GEOLOGICAL SURVEY OF CANADA
DEPARTMENT OF ENERGY, MINES AND RESOURCES

105 L

PRELIMINARY SERIES

GEOLOGICAL SURVEY OF CANADA
DEPARTMENT OF MINES AND TECHNICAL SURVEYS

SHEET 105 K

LEGEND

CENOZOIC

PLEISTOCENE AND RECENT

- **23** — 23a, stream deposits; gravel, sand, silt; 23b, glacial gravel, sand, silt, clay, till; volcanic ash, bog deposits and soil; few if any bedrock exposures

TERTIARY

- **22** — 22a, basaltic flows, minor shale and conglomerate; 22b, trachytic and basaltic flows; may be younger than 22a
- **21** — Quartz-feldspar porphyry, rhyolite

MESOZOIC

JURASSIC AND/OR CRETACEOUS AND (?) EARLIER

- **20** — 20a, biotite granodiorite and quartz monzonite; minor biotite-hornblende quartz diorite and leuco-quartz monzonite; 20b, biotite-hornblende granodiorite, quartz monzonite, quartz diorite; 20c, augite-hornblende monzonite and syenite; minor mafic rocks; 20d, hornblende diorite; 20e, gneissic granitic rocks

JURASSIC (?) AND CRETACEOUS (?)
UPPER JURASSIC(?) AND LOWER CRETACEOUS(?)
TANTALUS GROUP (5)

- **19** — 19a, chert pebble and cobble conglomerate and sandstone; 19b, conglomerate, shale, sandstone (19b may be early Tertiary)

JURASSIC
LOWER JURASSIC AND LATER
LABERGE GROUP

- **18** — Arkose and conglomerate, sandstone, siltstone, argillite

TRIASSIC
UPPER TRIASSIC
LEWES RIVER GROUP

- **17** — 17a, limestone; 17b, basaltic and andesitic volcanic rocks, conglomerate, greywacke

UPPER TRIASSIC OR EARLIER

- **16** — 16a, andesitic and basaltic flows, breccia, tuff; minor rhyolite breccia and argillite; 16b, limestone and limestone conglomerate and breccia (interbedded with 16a; may represent several limestone units)

MISSISSIPPIAN OR LATER
ANVIL RANGE GROUP

- **15** — Andesitic and basaltic flows, breccia, tuff; diorite, slate, phyllite; minor limestone, chert, carbonaceous shale; local quartz-mica schist and lime-silicate rocks
- **14** — Serpentinite

EARN GROUP (10-13)

- **13** — Thin-bedded chert, argillite, quartzite, minor limestone

MISSISSIPPIAN
LOWER MISSISSIPPIAN

- **12** — KALZAS FORMATION: limestone, minor argillite, limy argillite, chert

MISSISSIPPIAN AND/OR EARLIER

- **11** — CRYSTAL PEAK FORMATION: chert pebble and cobble conglomerate and breccia; minor quartzite
- **10** — Bedded chert, argillite, quartzite, limestone, chert conglomerate
- **9** — 9a, chert pebble and cobble conglomerate, slate, sandstone, greenstone; 9b, greenstone, tuff, cherty argillite, siliceous limestone, chert pebble conglomerate and minor hornfels

MISSISSIPPIAN (?) OR EARLIER

- **8** — 8a, slate, argillite, quartzite, lime-silicate rocks, chert, limestone, minor greenstone; 8b, limestone
- **7** — Dominantly meta-volcanic rocks: 7a, greenstone, greenschist, diorite, quartz-chlorite schist, chert, argillite, limestone; 7b, includes many small bodies of serpentinite
- **6** — 6a, quartz-hornblende-epidote schist, quartz-chlorite-sericite schist, white sericitic quartzite, quartz-mica schist (locally garnetiferous), greenstone, limestone, lime-silicate rocks; 6b, quartz-mica schist (locally garnetiferous), quartzite, marble, amphibolite; 6c, amphibolite and quartz-mica schist; 6d, argillite, phyllite, cherty quartzite, slaty tuff, greenstone, limestone; 6e, sericitic and chloritic quartzite, locally limy, feldspathic, or epidotic, greenstone, phyllite, limestone; 6f, limestone (probably represents several limestone units)

PALAEOZOIC

SILURIAN (?) AND DEVONIAN (?)
SIKON GROUP (?)

- **5** — 5a, quartzite, dolomitic quartzite, slate, argillite; 5b, dolomite, siliceous dolomite, slaty limestone; interbedded with 5a (may represent two carbonate units)

CAMBRIAN (?) AND/OR ORDOVICIAN (?)
MIDDLE CAMBRIAN (?) AND LATER (?)
HARVEY GROUP (2-4)

- **4** — 4a, slate, phyllite, spotted slate, hornfels; 4b, thin-bedded argillite, slaty limestone, minor hornfels

CAMBRIAN (?)
LOWER CAMBRIAN (?)

- **3** — Mainly limestone; phyllite, lime-silicate gneiss, skarn, quartz-biotite schist, slate, hornfels

LOWER CAMBRIAN (?) OR EARLIER (?)

- **2** — 2a, quartzite and quartz-mica schist, locally garnetiferous; minor amphibolite, lime-silicate rocks; marble (includes small bodies of granitic rocks); 2b, marble, lime-silicate rocks, amphibolite, skarn

PROTEROZOIC (?)

- **1** — Red, green, grey slate and quartzite

LEGEND

CENOZOIC

MODERN

- Recent alluvium, glacial deposits, volcanic ash

TERTIARY

- **14** — Andesite, basalt, rhyolite, quartz porphyry

MESOZOIC AND LATER

JURASSIC OR LATER

- **13** — LITTLE RIDGE VOLCANICS: andesite, basalt
- **12** — Granodiorite porphyry, monzonite porphyry, aplite, quartz porphyry, dacite porphyry, ceratophyre
- **11** — Granite, granodiorite, monzonite, diorite
- **10** — Peridotite, hornblendite, serpentine
- **9** — HUTSHI GROUP: andesite, basalt; lava, breccia, tuff
- **8** — TANTALUS FORMATION: conglomerate, sandstone, shale, coal seams

MESOZOIC

JURASSIC

- **7** — NORDENSKIÖLD FORMATION: dacite, tuff, breccia
- **6** — LABERGE SERIES: conglomerate, greywacke, sandstone, argillite, coal seams

TRIASSIC

- **5** — LEWES RIVER SERIES: limestone; LEWES RIVER SERIES: sandstone, argillite — Note. Section is limestone top, sandstone, argillite middle, limestone base. In places, several horizons of limestone, sandstone, argillite interbedded

PALAEOZOIC

CARBONIFEROUS OR PERMIAN

- **3** — Limestone

YUKON GROUP

- **2** — Sheared granodiorite

PRE-CAMBRIAN

- **1** — Quartzite, schists, limestone, gneiss, greenstone

Geological boundary (approximate, assumed)
Glacial striae
Road
Trail or winter road
Telegraph office ..... T.O.
Height in feet ..... 999'

Geology and topography by W.E.Cockfield (in charge), 1929, 1930; E.J.Lees, 1929, 1930, 1931; and H.S.Bostock, 1934.

Approximate magnetic declination, 32°36' East

COPIES OF THIS MAP MAY BE OBTAINED FROM THE DIRECTOR, GEOLOGICAL SURVEY OF CANADA, OTTAWA

MAP 372A

LABERGE SHEET
YUKON TERRITORY

Scale, 1/253,440 or 1 Inch to 4 Miles

Kilometres

Contour interval 500 Feet

PUBLISHED, 1960

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DESCRIPTIVE NOTES

During the summer the map-area is accessible by motor vehicle on the Canol Road as far as Pelly River. Pelly and South Macmillan Rivers can be used by small boats to reach the southern and northern parts, respectively. Numerous lakes, suitable for float- and ski-equipped aircraft, are scattered throughout the map-area.

Ice covered all of the area during the Pleistocene, except possibly the highest peaks. It moved west and northwest along the major valleys.

Unit 1 is a sequence of mainly quartzose, clastic rocks. The best exposed east of Mount Selous. In Nahanni map-area these rocks are overlain, probably unconformably, by limestone of probable Cambrian age, and are, therefore, considered to be late Precambrian. At several places in Tay River and Shotgun Lake map-areas, Ordovician strata (3) lie on light-colored siliceous rocks consisting mainly of light grey to whitish quartzite, grey and brownish quartzite, banded hornfels, and skarn (1a). These rocks (1a) appear to comprise the upper part of unit 1, but owing to complex structure, the stratigraphic sequence of units 1a to 1d has not been firmly established. Unit 1c consists mainly of shales, of which the most easily recognized are green and maroon. They are exceptionally persistent along strike, but outcrop best east of the map-area. The lower part of unit 1 is characterized by massive, grey, quartz-pebble quartzite (1d) interbedded with dark shales. The thickness of unit 1 is not known as its base is not exposed. It is complexly folded and faulted; but it is thought to exceed 10,000 feet.

Unit 2 was recognized only south of Tintina Valley. Most of the rocks in this unit are sheared and more or less phyllitic. The cleavage is at various angles to the bedding. As similar rocks were found in Quiet Lake map-area, in places overlying Lower Cambrian strata and in others underlying Ordovician strata, a tentative Middle and Upper Cambrian age has been assigned to this unit.

In the northern part of Tay River map-area the Precambrian rocks (1) are overlain unconformably by mainly black chert and shale (3) containing Ordovician and Silurian graptolites. These beds are limited in the map-area to the vicinity of South Macmillan River, but are more widespread to the east. The cherts are commonly thin bedded, and more or less silty. The thickness of these strata is probably about 10,000 feet, but poor exposures and extremely complex structure combine to prevent a reliable estimate.

Unit 4 outcrops in a structurally complex belt south of Tintina Valley. It is best exposed south of the map-area in the vicinity of Fox Mountain, where the thickness is perhaps as much as 5,000 feet. There, Silurian fossils were found in the upper part of the section, and Middle Devonian carbonate rocks, although prominent near the top. The Siluro-Devonian carbonate rocks, north of it in Tay River map-area, of Tintina Valley, Mississippian strata (5) are believed to lie unconformably on the Ordovician-Silurian rocks (3), although the contact between the two units is not exposed.

Unit 5 underlies much of the region between the Anvil and South Fork Ranges. It contains practically no type of rock that does not exist also in the Ordovician-Silurian strata (3), from which it appears to have been derived. Quartzite and limestone are, however, much more abundant in unit 5. The assigned age of the unit is based on Upper Devonian brachiopods from thin beds of silty limestone about chert (5c) between Stokes Lake and Tay River, and on Mississippian brachiopods from a silty sandstone (5c) near the centre of the map-area. The dark cherts of unit 5b are at least 1,500 feet thick on Twopete Mountain and northwest of the head of Blind Creek.

Massive chert-pebble conglomerate beds (5a) form conspicuous outcrops in the vicinity of Stokes Lake. At least two beds are represented in the unit. Most of the fragments are of dark grey chert and shale, but significant numbers of fragments indicate that beds north of Earn River consist of light grey quartzite. The conglomerate beds are not as prominent to the east, and may thin in that direction.

Mississippian brachiopods were found in a massive grey limestone bed (5) northeast of Twopete Mountain. The limestone is involved in the complex folding and faulting of unit 5.

The granitic rocks of the Anvil Range is flanked by units 7, 8, and 9. Most of these rocks are metamorphosed to some extent, and locally, as in the vicinity of Blind Creek, to grades as high as coarse-grained staurolite-garnet-mica schist. As no fossils were found in the Pelly Mountains, nothing is definitely known as to their age except that they are older than the probably Cretaceous granitic rocks that cut them. They have been tentatively considered Mississippian (?) and/or younger (?) because volcanic rocks of that age, similar to those of unit 9, have been found in other Yukon map-areas. A Precambrian age has also been considered because of their outcrop pattern with respect to the granitic rocks and their high degree of metamorphism compared to the nearby unmetamorphosed Devono-Mississippian rocks (5). But two rocks like them were recognized in unit 1.

Unit 7 is several thousand feet thick. Near the granitic rocks the unit locally contains sulphide minerals. Unit 7 grades upward into material that is increasingly volcanic. The main volcanic assemblage (8) is in a belt that follows the northeast side of the Tintina fault zone for about 250 miles. Chloritization and silicification are common in these rocks, but, except in the immediate vicinity of granitic bodies, the grade of metamorphism is low. The conglomerate (9b) contains abundant volcanic material, and appears to overlie unit 8.

Unit 6 consists mainly of sandy and shaly, and was found only in isolated exposures in Tay River valley. It contains Triassic pelecypods.

The granitic rocks (11) comprise the core of the Anvil Range and Mount Selous, as well as smaller stocks elsewhere in the map-area. These rocks are clearly intrusive, with sharp, crosscutting contacts and very rare xenoliths. Also rare in the granitic rocks is foliation, even near the Tintina fault zone. If these rocks are the same age as similar rocks dated in the Isi Mountains (about 96 m.y.), they are Middle Cretaceous.

Shale, sandstone, and conglomerate (12), containing granitic pebbles and Paleocene plant fragments, were found in some of the tributaries entering Pelly River from the south. Similar, but less conglomeratic rocks are present in the valley of South Macmillan River.

Rather peculiar looking quartz and feldspar porphyries, of granodioritic composition (13), are associated with the volcanic rocks of unit 14 from Blind Lake to the Canol Road (just east of the map-area). In several places the flows (14) appear to overlie the porphyries, but the actual contacts are covered. Apparent similarities in composition and close areal association suggest that the porphyries may have been feeders to, or intrusive equivalents of, the flows.

Flows of unit 14 underlie much of the area between Tay River and the South Macmillan - Ridell rivers, and form the South Fork Range. The aggregate thickness exceeds 5,000 feet. Individual flows are rarely well-defined, but appear to range in thickness from about 10 feet to perhaps 100 feet, with many about 50 feet. Pyroclastic rocks form a large but very minor proportion of the assemblage. The upper part is characterized by dark dacites with phenocrysts of quartz and biotite. The lower part is mainly andesitic and basaltic, commonly containing feldspar phenocrysts. The volcanic rocks are gently deformed. Maximum dips of about 30° were noted. The volcanic sequence lies unconformably on intensely deformed Palaeozoic strata. The unconformity varies in elevation through about 2,000 feet. This may be accounted for by faulting and deformation, but the flows were probably extruded onto a surface of at least moderate relief. The gentle deformation and the porphyritic, massive character of these rocks distinguish them from the older volcanic unit (8), which is rarely porphyritic and commonly sheared.

The main mineral discovery in the map-area is a lead-zinc prospect located on Vangorda Creek between Mount Mye and Pelly River. Although inactive now, it was extensively drilled by its owner — Vangorda Mines Limited. The deposit consists mainly of disseminated pyrite, galena, sphalerite, and minor chalcopyrite in gently dipping sericitic schists (7) near their contact with the granitic rocks (11).

DESCRIPTIVE NOTES

The map-area is accessible during the summer months by motor vehicle on the Canol Road as far as Pelly River, by small boat on Big Salmon, Pelly, and Nisutlin rivers, by horse along the major valleys, and by float-equipped aircraft. The Hoole Canyon on Pelly River requires a portage.

Ice covered all or most of the area during the Pleistocene. It moved west and northwest along the major valleys, controlled strongly by topography in the Pelly Mountains.

The quartzites (1a) exposed near the gold property west of Ketza River, and south of White Creek are the oldest unmetamorphosed rocks in the Pelly Mountains. They are at least 1,000 feet thick and are overlain by a few hundred feet of phyllite and slate (1b) containing trilobite fragments. These in turn are overlain by limestone (1c) with Lower Cambrian archaeocyathids. The Lower Cambrian limestone, and probable correlatives west of Lapie Lakes are overlain by a extensive unit of phyllite (2) of unknown thickness. Intrusive and extrusive bodies of greenstone occur within the phyllite. Metamorphism to phyllite (2) of the pre-existing shales southwest of the head of Ram Creek was prevented by previous alteration to hornfels.

Unit 2 is separated from unit 4 in several places by black slates, siltstones, and, locally, volcanic breccia (3) totalling probably less than 700 feet in thickness. Graptolites collected from different beds in this unit range in age from Lower Ordovician to Middle Silurian. The volcanic breccia (3a) overlying the graptolitic siltstone is characterized by turquoise-green fragments.

Unit 4 is composed of three members. Its total thickness is about 1,500 feet near McConnell Peak, 1,000 feet near the head of McConnell River, and perhaps as much as 5,000 feet near Fox Mountain. The basal member is about 2,000 feet thick, except near the head of McConnell River where it is reduced to about 25 feet and north of Pass Peak where it is missing. Near Mount Hogg the basal member comprises sandy and silty dolomites with lenses of massive, grey dolomite containing fossils of Silurian age. The basal member is restricted to fault blocks near peak 6570. The middle member consists of dolomitic sandstone and quartzite, and is about 1,000 feet thick except near the head of McConnell River and west of Seagull Creek, where it is about 300 feet thick. It commonly contains current-bedding and ripple-marks. The upper member, mainly a dark grey dolomite, contains Middle Devonian fossils. It is more than 1,500 feet thick near Fox Mountain, but elsewhere is less than 1,000 feet.

Clastic sedimentary rocks and bedded chert (5) and volcanic rocks (6) lie disconformably, at different localities, on units 2, 3, and 4. Unit 5 contains possible fossil plants 8 miles northwest of Fox Mountain (outside the map-area). Felsic volcanic rocks are restricted to the region east of Seagull Creek, north of White Creek, and southwest of the Porcupine thrust. Most of the volcanic rocks (6) either overlie or are intercalated with rocks of unit 5, and hence are probably Mississippian in age. On the ridge 1½ miles southwest of peak 7001 is a conspicuous plug composed of numerous basalt and felsite feeder dykes.

The several syenitic stocks (7), which occur only in association with the felsic volcanic rocks (6c), are heterogeneous in texture and composition. Areas of fine-grained, leucocratic syenite grade locally into pegmatitic syenite containing 3-inch hornblende crystals. The syenites are cut by slickensided joints, numerous shear zones and carbonated breccia zones, and brown amygdaloidal felsite dykes. Fluorite is an abundant accessory mineral in the syenite body near peak 6541. Being restricted to the felsic volcanic rocks (6) and probably related to them, the syenites are considered Mississippian.

Unit 8 consists chiefly of clastic limestone in beds 2 to 30 feet thick, separated by thin argillaceous layers, but is dolomitic and argillaceous near the edges of the outcrop areas. It was found only in the St. Cyr range where it is invariably associated with unit 5 and is intensely deformed in most places. The contacts are commonly sharp, although in places a gradational through complex zones of migmatite. The origin of the plutonic rocks was not established.

Ultramafic rocks (D) occur in two main localities, Dunite Mountain and Tower Peak. Dunite is the chief primary rock in both occurrences although little is present in the Tower Peak area. Minor amounts of pyroxenite were noted near the margins of the Dunite Mountain body. Serpentine is concentrated around the margin of this body, but is rather ubiquitous at Tower Peak. At Dunite Mountain the metamorphic rocks dip gently under the dunite, suggesting a lopolithic body. The structure is obscure around Tower Peak. The volcanic breccias (6b) at the head of Ram Creek contain fragments of serpentine. This suggests an age not younger than Mississippian for at least some of the ultramafic rocks. No significant amount of asbestos was noted in the map-area.

Major structures in the map-area trend northwest. They may be divided into four belts, which are from southwest to northeast: 1) a broad belt of granitic and metamorphic rocks (containing an area of unmetamorphosed Palaeozoic rocks around Big Salmon Lake), 2) a belt of folded and faulted Palaeozoic rocks, 3) and intensely deformed zone between the Porcupine thrust and Tintina Valley (here occupied by Pelly River, and marking the en echelon continuation of the Rocky Mountain Trench), and 4) and area of metamorphic rocks and Palaeozoic volcanic rocks northeast of the Tintina fault.

The metamorphic rocks (A, B, C) in the southwestern part of the map-area are characterized by northwest trends and moderate northeast dips. Departures from this attitude are confined mostly to contact zones, a broad area within the bend of Big Salmon River where gentle dips prevail, and the zone between Big Salmon River and the granitic rocks to the northeast, characterized by southwest dips.

The belt of unmetamorphosed Palaeozoic rocks is divided by the Seagull fault. West of the fault extensive areas of phyllite (2) are variably by numerous bodies of dolomite (4). Some of these are conformable on the phyllite, whereas others (near peak 7000) are probably intrusive (the contacts are covered, hence uncertain). East of Seagull fault, structural trends are obscure, as the volcanic rocks (6) commonly have gentle dips and units 1 and 4 are in places folded to overturned and recumbent positions. The zone, furthermore, is broken into numerous blocks by both thrust and normal faults. The characterized, east of Seagull Creek, by isolated klippes of unit 4. The western margin of the zone is marked around McConnell Peak by folds overturned to the southwest, and west of Lapie Lakes by a northeast-dipping reverse fault which brings limestone of unit 1 onto crystalline rocks of unit A. The eastern margin is defined by the northeast-directed Porcupine thrust. The carbonate rocks of unit 4 in the upper plate of the Porcupine thrust are deformed into synclines and tilted anticlines cut by northeast-trending faults that are restricted to the upper plate.

The intensely deformed zone between the Porcupine thrust and the Tintina fault is divided by the St. Cyr fault. West of the St. Cyr fault are incompetent sediments (5, 8) which are deformed into tight, irregular, essentially upright folds containing steeply dipping fault slices of unit 4. The western outcrops of this zone reveal folds overturned to the northeast. East of the St. Cyr fault is a southwest-tapering belt of disharmoniously folded phyllites (2).

The Paleocene sedimentary rocks (10), found only in Tintina Valley, have dips as steep as 45°. The Tertiary basalts (11) are flat-lying. The structure of the metamorphic and volcanic rocks northeast of Tintina Valley is not known.

No operating mines exist in the map-area. Development work has been conducted on the molybdenite property near the head of Upper Sheep Creek, on the gold and base-metal properties near the head of Ketza River, and on the asbestos property on Tower Peak. Although the metamorphic rocks in the southwestern part of the map-area appear favourable for metalliferous deposits, no significant mineralization was noted. Widely scattered, but not abundant, mineral occurrences are present in the Lower Palaeozoic rocks. The Lower Cambrian limestone is probably the most favourable for detailed prospecting.

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MAP 7-1960
GEOLOGY
QUIET LAKE
YUKON TERRITORY

Scale: One Inch to Four Miles = 1/253,440
Miles

015662

PRINTED BY THE SURVEYS AND MAPPING BRANCH

LEGEND

Road
Trail
Intermittent stream
Contours (interval 1000 feet)
Height in feet above mean sea-level 7886

MAP 7-1960
QUIET LAKE
YUKON TERRITORY
SHEET 105F

Cartography by the Geological Survey of Canada, 1960

Approximate magnetic declination, 33° 20' East

Geographical names subject to revision