Lake, Hay Lake, Simpson-Liard, and Providence map sheets of the National Topographic Series on a scale of 8 miles to 1 inch. The results of this study are shown on the accompanying regional geomorphic analysis map. A generally circular drainage pattern, roughly 100 miles in diameter, is bounded on the west by the Liard River; on the north by the Blackstone River, the Poplar River, an unnamed tributary of Jean Marie Creek, and a part of Trout River; on the east by the Red Knife River, the headwaters of the Kakisa River, and an unnamed tributary of the Petitot River; and on the south by parts of the Petitot River. The stream pattern is not continuous on the south, but parts of Sahdoanah and Thetlaandea creeks are parallel to the main trend of the Petitot River. This pattern is interpreted here to indicate the presence of a large, circular basin at the north end of the Alberta syncline. The northern arc of this circular pattern is paralleled by a broadly

MEMORANDUM PHOTOGEOLOGIC REPORT
OF THE
KAKISA RIVER AREA, NORTHWEST TERRITORIES

Location

The project area is bounded by latitudes $60^{\circ}00'$ and $60^{\circ}25'$ north, and longitudes $119^{\circ}07\frac{1}{2}'$ to $120^{\circ}07\frac{1}{2}'$ west. The area is entirely within the Northwest Territories and comprises approximately 1,000 square miles.

Photography

The air photographs used in this evaluation were obtained from the Royal Canadian Air Force. The cameras used were equipped with six-inch focal length lenses, and the scale of the photography is approximately 1:36,000. The quality of the photography is generally good. Stapled, uncontrolled mosaics of the project area were constructed by Geophoto Services, Ltd. by carefully matching photo detail of alternate prints along flight lines. Scale control for these mosaics was afforded by identification on the air photographs of hydrographic and geographic features shown on published topographic and geographic maps of the area. The mosaics were then copied photographically and reduced to the scale of the base map, 1 inch to 1 mile. All information derived from the stereoscopic examination of the air photographs was transferred to the acetate overlays of the mosaic prints. The acetate overlays served as the medium of transfer of information to the base map.

Geology

Nature of Outcrops

The entire area is covered with a variable thickness of glacial drift with no bedrock apparent on the air photographs.

Regional Geomorphology

The project area is in the Interior Plains physiographic province. It is about 130 miles east-southeast of the Liard Range, which is the southernmost extension of the Franklin Mountains (Bostock, Geol. Surv., Canada, Memoir 247, 1948, page 13), and about 220 miles west-southwest of the Canadian Shield. A study was made of the stream patterns shown on the Fort Nelson-Kotcho Lake, Hay Lake, Simpson-Liard, and Providence map sheets of the National Topographic Series on a scale of 8 miles to 1 inch. The results of this study are shown on the accompanying regional geomorphic analysis map. A generally circular drainage pattern, roughly 100 miles in diameter, is bounded on the west by the Liard River; on the north by the Blackstone River, the Poplar River, an unnamed tributary of Jean Marie Creek, and a part of Trout River; on the east by the Red Knife River, the headwaters of the Kakisa River, and an unnamed tributary of the Petitot River; and on the south by parts of the Petitot River. The stream pattern is not continuous on the south, but parts of Sahdoanah and Thetlaandea creeks are parallel to the main trend of the Petitot River. This pattern is interpreted here to indicate the presence of a large, circular basin at the north end of the Alberta syncline. The northern arc of this circular pattern is paralleled by a broadly

arcuate alignment made up of parts of the Liard River, Jean Marie Creek, the Mackenzie River, and several unnamed streams flowing into Kakisa Lake. South of Kakisa Lake, there is an escarpment facing north. This is interpreted as indicating general gentle south to southwesterly dip in this area.

As shown on the Providence map sheet, the Cameron Hills are roughly canoe-shaped, and are bounded by a steep outward-facing escarpment. This topography is common in synclinal structures and it is here interpreted as indicating that the Cameron Hills are generally synclinal.

If both of the above interpretations are correct, the structure within the project area must be very broadly anticlinal. The slightly arcuate course of the Petitot River just west of Bistcho Lake, the very clearly arcuate course of the tributary of the Sahdoanah Creek, and the markedly arcuate course of the Fort Nelson River just east of the Poplar Hills, are here interpreted as indicating a possible southwesterly extension of this anticlinal trend which would connect with a culmination or structural high postulated to exist in the Poplar Hills, as explained on pages 15 and 16 in the report on the Liard River Extension Area prepared for the Northern Foothills Agreement by Geophoto Services, Ltd.

The Geologic Map of Canada (1955) shows the contact between the Devonian and Cretaceous to be just below the northern escarpment of the Cameron Hills, and to coincide with the northern arc of the circular drainage pattern described above. This confirms the general impression of gentle, south to southwesterly dip.

arcuate alignment made up of parts of the Liard River, Jean Marie Creek, the Mackenzie River, and several unnamed streams flowing into Kakisa Lake. South of Kakisa Lake, there is an escarpment facing north. This is interpreted as indicating general gentle south to southwesterly dip in this area.

As shown on the Providence map sheet, the Cameron Hills are roughly canoe-shaped, and are bounded by a steep outward-facing escarpment. This topography is common in synclinal structures and it is here interpreted as indicating that the Cameron Hills are generally synclinal.

If both of the above interpretations are correct, the structure within the project area must be very broadly anticlinal. The slightly arcuate course of the Petitot River just west of Bistcho Lake, the very clearly arcuate course of the tributary of the Sahdoanah Creek, and the markedly arcuate course of the Fort Nelson River just east of the Poplar Hills, are here interpreted as indicating a possible southwesterly extension of this anticlinal trend which would connect with a culmination or structural high postulated to exist in the Poplar Hills, as explained on pages 15 and 16 in the report on the Liard River Extension Area prepared for the Northern Foothills Agreement by Geophoto Services, Ltd.

The Geologic Map of Canada (1955) shows the contact between the Devonian and Cretaceous to be just below the northern escarpment of the Cameron Hills, and to coincide with the northern arc of the circular drainage pattern described above. This confirms the general impression of gentle, south to southwesterly dip.

It is interesting to note that the Bowie Lake anticline is reflected by a northward bend in the Muskeg River and a southerly bend in the Petitot River.

Local Geomorphology

In the project area three main topographic types were observed and are indicated on the accompanying terrain analysis map. First, in the southeast corner of the area the topography consists of numerous irregularly shaped lakes and low, rounded hills, and is typical knob-and-kettle topography common in heavily glaciated areas. This area is outlined and indicated by the symbol "K" on the map. Second, along the Kakisa River there are many large glacial grooves trending about south 30° west. This area is also outlined on the map and is labeled "G". Many of the tributaries of the Kakisa River follow these grooves for parts of their courses. Third, on the uplands on either side of the Kakisa River valley, there are numerous low, short ridges trending roughly north 30° west, or at right angles to the grooves described above. These areas are labeled "C" on the map. The latter set of ridges vary widely in the orientation, sometimes joining one another. These ridges are interpreted as deposits of material that occupied crevasses in the last ice sheet to cover the area, which material was dumped when the ice melted. The crevasse fillings appear to control the course of the streams flowing down to the Kakisa River. Kupsch (Williston Basin Symposium, 1956) noted the control of drainage by crevasse fillings in Saskatchewan.

At about 60°15½' north and about 119°27' west, is a steep-sided

valley about 4 miles long, presently occupied by only a very minor stream and some sloughs. At the west end of the valley is a delta, apparently deposited in a pro-glacial lake by melt-water streams that carved the valley. Locally, other shorter, steep-sided valleys were noted, and they are considered to be melt-water channels also.

Thus, with the possible exception of the main course of the Kakisa River, all of the drainage courses in the project area appear to be determined by glacial deposits and are not indicative of any geologic structure.

Terrain Analysis

As mentioned in the preceeding section, three types of topography have been mapped and are indicated on the terrain analysis map. In the southeast corner of the area, the knob-and-kettle topography labeled "K" is an area of poor drainage with little vegetative cover. Tracked vehicles should encounter no great difficulty in moving on the divides in this area. The area typified by glacial grooving, labeled "G", should offer little obstacle to travel parallel to the glacial grooves; travel being possible along the ridges between the grooves. However, travel across the grain of the country, that is in a northwest-southeast direction, should be difficult, particularly for people moving on foot as one would alternately encounter drained ridges and muskeg filled grooves. The crevasse fillings, labeled "C", should offer no obstacle to the laying out of seismic lines as the ridges are low and can probably be crossed by tracked vehicles with a minimum of difficulty. The chief

valley about 4 miles long, presently occupied by only a very minor stream and some sloughs. At the west end of the valley is a delta, apparently deposited in a pro-glacial lake by melt-water streams that carved the valley. Locally, other shorter, steep-sided valleys were noted, and they are considered to be melt-water channels also.

Thus, with the possible exception of the main course of the Kakisa River, all of the drainage courses in the project area appear to be determined by glacial deposits and are not indicative of any geologic structure.

Terrain Analysis

As mentioned in the preceeding section, three types of topography have been mapped and are indicated on the terrain analysis map. In the southeast corner of the area, the knob-and-kettle topography labeled "K" is an area of poor drainage with little vegetative cover. Tracked vehicles should encounter no great difficulty in moving on the divides in this area. The area typified by glacial grooving, labeled "G", should offer little obstacle to travel parallel to the glacial grooves; travel being possible along the ridges between the grooves. However, travel across the grain of the country, that is in a northwest-southeast direction, should be difficult, particularly for people moving on foot as one would alternately encounter drained ridges and muskeg filled grooves. The crevasse fillings, labeled "C", should offer no obstacle to the laying out of seismic lines as the ridges are low and can probably be crossed by tracked vehicles with a minimum of difficulty. The chief

impediment to travel in this country will be the very common small areas of muskeg. The larger ones are outlined and colored blue, and the medium-sized muskeg areas are indicated by the swamp symbol, but the small, wide-spread muskeg areas are too small to be shown on this scale of a map.

Apart from the muskeg mentioned above, two vegetative types have been distinguished on the accompanying map. They are:

1. Tall timber, which may be tall enough to impede the movement of vehicles.
2. Scrub timber which exists in sparse stands, generally over the entire area. The individual trees in these stands are probably not large enough to be an obstacle to the laying out of shot lines.

Several escarpments are indicated on the map. These are not vertical cliffs, but are generally areas of steep slope in an area of generally very low topography. Movement along the scarps would probably be easy because of the better drainage that could be found adjacent to the steep slopes.

Summary

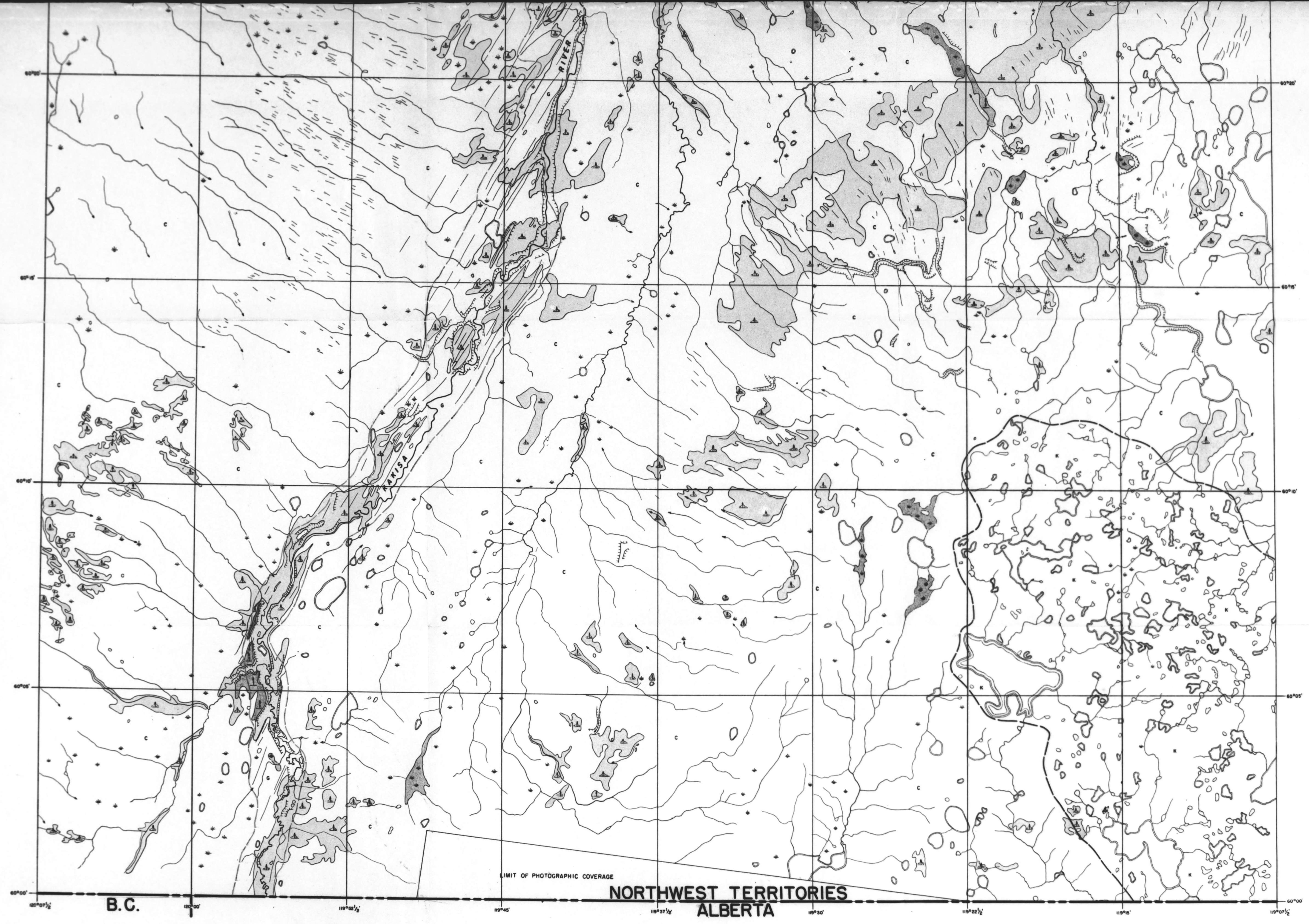
The project area is covered by glacial drift which obscures the bedrock and prevents the obtaining of dip and strike information. All geomorphic features within the area are directly related to glacial activity. A study of regional drainage patterns indicates that the area may be situated on a broad, structurally positive area.

Respectfully submitted,

GEOFOTO SERVICES, LTD.

A handwritten signature in cursive script, reading "Paul Fuenning". The signature is fluid and elegant, with a large loop at the end of the last name.

Paul Fuenning



57-3-4-9
 TERRAIN ANALYSIS
 OF THE
 KAKISA RIVER AREA, N.W.T.

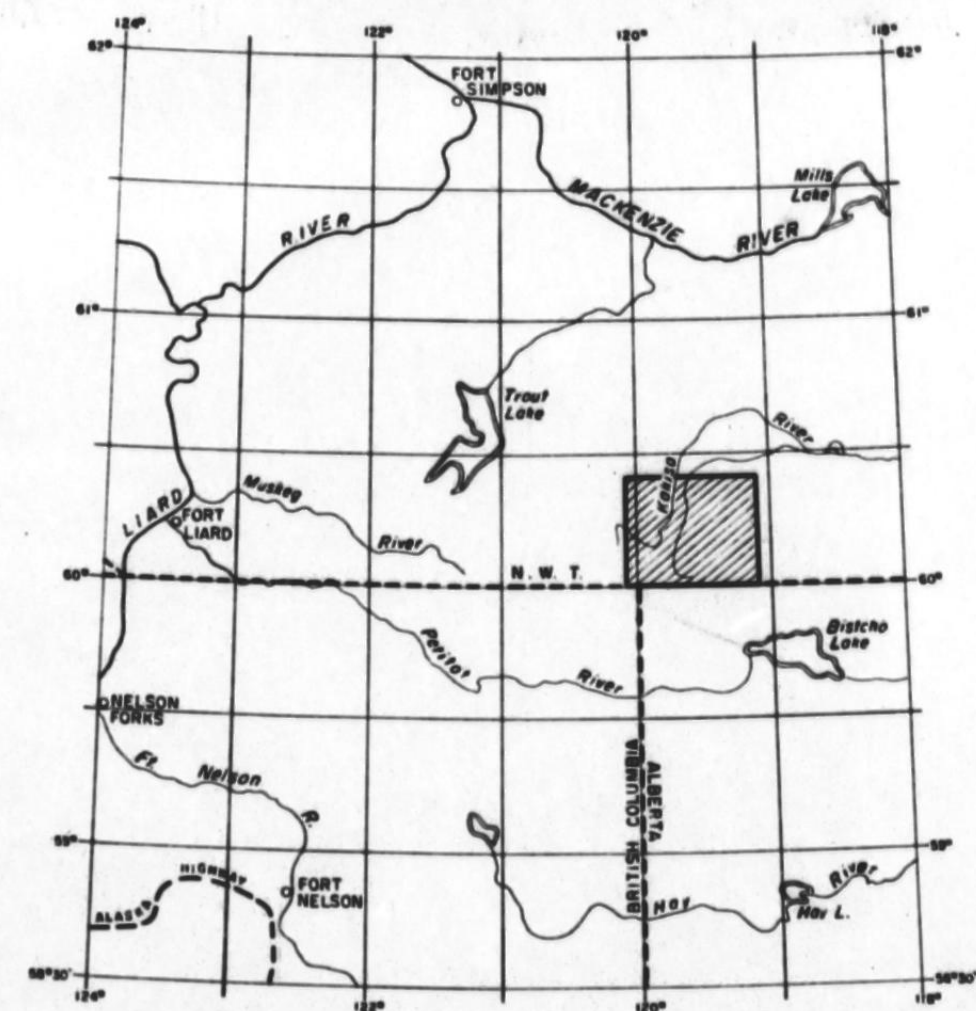


SCALE
 1:50,000 - 1 inch to 1 mile

PREPARED FOR MOBIL OIL OF CANADA, LTD. - JULY, 1957

NOTES

The entire area is covered with a variable thickness of glacial drift with no bedrock apparent on the air photographs.
 This map was prepared entirely from air photographs without benefit of a field check and should not be construed as a final analysis.

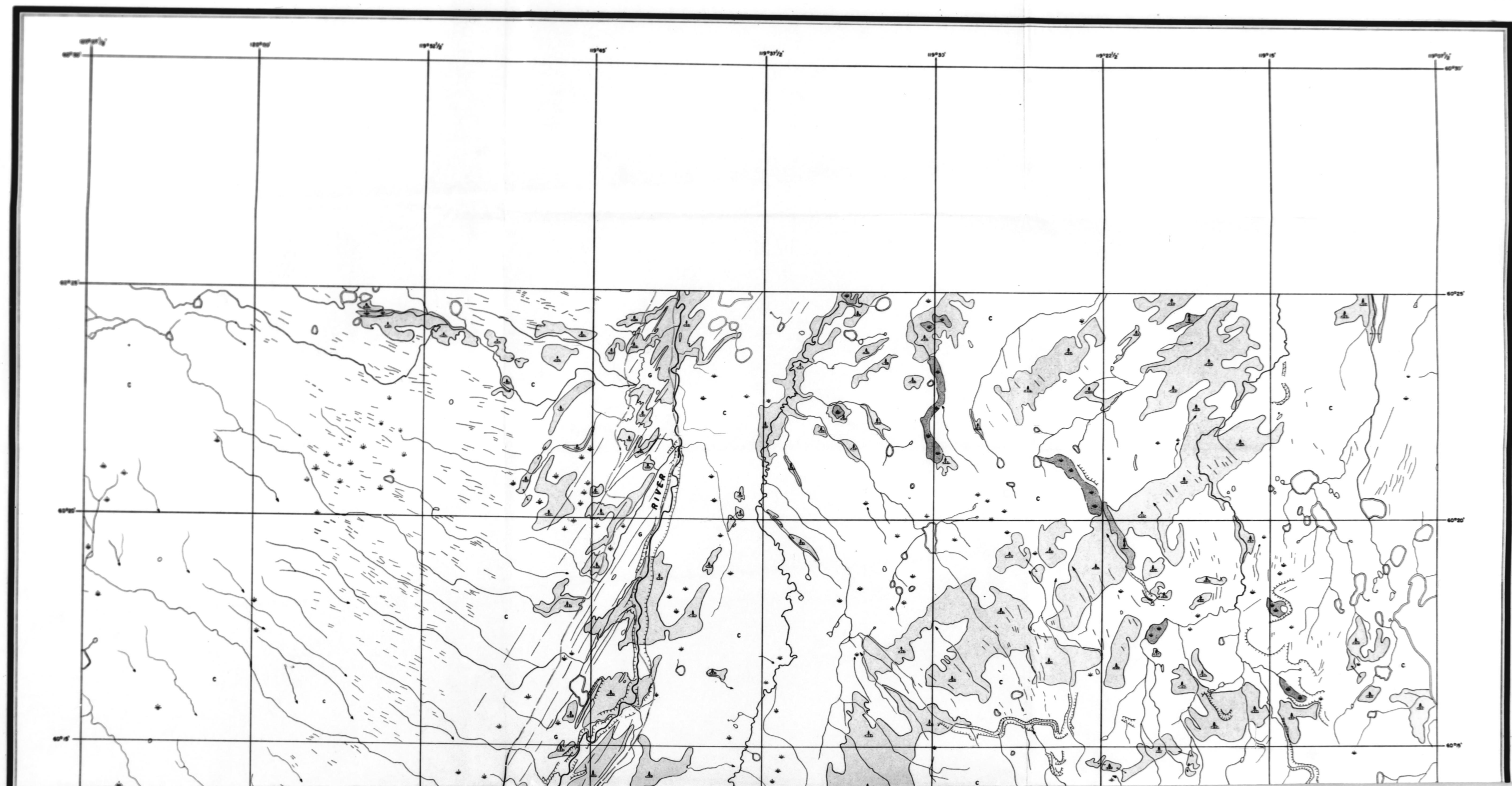


INDEX MAP
 Magnetic declination at center of sheet 30° 30' East

LEGEND

- TERRAIN FEATURES**
- Sparse stand of scrub timber
 - Tall timber, generally spruce forest
 - Intermittent lake (marshy area)
 - Escarpment
 - Marsh or muskeg
 - Stream
 - Lake
- GLACIAL DRIFT FEATURES**
- Crevasse fill, reflected on low ridges
 - Glacial grooves
 - Area dominated by glacial grooves
 - Area dominated by crevasse fillings
 - Area dominated by knob and bottle topography

JAN 2 1958



NATIONAL TOPOGRAPHIC SERIES

Canada
Department of Mines and Resources
MINES, FORESTS AND SCIENTIFIC SERVICES BRANCH
SURVEYS AND MAPPING BRANCH
(Scale 1:50,000 and 1:62,500)

THIRD EDITION (PRELIMINARY)

SHEET 10NAL TOPOGRAPHIC SERIES

Canada
DEPARTMENT OF
Mines and Technical Surveys
SURVEYS AND MAPPING BRANCH
(Scale 1:50,000 and 1:62,500)

SHEET 85 S.W.

