GEOLOGICAL SURVEY OF CANADA
DEPARTMENT OF ENERGY, MINES AND RESOURCES

LEGEND

PROTEROZOIC

- **16** / 16 — *Diabase, gabbro; dykes and sills*

ET-THEN GROUP

- **15** — *MURKY FORMATION: conglomerate, minor sandstone*

GREAT SLAVE GROUP (6-10)

- **10** — *TOCHATWI FORMATION: shale, argillite, sandstone*
- **9** — *STARK FORMATION: dolomite, limestone, breccia, shale*
- **8** — *PETHEI FORMATION: limestone and dolomite, in part argillaceous*
- **7** — *KAHOCHELLA FORMATION: shale, slate, argillite, arkose, limestone*
- **6** — *SOSAN FORMATION: sandstone quartzite, grit, conglomerate;* **6a**, *sandstone, age relative to Great Slave and Nonacho groups uncertain*

NONACHO GROUP (11-14)

- **14** — *Greenstone; schists and gneisses probably of volcanic origin; age relations uncertain*
- **13** — *Arkose, quartzite; some slate, greywacke, and conglomerate*
- **12** — *Slate, greywacke; some arkose and quartzite*
- **11** — *Conglomerate; some arkose and quartzite*

- **5** — *Granodiorite, quartz diorite; older than 6-10, age relative to 1-4 unknown*

ARCHEAN

- **4** — *Granite, granodiorite, and allied rocks, in part gneissic and impure and gradational into 3; in part probably of Proterozoic age;* **4a**, *younger than Nonacho Group,* **4b**, *granitic mylonites;* **4c**, *older than Nonacho Group;* **4d**, *muscovite granite and pegmatite*
- **3** — *Gneissic complex; undifferentiated gneisses including impure and gneissic granitic rocks; mixed gneisses (migmatites) containing 25 to 75 per cent sedimentary and volcanic schists and gneisses in granitic material; granitized paragneiss; mylonites. Gradational into 2 and 4*

YELLOWKNIFE GROUP (1-2)

- **2** — **2a**, *quartzite, grit, arkose, greywacke, chlorite schist;* **2b**, *paragneiss, quartzite; some knotted quartz-biotite schist and hornfels*
- **1** — *Dacite, quartz basalt*

Geological boundary (defined, approximate, assumed)
Bedding, tops known (inclined)
Bedding, tops unknown (vertical)
Schistosity, gneissosity (inclined, vertical, dip unknown)
Fault (defined, approximate, assumed)
Anticline (approximate)
Syncline (approximate)
Glacial striae
Drift ridge
Esker, sand ridge
Area of abundant sand
Mineral prospect or occurrence (Copper, Cu; Galena, gn; Graphite, gf) . . . Cu ×

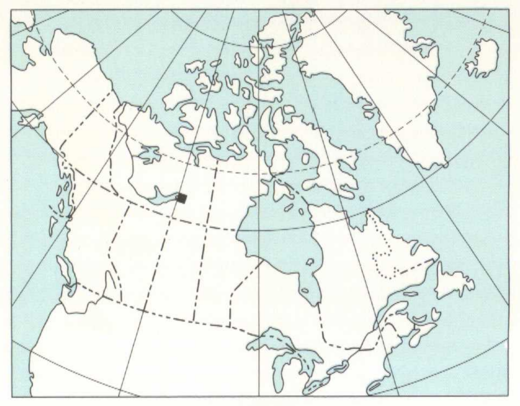
Geology by C.H. Stockwell, 1929, 1930, 1931; J.F. Henderson, 1936; I.C. Brown, 1949; G.M. Wright, 1950; and F.Q. Barnes, 1950, 1951

Geological cartography by the Geological Survey of Canada, 1967

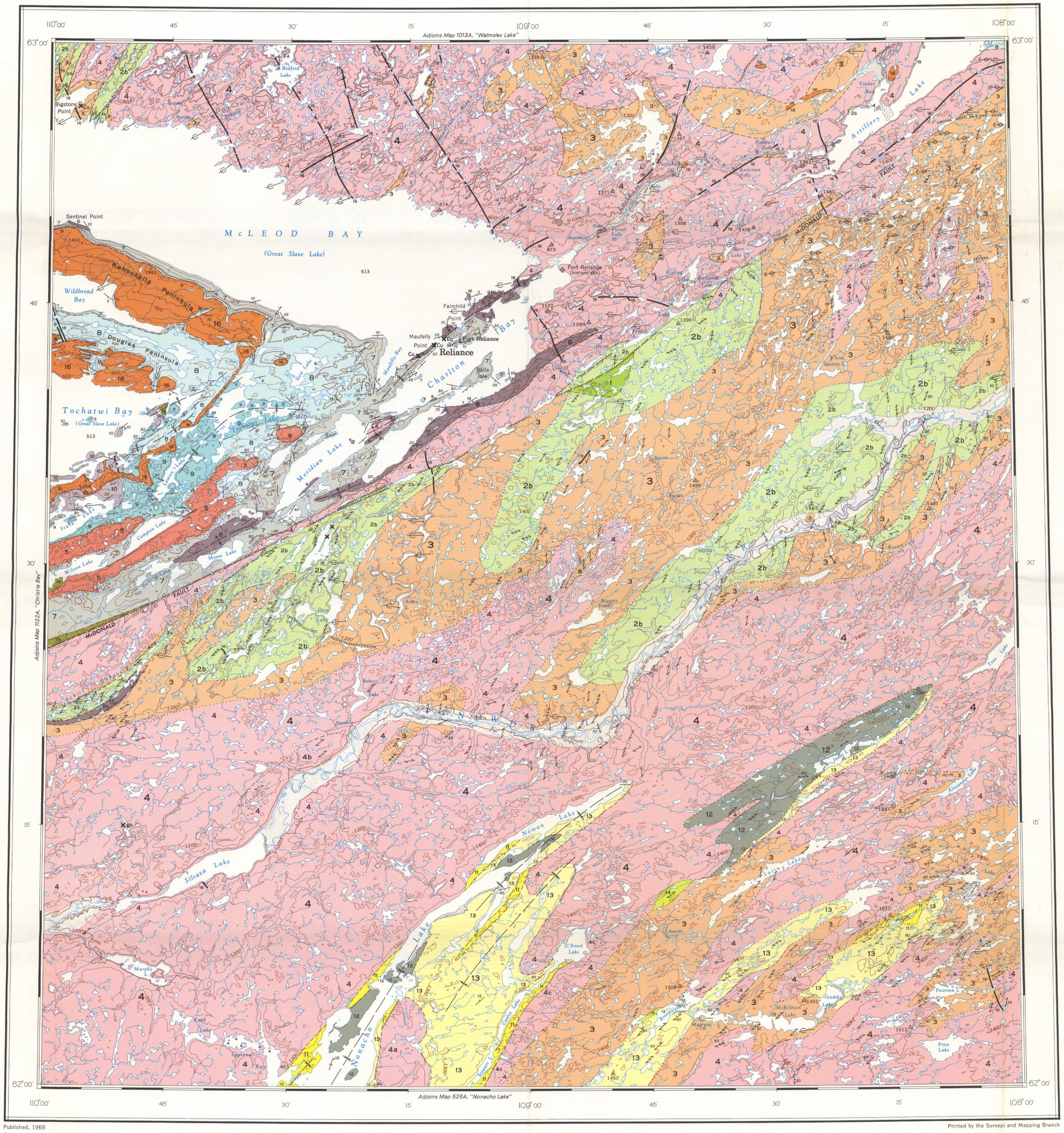
Trail or portage
Anchorage
Horizontal control point
Falls and rapids . . . F R
Sand
Marsh
Contours (interval 200 feet) . . . 1000
Height in feet above mean sea-level . . . 513

Base-map (Fort Reliance 75 K) compiled and drawn by the Surveys and Mapping Branch, 1963

Magnetic declination 1967 varies from 27°02′ easterly at centre of east edge to 29°23′ easterly at centre of west edge. Mean annual change decreasing 5.5′



INDEX MAP



Published, 1968
Copies of this map may be obtained from the Director, Geological Survey of Canada, Ottawa

Printed by the Surveys and Mapping Branch

MAP 1123A
GEOLOGY
RELIANCE
DISTRICT OF MACKENZIE

Scale 1:253,440
1 inch to 4 miles
Miles 4 0 4 8 12 Miles
Kilometres 6 0 6 12 18 Kilometres

DESCRIPTIVE NOTES

The general level of bordering lands and peninsulas is 500 to 1,000 feet above Great Slave Lake. The granitic uplands bordering the lake basin present a monotonous succession of low rocky hills and ridges with local relief rarely exceeding 200 feet. The upland south of the lake rises abruptly along an escarpment (McDonald Fault) 700 to 800 feet above the lake, whereas north of the lake rocky slopes rise gradually to plateau level at 1 mile to 4 miles inland. Rivers entering the lake basin follow either poorly defined valleys or deep gorges, and are unnavigable for 2 to 12 miles inland. The monotonous aspect of the bordering uplands contrasts sharply with the rugged and picturesque topography within the lake basin. In the north part of the basin large peninsulas reflect the structure with steep north slopes and gentle dip slopes to the south. In the southern part of the basin structure is complex; vertical cliffs of diabase and limestone in places rise several hundred feet from the water, or form cappings over steep slopes of softer rocks, particularly shale.

Thick morainal deposits occur south of Artillery Lake and form bouldery hills 50 to 100 feet high composed of unsorted, angular, granitic and gneissic boulders and coarse gravel. They range from irregular ridges and knobs to elongated drumlins whose long axes trend slightly south of west, parallel with the direction of glaciation. The overall effect produces a rolling, more or less flat plain. As many of the drumlins are rock cored the morainal deposits must have a thickness about equal to the local relief, some 200 feet. Eskers composed of angular, coarse sand and gravel form ridges up to 40 feet high. Along Lockhart and Snowdrift Rivers there are almost continuous sand plains averaging 1 mile to 2 miles in width. Widely scattered sand deposits cover much of the bedrock in the southeast quarter of the area.

The country from Artillery Lake south to Snowdrift River is barren of trees except for a few, small, widely scattered stands of scrub trees 1 foot to 6 feet tall, and some stands of larger trees growing on sand deposits. Elsewhere the region is sparsely timbered with spruce, birch, pine, and tamarack.

Volcanic rocks of the Yellowknife Group (1) are green to pale pink, fine-grained dacites and quartz basalts that have been recrystallized and are now composed of plagioclase, fresh green hornblende, biotite, and quartz. Volcanic structures are poorly preserved, but distorted pillows and amygdules are recognizable.

Sediments of the Yellowknife Group are divisible into relatively unaltered types (2a), and more highly altered paragneiss, knotted schists, and hornfels (2b). The less-altered types (2a) are restricted to a narrow band 8 miles south of Wilson Lake and their present classification is based solely on resemblance to Yellowknife sediments in other areas.

A widespread group of gneisses (3), probably of diverse age and origin, is gradational into the Yellowknife (and Nonacho) rocks on the one hand, and into the granitic rocks (4) on the other. The most common type is migmatitic gneiss, partly granitic, partly sedimentary, or less commonly, partly volcanic. In some occurrences, the non-granitic parts are clearly recognizable as sedimentary, but in many places alteration has produced a highly garnetiferous, contorted, banded gneiss of granitic aspect. Contacts between areas of mixed gneisses (3) and granitic rocks (4), particularly where the latter are impure and gneissic, are arbitrary. Many of the rocks included in this group appear to be granitized paragneiss; others are fine-grained, banded, felsitic rocks that probably represent mylonitized granites and are essentially similar to such rocks (4b) mapped with the granitic group.

There is a wide variety of granitic (4) rocks, some of which are impure and gneissic and gradational into the gneissic complex (3). They are light grey to pink, medium to coarse grained, and are composed of quartz, plagioclase, microcline, and minor biotite, muscovite, chlorite or hornblende. Granodiorite, granite and quartz monzonite are the most common types. Granitic rocks (4a) cut the Nonacho sediments and have altered the arkose and quartzite to a pink, glassy, quartzose rock, and the slates and greywackes to phyllites and micaceous schist. These younger granitic rocks are so similar lithologically to the older Archaean granite (4c) that the two cannot be separated except where they are in actual contact with Nonacho sediments. For this reason granitic rocks of similar lithology are grouped together (4); rocks of widely differing ages are probably included in this group, but all are apparently younger than Yellowknife Group rocks.

Small bodies of muscovite granite and pegmatite (4d) cut the older granitic intrusions throughout the area, but only one of these, in the northwest corner, is large enough to map.

Mylonitized granites (4b) are pink to white, finely banded rocks, which on weathered surfaces show tiny elongated, discontinuous lenses of quartz in a feldspathic groundmass. Along strike they change into crushed granites and finally into massive granitic rocks.

Granodioritic rocks (5) occur only within the lake basin and differ lithologically from the granitic rocks in the surrounding uplands. They are reddish, massive, nearly equigranular, and medium to coarse grained. All contain some quartz, and range in composition from hornblende granite and granodiorite, to biotite granodiorite (most common) and biotite quartz-diorite.

The Great Slave Group (6-10) was deposited on an erosion surface developed on granitic rocks (4, 5) and the upturned edges of older rocks. It forms an easterly trending asymmetrical synclinorium 150 miles long, whose eastern end occupies almost the whole of the lake basin. Beds on the north limb commonly dip 5 to 10°S but in the axial region and on the south limb they are generally folded into a series of anticlines and synclines with limbs commonly dipping from 30 to 70°.

The Sosan, Kahochella, and Pethei Formations are best exposed on the north limb of the synclinorium on Kahochella and Douglas Peninsulas. The Sosan Formation (6) is perhaps 3,000 feet thick and consists of beds of sandstone, quartzite, and grit with partings of shale. Where observed, the basal arkose and conglomerate rest on granite and are composed largely of the detrital material derived from it. The Kahochella Formation (7) is composed of about 1,000 feet of shaly sediments with some red, laminated, argillaceous limestone. The Pethei Formation (8) comprises about 1,500 feet of limestone and dolomite characterized by algal structures in some beds. The Pethei is generally missing on the south limb of the synclinorium, and the rocks of the upper part of the Great Slave Group (9, 10) rest on the Kahochella Formation, suggesting that there may be an erosional unconformity. However, this may be due to non-deposition of the Pethei Formation.

The Stark Formation (9) consists of possibly 1,000 feet of interbedded, varicoloured dolomite, red shale, and limestone, including some layers that are much brecciated. The Tochatwi Formation (10) comprises a thick assemblage of shaly sediments and sandstone.

Most of the clastic strata of the Great Slave Group are red or brown. Ripple-marks, crossbedding and mud-cracks are common, and concretions occur locally in shale and argillite.

The Nonacho Group (11-14) was deposited unconformably on the older granitic rocks (4c). It is composed of conglomerate, slate, arkose, quartzite, and greywacke; one type grades into another, and beds and lenses of conglomerate and slate occur interbedded with arkose and quartzite. In general the conglomerate (11) is several hundred feet thick. It is composed almost entirely of pebbles of granite and allied rocks, and near the base consists of closely packed, angular, granite fragments from 1 foot to 2 feet in diameter in an arkose matrix composed largely of small granite fragments. The slates and greywackes (12) are fine to medium grained, dark grey to black weathering rocks. The arkose and quartzite (13) are buff, yellow, and light grey weathering, and of fine to medium grain. Crossbedding, grain gradation, ripple-marks and mud-cracks are common. Two small areas of basic volcanic schist (14) have been included because of their close areal association, though no other volcanic rocks are known in the Nonacho Group. The conglomerates, arkoses and quartzites lie in a series of open, gently plunging folds, and only locally is folding closer and beds in places overturned. The dip of the beds on the limbs of the folds generally vary from 45° to 60°, but dips to 80° are not uncommon. Folds within the slates and greywackes are closely compressed in contrast with the open folds within the arkose and quartzites. The Nonacho Group may be correlative with the lower part of the Great Slave Group; lithologically it resembles the Sosan Formation.

The Murky Formation (15) of conglomerate carries closely packed, rounded boulders of a great variety of rocks representing almost every member of the older groups.

Dykes and sills of diabase (16) cut all other consolidated rocks and the large faults. Steeply dipping dykes in the Archaean rocks surrounding the basin are not so large as the massive sills and dykes found within the basin. Sills up to several hundred feet thick occur on the Douglas and Kahochella Peninsulas. Their dip slopes are characteristically smooth and relatively flat; forward slopes are cliffs exhibiting good columnar jointing. Locally the sills are transgressive. In the southern part of the basin the diabase tends to take the form of moderately dipping dykes of irregular trend. Both sills and moderately dipping dykes form prominent topographic features.

The diabase consists of a sub-ophitic, medium-grained aggregate of approximately equal amounts of pyroxene and basic feldspar, with a little magnetite; quartz is not common. Edges of both sills and dykes are chilled to fine-grained basalt, whereas interiors of thick bodies approach coarse-grained gabbro.

Quartz veins are abundant in the sedimentary rocks of the Yellowknife Group on the north shore of McLeod Bay. Chalcopyrite calcite lenses have been investigated near Bigstone Point. Claims have also been staked on Fairchild and Maufelly Points where chalcopyrite-carbonate stringers occur in the Sosan Formation.

Rocks of the Great Slave Group are cut by many large, hematite-rich carbonate veins, and there are large areas of rusty gossan. Similar gossan zones were noted in the paragneiss near Daisy Lake, and a yellowish gossan, carrying abundant graphite, occupies most of the long peninsula in this lake.

Quartz veins are numerous in the sedimentary rocks near Nonacho Lake, particularly around the 'younger' granite body (4a). Few contain sulphides, but those that do generally occur near contacts with this granite. The most common sulphides in the veins are pyrite, chalcopyrite, and galena.

The granodiorite bodies (5) appear to afford favourable prospecting ground for radioactive minerals.

Hydro-electric power could be developed in large quantities on Lockhart River.

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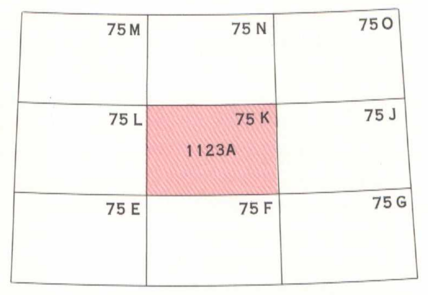

NATIONAL TOPOGRAPHIC SYSTEM REFERENCE
RELIANCE
DISTRICT OF MACKENZIE

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