GEOLOGICAL SURVEY OF CANADA
DEPARTMENT OF ENERGY, MINES AND RESOURCES

PRELIMINARY SERIES

LEGEND

			Unit name	Material	Thickness	Topography	Stoniness		
CENOZOIC	QUATERNARY	10	Alluvium and colluvium	Sand, silt, gravel	5' - 20'	Flat to gently rolling	Few stones C 1	FLUVIAL	POST-GLACIAL
		9	Alluvium	Very coarse gravel	10' - 35'	Flat, occasional abandoned channel	Excessively stony C 5	FLUVIAL	POST-GLACIAL
		8	Deltaic deposits	Sand, silt	10' - 70'	Rolling, mounds and ridges	Stone free C 0	GLACIO-FLUVIAL OR FLUVIAL	
		7	High terrace deposits	Silty loam, sand, gravel	10' - 20'	Flat, occasional abandoned channel	Variable C 1 to C 4	GLACIO-FLUVIAL OR FLUVIAL	LAST GLACIATION
		6	Fluvio-glacial deposits	Sand, loamy sand, minor gravel	5' - 30'	Undulating to hummocky	Occasional stones C 0 to C 1	GLACIO-FLUVIAL OR FLUVIAL	LAST GLACIATION
		5	Glacial lake deposits	Clay, silty clay, silty clay loam	5' - 10'	Flat	Stone free C 0	LACUSTRINE	LAST GLACIATION
		4	Glacial lake deposits	Silt loam, silty clay loam, clay	10' - 40'	Flat to rolling	Scattered pebbles C 0	LACUSTRINE	LAST GLACIATION
		3	Ground moraine	Till: clay, clay loam, silt loam	10' - 50'	Generally rolling	Moderately stony C 1 to C 2	MORAINAL	LAST GLACIATION
		2	Hummocky moraine	Till: loam, silt loam, clay loam	10' - 50'	Hummocks and doughnut shaped mounds	Stony C 1 to C 3	MORAINAL	LAST GLACIATION
	TERTIARY	1	Hill top gravels	Conglomerate: gravel, sand	15' +	Flat to rolling plateaux, deep steep-sided valleys	Excessively stony C 5	FLUVIAL	PALEOCENE

Bedrock, Lower Cretaceous sandstones and shales, exposures along steep valley sides .... R

Geological boundary (defined, assumed) ....

Slumps; on steep slopes, generally in bedrock ....

Moraine ridge (prominent, subdued) ....

Glacial fluting ....

Esker ridge ....

Terrace escarpment ....

Meltwater channel or small spillway (direction of stream flow indicated where known) ....

Glacial lake spillway ....

Dunes (parabolic, linear) ....

Small ice marginal channel (direction of stream flow determined, not determined) ....

Glacial lake shoreline (wave cut) ....

Geology by D. A. St-Onge, 1965

Material and stoniness categories according to:
Soil Survey Manual, U.S. Dept. Agriculture Handbook
No. 18, 1951

Geological cartography by the Geological Survey of Canada, 1966

Road, all weather .... Route 43

Other roads ....

Cart track ....

Trail ....

Railway ....

Airstrip ....

Township or range boundary ....

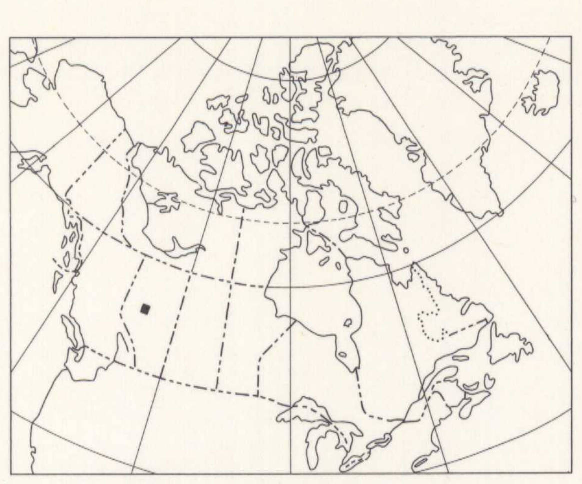
Intermittent stream ....

Marsh ....

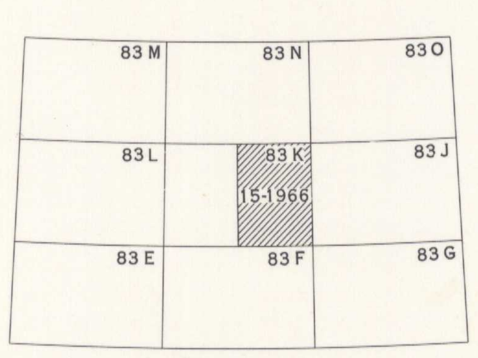
Contours (interval 200 feet) 3000

Base-map compiled and drawn by the Surveys and Mapping Branch, 1962

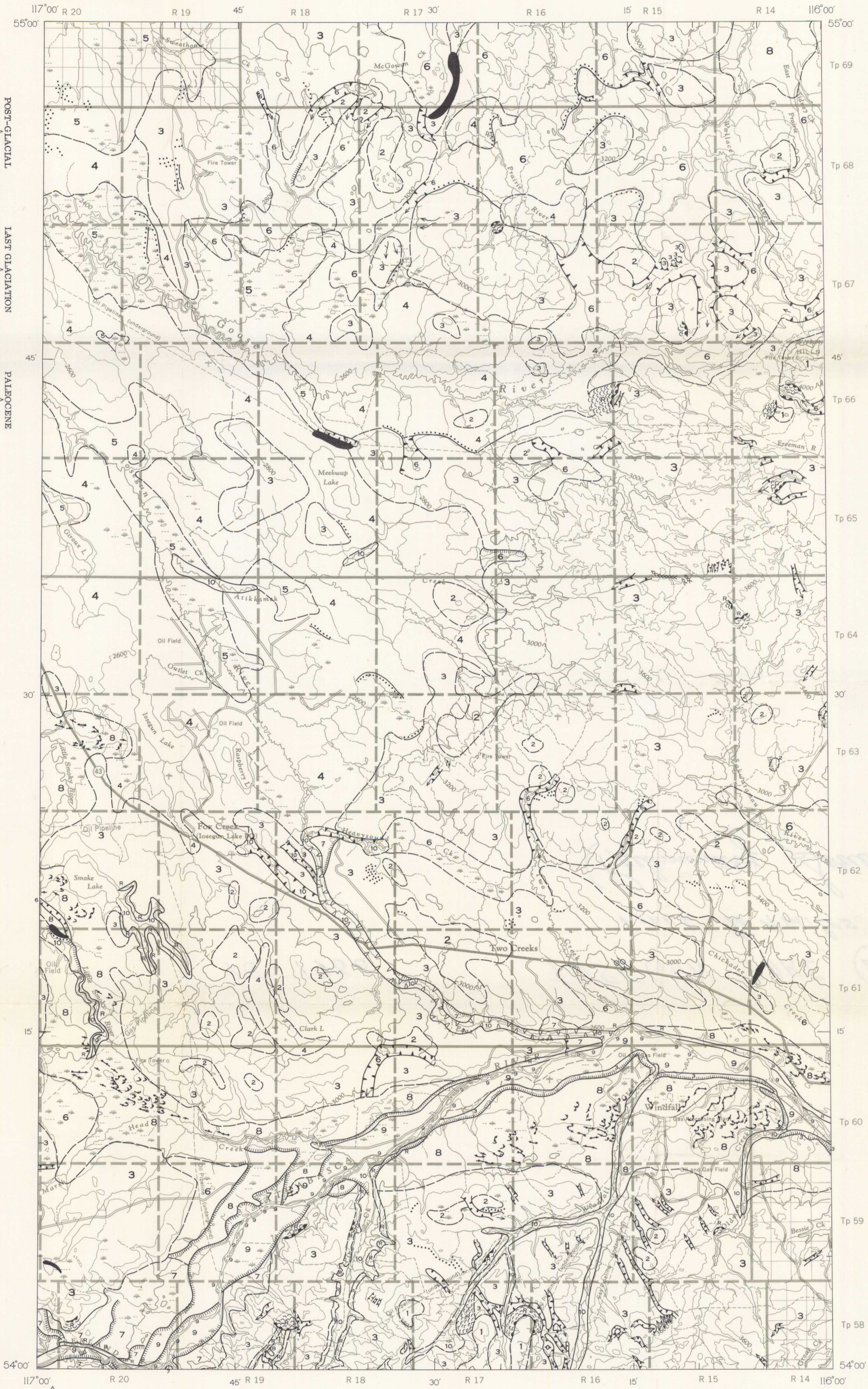
Magnetic declination 1966 varies from 24° 56' easterly at centre of west edge to 24° 43' easterly at centre of east edge. Mean annual change 0.4' westerly.



INDEX MAP



N. T. S. REFERENCE



Published 1967, the Centennial of Canadian Confederation
1867 1967

MAP 15-1966

SURFICIAL GEOLOGY

IOSEGUN LAKE

(East Half)

WEST OF FIFTH MERIDIAN

ALBERTA

Scale 1:253,440
1 inch to 4 miles

Miles 4 0 4 8 12 Miles

Kilometres 6 0 6 12 18 Kilometres

Copies of this map may be obtained from the Director, Geological Survey of Canada, Ottawa
Printed by the Surveys and Mapping Branch

DESCRIPTIVE NOTES

Physiography

In general the terrain of the Iosegun map-area is moderately to strongly rolling with a regional slope to the northwest.

For the purpose of these notes, provisional names have been assigned to the main physiographic units.

Windfall Ridge, a flat-topped conglomerate-covered, deeply dissected upland lies along the southern border of the map-area. Steep slopes and local relief in excess of 800 feet typify this part of the area. A similar, more sharply defined upland, comprising the western extremity of the Swan Hills, is located in the northeast sector of the area.

The Athabasca River flows in a major valley, which is 1,000 feet deep and 2 to 8 miles wide and is characterized by numerous gravel and sand terraces. The Athabasca has all the characteristics of an actively eroding river whose seasonal discharge is extremely irregular; these characteristics include tree-covered islands, sand bars and very steep banks.

The Athabasca Ridge north of the valley is broad and smoothly rounded. The local relief of its moderately rolling surface rarely exceeds 50 feet.

The northwest sector of the map-area is a gently rolling plain with several lakes and extensive muskegs. The Iosegun and Goose Rivers flow in narrow valleys trenched into the plain. East of this lowland, between the Swan Hills and Athabasca Ridge, is a very hilly region with local relief of 200 to 400 feet. Deep valleys and steep slopes are the main characteristics of this dissected physiographic unit.

The Prairie River Ridge extends northwesterly from the Swan Hills across the northeastern part of the area. Its broad, rounded crest is cut by several wind gaps. Like the Athabasca Ridge, its surface relief is generally less than 50 feet.

The northeast corner of the map-area is a deeply dissected hilly region. Local relief is commonly in excess of 200 feet.

The various physiographic units have been carved out of essentially flat-lying, Lower Cretaceous sandstone and shale. Although sandstone and shale are found in each physiographic unit, sandstone is the principal bedrock type underlying the hills and ridges, while shale dominates in the lowlands. The Swan Hills and Windfall Ridge are capped by a Tertiary conglomerate several tens of feet thick.

Surface Material

Throughout most of the map-area, the shale and sandstone bedrock is covered by 10 to 25 feet of unconsolidated overburden. On slopes of more than 10 degrees, the overburden is thin and discontinuous, whereas on floors of major valleys it attains a thickness of up to 100 feet. As is evident from the map legend, these materials are largely glacial, glacio-fluvial, and glacio-lacustrine in origin. They consist mainly of material derived from the local bedrock, although the till contains erratics of granitic rocks and other materials derived from the Canadian Shield. Some river deposits contain quartzite and other rock types from sources in the Rocky Mountains.

Typically the till is a relatively compact silt loam or clay loam, containing irregular pockets of sand and cobbly sand. Distorted lenses of bedrock are common. Near the Swan Hills large quantities of cobbles have been incorporated in the till; these have been concentrated on the surface by rill erosion on moderate to steep slopes. Tills of different characteristics, ranging from bouldery hard-pan to silty-clay loam have been recognized in various parts of the map-area. Most of these different characteristics have probably been caused by variations in type of bedrock and/or by the nature of pre-glacial material.

The glacio-fluvial deposits are varied in composition, ranging from cobbly sand to loamy sand. In the inaccessible northeast sector of the area glacio-fluvial and glacio-lacustrine deposits have not been clearly differentiated. Limited information indicates extensive fluvio-glacial deposits and glacial lake deposits with numerous ice rafted cobbles.

The glacio-lacustrine deposits are rhythmically bedded clay, clay loam, and silty-clay loam. They blanket extensive, poorly drained, marshy lowlands in the western and northwestern sectors of the map-area. The material tends to be finer textured in the central part of the basins and coarser at the margins. Locally numerous pebbles are incorporated in the varved sediments, forming a type of material that is classified as "lacustro-till" on the soils map of the region.

Recent river deposits tend to be relatively fine textured in small valleys and exceptionally coarse along the Athabasca River.

Sequence of Events

During the climax of the last glaciation the continental ice sheet spread across the entire map-area including the tops of the highest hills, although only a few scattered erratic boulders bear witness to its former presence over the summits of the Swan Hills. The last glacier, at least during its waning phases, flowed in an arcuate pattern around the Swan Hills and receded to the north. As the declivity of the land in this area is generally also to the north, numerous and sometimes extensive glacial lakes were formed between the ice-mass and higher land to the south.

The first part of the map-area to become ice-free was the gravel-covered Windfall Ridge in the south. At this stage meltwater was ponded in the broad, pre-existing valleys, such as those of Oldman, Windfall, and Pine Creeks, and drained eastward and southward through small channels to flow ultimately into an early stage of glacial Lake Edmonton. A spillway, occupied at this stage, occurs at an elevation of 3,450 feet, in eastern part of tp. 75, rge. 16, W. 5th mer. At about the same stage, to the west of Pine Creek, meltwater flowed into a lake ponded in the Athabasca Valley southwest of the map-area.

When the ice margin had retreated north of the Athabasca Valley, meltwater was ponded between the ice front and the Athabasca Ridge. This water spilled over the ridge and carved valleys in the sandstone bedrock. From the Smoke Lake area meltwaters flowed south to Little Smoky River, and then eastward through the Marsh Head Creek depression. Similarly meltwater from the central part of the map-area flowed southeastward and cut the Pass Creek channel. Some meltwater also flowed in the lower reaches of Chickadee Creek during this period. All these rivers along with those of the upper reaches of the Athabasca River flowed into an arm of glacial Lake Edmonton, which occupied the Athabasca Valley as far upstream as the junction of the Berland River and brought large quantities of sand into the former lake basin. As the lake level fell, Berland and Athabasca Rivers carved a series of stepped terraces in the southwest corner of the map-area. Also, as the lake lowered, and its shore retreated eastward, streams were able to carry their load farther eastward and built deltas successively along the whole valley bottom from the present Little Smoky River to east of the map-area.

As the ice front receded further north to a position roughly parallel with and adjacent to the present Goose River, a large glacial lake formed at an altitude of approximately 2,800 feet. This vast body of water, which is known as Glacial Lake Rycroft, extended northwestward into the Peace River valley. It emptied into the Athabasca Valley through the Pass Creek spillway. Continuing rapid sedimentation in the Marsh Head Creek depression, combined with a comparatively low level of Lake Rycroft, now caused the Little Smoky River to change its course. The flow across the ridge south of Smoke Lake was reversed from south to north and the river flowed into Glacial Lake Rycroft. A C_{14} date on small shells from a delta deposit west of Smoke Lake suggests that Glacial Lake Rycroft was in existence about 12,000 years ago (radiocarbon age 12,190 ± 350; Date number GSC 508; determination in Geological Survey of Canada Radiocarbon Laboratory). However, further work is needed to establish the validity of this date. Sedimentation within Glacial Lake Rycroft was very uneven and, as a result, materials vary a great deal both in thickness and in composition. Beaches and wave-cut benches are poorly developed and, because of the forest cover, are difficult to identify.

Further retreat brought the ice front to the northeast flank of Prairie River Ridge extending northwesterly from the Swan Hills. Meltwater from this ice front poured into Glacial Lake Rycroft through channels cut across the ridge. Further retreat resulted in formation of a lake between the ice front and Prairie River Ridge; a small remnant ice lobe in McGowan Creek prevented drainage to the northwest. This lake, here called Glacial Lake Allan, first drained south into Glacial Lake Rycroft through a spillway up to a level of 2,925 feet (tp. 68, rge. 17, W. 5th mer.). Continued melting and retreat of the ice freed low ground north of House Mountain and allowed glacial Lake Allan to drain eastward through a spillway at an altitude of 2,600 feet in tp. 71, rge. 11, W. 5th mer., northeast of the map-area. Glacial Lake Rycroft, however, lasted until the Lesser Slave Lake area became ice-free.

MAP 15-1966
IOSEGUN LAKE
ALBERTA