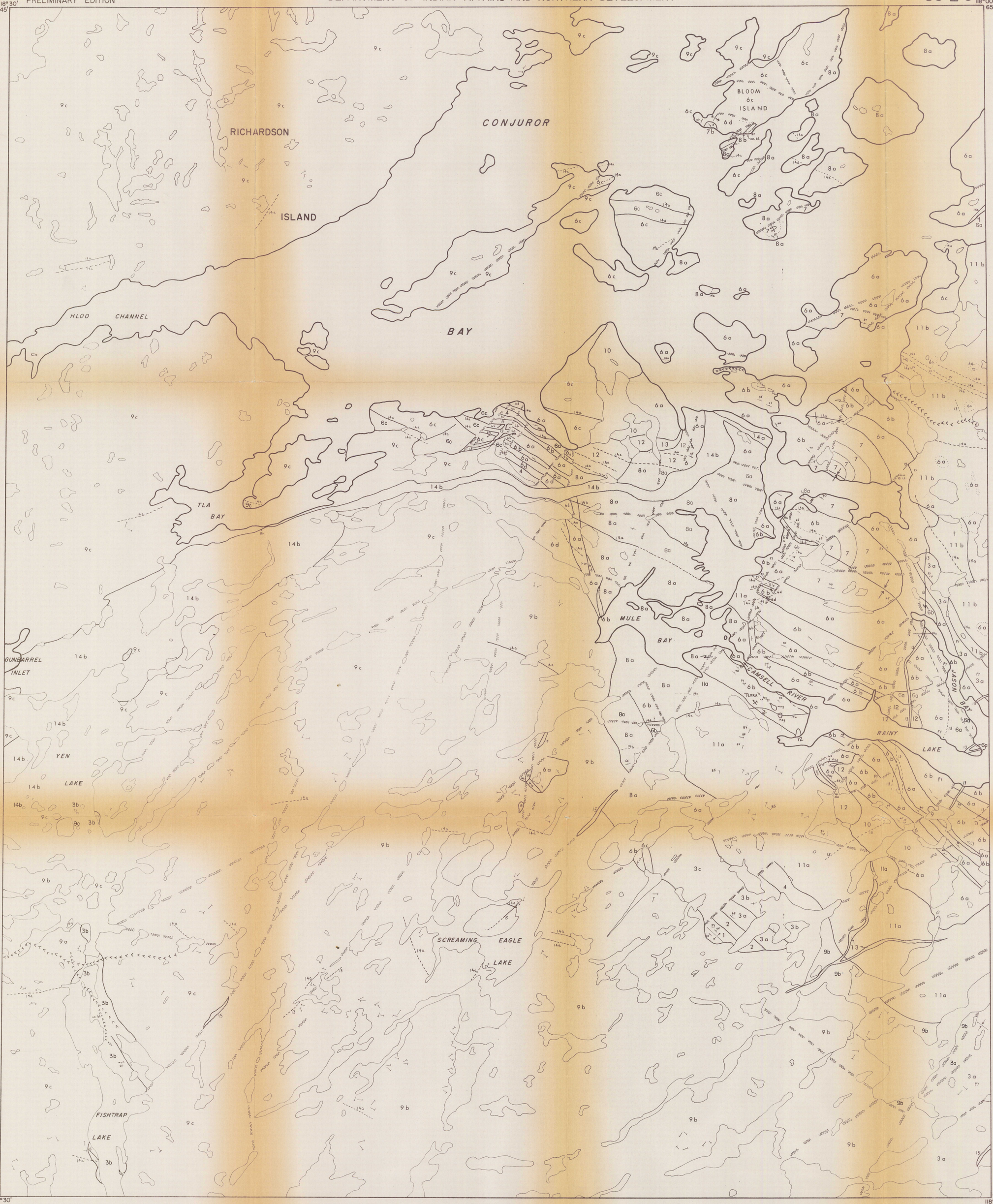
sh. 2 of 2
c. 2

PRELIMINARY EDITION

DEPARTMENT OF INDIAN AFFAIRS AND NORTHERN DEVELOPMENT

86-E-9

118°30' 65°45' — 118°00' 65°45' — 65°30' 118°30' — 65°30' 118°00'



LEGEND

GEOLOGY

RAINY LAKE

DISTRICT OF MACKENZIE

NORTHWEST TERRITORIES

Dykes and Veins

15 Quartz veins, commonly milky white quartz

14 14a, medium-grained diabase, near vertical dip; 14b, coarse-grained diabase with wide chill margins, dip varies from vertical to horizontal

13 Granite porphyry, feldspar and quartz phenocrysts in a fine-grained granitic matrix

Plutonic Intrusions

12 Fine-grained mafic (diorite?)

11 11a, coarse-grained syenite; 11b, fine-grained syenite

10 Quartz-feldspar porphyry, phenocrysts of feldspar ± quartz in a fine-grained matrix

9 9a, fine-grained granite; 9b, medium-grained granite; 9c, coarse-grained granite. There are at least three ages of granite but these cannot be correlated with grain size

PROTEROZOIC

8 8a, rhyolite volcanics and pyroclastics, crystal tuff, ignimbrite and lapilli fractions; 8b, dolomite, rusty weathering

7 Conglomerate, 7a, andesite, sandy tuff and quartz cobbles in a fine-grained arkosic matrix; 7b, quartz-pebble

6 6a, andesite, usually containing feldspar and, rarely, hornblende phenocrysts in a purple or black fine-grained matrix, locally with interbeds of sandy tuff; 6b, sandy tuff, reworked volcanics, and locally, thin beds of carbonate, chert, argillite, sandstone, conglomerate; 6c, metavolcanics ± feldspar porphyroblasts; 6d, rhyolite

5 Diabase, dark brown, metamorphosed

4 Quartzite, white

3 3a, basalt, locally with thin rhyolite beds; 3b, andesite, with thin interbeds of vesicular rhyolite; 3c, rhyolite, commonly thin beds, locally thick

2 Quartz pebble conglomerate; white quartz pebbles in a fine-grained quartz-biotite matrix

1 Rhyolite with interbeds of sandy tuff

SCALE

Miles 0 1/2 1 1 1/2 2 Miles

Feet 1500 0 3000 6000 9000 Feet

MAGNETIC DECLINATION 38° 10' AT CENTER OF MAP 1972
ANNUAL MAGNETIC CHANGE 10' WESTERLY

INDEX MAP

LEGEND

Bedding (vertical, inclined, overturned, dip unknown)

Geological boundary (defined, approximate; includes contacts extended by air photo interpretation)

Schistosity, gneissosity (inclined, vertical)

Dykes (less than 100 feet, greater than 100 feet)

Fault (defined, approximate)

Syncline (defined, approximate)

Anticline (defined, approximate, overturned)

Joints (vertical, inclined)

Esker

Sand or gravel

Mineral occurrence py

Symbols for Minerals

Pyrite	py
Chalcopyrite	cp
Magnetite	mag
Hematite	hem
Cobalt Bloom	co.bl.
Silver	Ag
Bornite	bo

Geology by J. D. Murphy, R. Shegelski, 1972
Geological compilation by J. D. Murphy, 1972
Drafting by H. Burki, Drafting Services, I.A.N.D.

DESCRIPTIVE NOTES

Geological studies of the Rainy Lake area were conducted in 1972 for the Exploration and Geological Services Unit of the Department of Indian Affairs and Northern Development.

The topography is typical of shield areas with hummocky granitic areas and higher relief sedimentary and volcanic areas. Over 50% of the map area is outcrop but the exposures are commonly covered with a thin lichen skin which may mask the rock type. Pleistocene glacial landforms such as eskers and raised beaches occur in a few isolated localities.

The eastern half of the map area, the most interesting in terms of geology and economic potential, is underlain by a cyclic sequence of waterlain sediments and volcanics intruded by plutonic masses.

Rhyolite interbedded with sandy tuff, the oldest rock unit (1), outcrops three miles east of Screaming Eagle Lake. The rhyolite is fine-grained, pink and may contain anhedral quartz phenocrysts. The massive to well-bedded or cross-bedded sandy tuff contains angular quartz and feldspar fragments in a fine-grained grey matrix and locally grades into an arkose.

The rhyolite and sandy tuff of unit (1) is overlain by quartz-pebble conglomerate (2) which consists of rounded white quartz pebbles embedded in a fine-grained dark matrix of quartz and biotite.

Above the quartz-pebble conglomerate lies a thick basaltic layer (3a) that grades upwards into andesite (3b). The basalt is a fine-grained black rock and the andesite is porphyritic with subhedral plagioclase or, rarely, hornblende crystals in a fine-grained purple to black matrix. Both the andesite and basalt enclose interbeds of rhyolite, a fine-grained, light to dark pink rock with dark-coloured chill margins. Thicker rhyolite units contain megascopic anhedral quartz crystals.

Conformably overlying the volcanics is a distinctive quartzite (4) comprised of 90% white quartz grains and 10% feldspar. The true thickness of the quartzite cannot be determined because it is in contact with intrusive granite, but its mineralogy permits correlation of exposures which occur seven miles apart.

Andesite (6a) is the most abundant volcanic rock in the area. Commonly it contains greyish white plagioclase crystals up to one-half inch long in a purple or black fine-grained matrix, but near the syenite intrusions east of Jason Bay the plagioclase phenocrysts have been altered to hornblende through contact metamorphism. Flow brecciation, quartz-filled vesicles and flow banding within the andesite beds indicate the extrusive nature of the rock. The andesites are locally trachytic with the plagioclase crystals aligned approximately parallel to the strike of the unit. Thick units of sandy tuff (6b), commonly interbedded with the andesites, are usually massive but may be thin-bedded or cross-bedded and grade into thin lenses of conglomerate along strike. On the Terra peninsula sandy tuff is associated with thin-bedded cherts, calcilutites, argillites, conglomerates and ripple-marked sandstones. One arkosic layer contains fossil-like structures which are probably pieces of flattened pumice. In the third volcano-sedimentary sequence the contact between massive andesite and massive sandy tuff is gradational. A few thin sandy tuff layers appear in the andesite and gradually increase in thickness until there are but a few thin andesite layers in a massive sandy tuff. Thin rhyolite flows (6d) occur in the middle of this andesite-sandy tuff sequence but are seldom present elsewhere in the sequence.

A thick conglomerate unit (7), overlying the andesite-sandy tuff unit, contains large cobbles of andesite, sandy tuff and quartz in a fine-grained matrix of sandy tuff. Lenticular accumulations of bombs and lapilli occur between the overlying conglomerate and underlying andesite. An island in Conjuror Bay consists of cobble conglomerate overlying a thin ripple-marked sandstone in contact with crystal tuff.

The crystal tuff (8a) contains large anhedral crystals of quartz in a fine-grained pink to green matrix. They are generally massive but locally thin-bedded and may be ignimbrites. These rhyolitic pyroclastics are commonly fine-grained but in places contain lapilli. Lenses of conglomerate are found within the crystal tuff on an island in Mule Bay and flattened pumice fragments are found on an island in Conjuror Bay. A 400-foot thick layer of banded dolomite (8b) on Bloom Island strikes onto a small island to the south where it thins to 20 feet. Thin fine-grained layers alternate with thicker rusty weathering coarse-grained ones, both of which are highly contorted.

Granite intrusions underlie more than one-half the map area. Grain size varies from fine to coarse and locally the rock is porphyritic. Evidence for at least three ages of granite was found in the Gunbarrel Inlet-Richardson Island area where medium-grained granite (9b) contains fine-grained granitic xenoliths, both of which are crosscut by another granite. Where the granite is sheared, it weathers quickly and crumbles into coarse angular granules (grus).

Quartz-feldspar porphyries (10) with subhedral phenocrysts of quartz and feldspar in a fine-grained pink matrix are located near the granite-volcanic contact. The porphyry body near Conjuror Bay contains abundant quartz phenocrysts while the porphyry body south of the Camsell River has only minor quartz.

Coarse-grained homogeneous syenite (11a) outcrops south of the Camsell River between volcanics and sediments to the north and granite to the south. Locally the syenite may be finer-grained and bleached by silicification. A much finer-grained syenite (11b) is located northeast of Jason Bay. Locally long thin feldspar crystals are embedded in a magnetite matrix and veins of magnetite-actinolite, less than six inches wide, crosscut the pluton. Bleached and altered roof pendants of andesite and basalt are found within this pluton.

Two mafic plutons (diorite?) (12) outcrop within the map area. This "diorite" is medium- to fine-grained and locally epidotized. The epidote occurs in irregular veins less than one inch wide, and as thin films concentrated along fracture planes.

Dykes of porphyritic granite are found in varying orientations in the eastern quarter of the map sheet. The porphyry dykes intrude granite, syenite and volcanics and are cut by diabase dykes.

With one exception, the diabase dykes (14a) are medium-grained, brown weathering intrusions usually less than 200 feet wide. A giant diabase dyke (14b) cuts across the northern part of Yen Lake and continues easterly to the Camsell River. This diabase is coarse-grained and has wide fine-grained chill margins. The outcrop width of the dyke varies with the dip which ranges from near vertical in the east to near horizontal in the west. Just south of Tla Bay the horizontal diabase overlies granite. North of Yen Lake a small granite window is exposed where erosion has cut through the diabase. Two older diabase dykes (5) outcrop near Fishtrap Lake. These dykes are more mafic, altered and lack the brown weathering surface of the younger diabase. Also they trend in a northerly direction whereas the younger diabase trend westerly.

Quartz veins and stockworks (15), the youngest rocks in the map area, are localized in dilation zones associated with faults. Giant quartz veins up to 300 feet wide occur as discontinuous lenses along larger faults. The quartz veins comprising quartz stockworks locally crosscut each other indicating different periods of quartz introduction. Silicification and intense bleaching are common along the larger faults.

A large syncline north of the Camsell River plunges approximately 40° to the northwest and is cut by a northeasterly dextral fault which has produced a one and one-half mile horizontal displacement of the fold. To the southeast, another dextral fault has produced a three-mile horizontal displacement of the nose of the fold. An important fault system trends to the northeast and a secondary system trends to the northwest. The predominant joints are vertical with strikes of 045° and 140°.

Terra Mining and Exploration Ltd., a silver-copper-bismuth producer, is the only mine in the map area. Native silver, argentite and native bismuth are mined from podiform radioactive calcite veins near the syenite contact while the copper is mined from layered chalcopyrite-pyrite zones in black calcareous lutites. The silver veins, which locally contain fluorite, appear on the surface as simple calcite veins that are rarely more than three inches wide.

A large gossan at Terra and another three miles to the southeast are presumably in much the same rock type. Extensive gossans have also formed on basalt and andesite near the syenite contact north and east of Jason Bay. Small rusty patches produced from weathered sulphides are common throughout the andesites but rarely cover more than a few square feet. Most of the gossans are produced by pyrite but a few have azurite and malachite stains resulting from weathering of copper minerals.

On Bloom Island cobalt bloom was noted where a carbonate vein dilates as it crosscuts the dolomite. Bloom was also found near Fishtrap Lake in a quartz-carbonate-hematite-chalcopyrite vein that is less than one foot wide.

Magnetite-apatite pods on Terra's property and narrow magnetite-actinolite veins northeast of Jason Bay are a syenite differentiate. Magnetite-hematite occurs locally in thin beds in the sediments close to the syenite contact. Patches of disseminated hematite also occur within syenite east of Jason Bay.

Many of the mineral showings are in the sediments and volcanics close to the syenite contacts. This may imply that either the syenite is the source of the minerals or that heat and volatiles derived from the syenite may have remobilized the minerals.

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