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ONTARIO DEPARTMENT OF MINES

PRELIMINARY GEOLOGICAL MAP No. P. 203

GRAHAM TOWNSHIP

DISTRICT OF SUDBURY

Scale 1 inch to ¼ mile

N.T.S. Reference 41 I/6

GRAHAM TOWNSHIP

Location

The centre of Graham township is about 14 miles southwest of the city of Sudbury. Localities in the township can be reached by Highway No. 17, the Sudbury - Sault Ste. Marie branch of the Canadian Pacific Railway and numerous public and private roads.

Mineral Exploration

The area is in the southwestern part of the Sudbury mining camp. Exploration has been concentrated along the contact of the Nickel Irruptive. Sulphide mineralization in other rock formations has also been tested by trenching and diamond-drilling.

General Geology

The main rock units recognized, in order of decreasing age are as follows:

Metavolcanics: This group consists mainly of fine- to medium-grained amphibolite and amphibolitic gneiss or schist. Amygdules, phenocrysts and pillows occur in the more basic rocks. Rhyolite and quartz-feldspar porphyry in the form of lenses and plug-like bodies are also present. Banded rhyolite in the eastern part of the township is probably part of the Copper Cliff rhyolite body.

There are also many elongate conformable lenses of metasedimentary material. Many of the lenses contain disseminated sulphides. The metasediments are commonly well-bedded fine- to medium-grained, light-coloured and quartzose. They are probably tuffaceous in part. Metamorphic minerals such as biotite and staurolite are developed in them.

Granitic Rocks: The Creighton "batholith" consists of grey and pink porphyritic "granite" with minor amounts of equigranular "granite". These rocks intrude metavolcanics in the northern part of the area. Inclusions of metavolcanics and metasediments are very numerous throughout the body. Foliation is well developed near granite - metavolcanic contacts and in fault zones.

Metasediments: The main group of metasedimentary rocks lies south of the metavolcanics. The basal pelites are fine-grained, thin-bedded chlorite-, sericite-, biotite-and chloritoid-bearing metasediments.

A conglomerate formation (Ramsay Lake Conglomerate) lies stratigraphically above the pelitic rocks. This is a polymictic conglomerate with a buff-weathering, quartzose matrix.

A thick sequence of quartzite constitutes the uppermost formation. This is medium-grained feldspathic quartzite which displays excellent bedding and cross-bedding.

Gabbroic Rocks: Hornblende metagabbro and amphibolite dikes and sills intrude the above-mentioned rocks. Minor remnants of the original pyroxene gabbro occur in the central parts of some bodies.

Nickel Irruptive. Norite is the only part of the Nickel Irruptive in the township; it is divisible into three main phases, as follows:

Dark-coloured norite; a dark grey to black gabbroic rock composed of pyroxene amphibole, and dark plagioclase.

Light-coloured norite; a light grey gabbroic or dioritic rock composed mainly of white plagioclase and mafic minerals.

Quartz diorite; a dark green or grey rock composed of plagioclase, amphibole, biotite and numerous "eyes" of blue quartz.

Late Basic Intrusions: Northwest-trending diabase dikes intrude the foregoing rocks. They are medium-grained and have an excellent diabasic texture.

Numerous dikes of fine-grained mafic "trap" cut the Nickel Irruptive. Most of these are only a few feet wide.

Structural Geology

Faults: The Creighton Fault and the Worthington Fault strike north of east and dip steeply south. The direction of displacement on each has probably been south side up and to the west with respect to the north side. The apparent horizontal displacement on the Creighton Fault, as determined from displacement of the Creighton "granite" contact, is about 1,300 feet; the displacement of the Worthington Fault, as determined by offset of a quartzite-argillite contact, is approximately 5,600 feet. A system of minor faults strikes east of north. The apparent displacement on these has been northwest side to the southwest for a few hundred to a few thousand feet with respect to the southeast side.

Folds. No major folds were recognized. Top determinations by grain gradation and coarse-bedding in the metasediments show that the beds are facing southward.

Minor folds are abundant, particularly along the metasediments-metavolcanics contact, around the Creighton granite, and near faults.

Schistosity, gneissosity, mineral lineations, later slip cleavages, and crinkle lineations are well developed. The mineral lineations and minor folds plunge steeply west throughout the township.

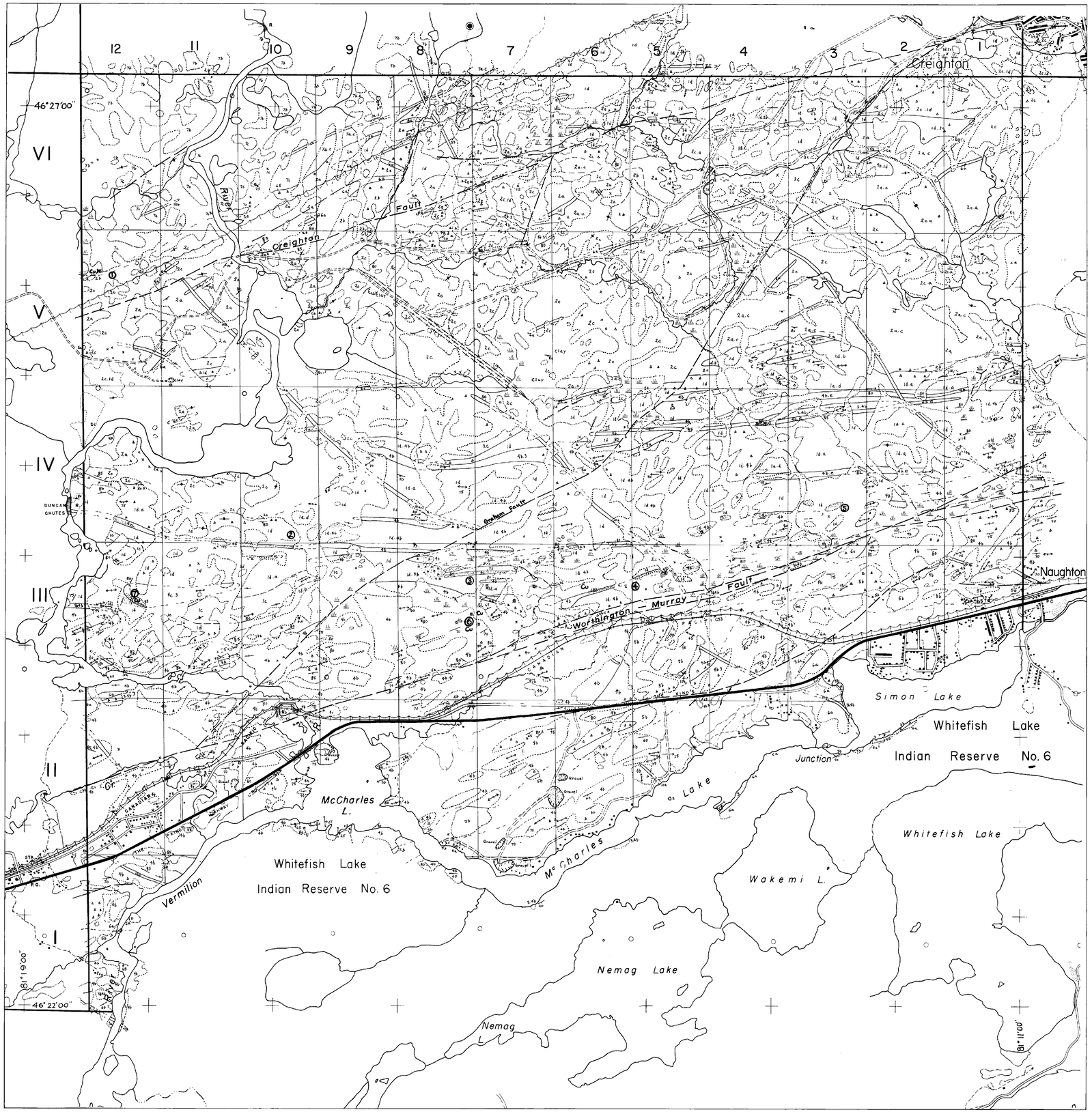
Economic Geology

Nickel and copper, in the form of pentlandite, pyrrhotite, and chalcopyrite are found throughout the area. Numerous deposits of gravel and sand are also being worked periodically. Clay occurs near the Creighton "granite" but the size and potential value of these deposits have not been assessed.

There are sulphide occurrences in and around the Nickel Irruptive and there appears to be an association between sulphide mineralization, quartz diorite, faulting and the outer contact of the irruptive. Quartz diorite also occurs above the lower contact and some bodies contain minor amounts of sulphides.

Sulphide mineralization also occurs in the metavolcanics. Long narrow zones contain minor amounts of disseminated pyrite, pyrrhotite and chalcopyrite. Some of these mineralized zones appear to be stratigraphic horizons; others are shear zones. Sulphide mineralization also occurs in brecciated, contorted amphibolite around rhyolitic bodies.

Zones of sulphide mineralization in the metavolcanics should be investigated carefully by numerous assays of fresh material. Any mineralized zones carrying significant amounts of copper or nickel would be of interest because of their large size. The Nickel Irruptive contact is of course, the most important locus of sulphide mineralization. However, there are bodies of quartz diorite, faults and areas of minor sulphide mineralization within the "norite" above the lower contact which are worth investigating.



LEGEND FOR DENISON AND GRAHAM TOWNSHIPS

CENOZOIC

PLEISTOCENE AND RECENT

Sand, gravel and clay.

Unconformity

PRECAMBRIAN

LATE BASIC INTRUSIONS

10 — 10a Olivine diabase. 10b Trap.

NICKEL IRRUPTIVE

Granophyre*

9 — 9a Light granophyre. 9b Dark granophyre.

Transition Rocks*

8 — 8a Light transition rocks. 8b Dark transition rocks.

Norite

7 — 7a Grey "norite". 7b Dark "norite". 7c "Quartz diorite". 7d Altered "norite".

GABBROIC ROCKS

6 — 6a Metagabbro.

METASEDIMENTS

Conglomerate

5 — 5a Oligomictic quartz-pebble conglomerate. 5b Polymictic conglomerate.

Pelitic Metasediments

4 — 4a Argillite. 4b Biotite metapelite. 4c Chloritic metapelite, sericitic metapelite. 4d Chloritoid metapelite. 4e Staurolite metapelite. 4f Garnet metapelite.

Quartzite

3 — 3a Feldspathic quartzite. 3b Biotitic, chloritic quartzite.

GRANITIC ROCKS

2 — 2a Pink porphyritic "granite". 2b Pink equigranular "granite". 2c Grey porphyritic "granite". 2d Grey equigranular "granite".

METAVOLCANICS

1 — 1a Porphyritic and amygdaloidal mafic metavolcanics. 1b Garnet amphibolite. 1c Acid metavolcanics: rhyolite, quartz-feldspar porphyry. 1d Amphibolite, amphibolitic gneiss and schist.

* Not present in Graham Township.

SYMBOLS FOR DENISON AND GRAHAM TOWNSHIPS

- Muskeg or swamp.
- River, creek, stream, R = rapids; F = falls.
- Bridge.
- Railway.
- Electric power transmission line.
- Highway.
- Wagon road.
- Glacial striae.
- Small rock outcrop.
- Boundary of rock outcrop.
- Geological boundary, defined.
- Geological boundary, assumed.
- Strike and dip; direction of top unknown.
- Strike and vertical dip; direction of top unknown.
- Direction (arrow) in which inclined beds face as indicated by gradation in grain size.
- Direction (arrow) in which vertical beds face as indicated by gradation in grain size.
- Direction (arrow) in which inclined beds face as indicated by cross bedding.
- Directions (arrow) in which overturned beds face as indicated by cross bedding.
- Direction in which lava flows face as indicated by shape of pillows.
- Strike and dip of schistosity.
- Strike of vertical schistosity.
- Strike and dip of gneissosity.
- Strike of vertical gneissosity.
- Lineation (plunge known, plunge unknown).
- Jointing, inclined.
- Drag-folds. (Arrow indicates direction of plunge).
- Fault, indicated or assumed.
- Location of mining property.
- Building.
- Shaft, vertical.
- Test pit.
- Open cut, quarry, gravel pit.
- Trench.
- Adit.
- Mine dump.
- Drillhole, inclination unknown.
- Drillhole.
- Veins.
- Network of quartz veins.
- MA Magnetic attraction.
- Gossan - sulphide mineralization.
- Breccia.

LIST OF PROPERTIES AND MINERAL OCCURRENCES

1. West Graham Mines Ltd. ..... Ni, Cu.
2. Sulphide occurrences ..... Lots 9, 10, 11, 12, Con.IV. Lots 9, 10, 11, Con.III.
3. Sulphide occurrences ..... Lots 6, 7, 8, Con.III.
4. Sulphide occurrences ..... Lots 5, 6, Con.III.
5. Sulphide occurrences ..... Lots 1, 2, 3, 4, Con.IV.
6. Copper occurrences ..... Lots 7, 8, Con.III. Lot 12, Con.III.
7. Sulphide occurrence ..... Lot 12, Con.III.

SOURCES OF INFORMATION

Basemap from maps of Forest Resources Inventory, Ontario Department of Lands and Forests.
Map 292 A, Copper Cliff sheet, Geol. Surv. Canada.
Geological maps of parts of Denison and Graham townships by The International Nickel Company of Canada, Limited.
Geology by K.D. Card and assistants, 1962, 1963.
Location of lot and concession lines approximate only.

Issued 1963.