Ministry of Natural Resources
Ontario

Hon. Alan W. Pope, Minister
W.T. Foster, Deputy Minister

ONTARIO GEOLOGICAL SURVEY
PRELIMINARY MAP P.2428
GEOLOGICAL SERIES

PRECAMBRIAN GEOLOGY OF

# LEVACK TOWNSHIP

SUDBURY DISTRICT

Scale 1:15 840

Mile 0 ½ 1 ½ Mile

Metres 100 0 0.2 0.4 0.6 0.8 1 Kilometre

NTS Reference: 41 I/11
ODM-GSC Aeromagnetic Map: 1518G
ODM Geological Compilation Map: 2419



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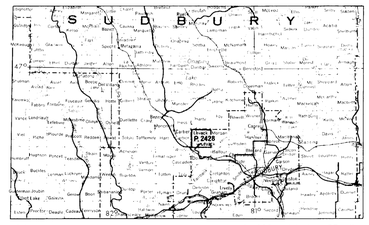



LOCATION MAP Scale: 1:1 584 000 or 1 inch to 25 miles.

## LEGEND[a]

PHANEROZOIC
CENOZOIC
QUATERNARY
RECENT

12 — 12 Swamp, lake, stream deposits

PLEISTOCENE

12 — 12 Sand, gravel, clay

*UNCONFORMITY*

PRECAMBRIAN
LATE PRECAMBRIAN
MAFIC INTRUSIVE ROCKS

11 — 11 Olivine diabase

*INTRUSIVE CONTACT*

MIDDLE PRECAMBRIAN
SUDBURY NICKEL IRRUPTIVE

10 — 10 Igneous Sublayer

*INTRUSIVE CONTACT*

9 — 9a Norite
9b Transition Zone Norite
9c Granophyre (Micropegmatite)

*INTRUSIVE CONTACT*

BRECCIA[b]

8 — 8 Sudbury-type breccia[c]

7 — 7a Sublayer leucocratic breccia
7b Megabreccia

WHITEWATER GROUP[b]
Onaping Formation

6 — 6a Basal breccia member
6b Grey member
6c Green member
6d Black member

*UNCONFORMITY*

EARLY PRECAMBRIAN
MAFIC INTRUSIVE ROCKS

5 — 5 Diabase

*INTRUSIVE CONTACT*

FELSIC INTRUSIVE AND MIGMATITIC ROCKS

4 — 4 Granite, granodiorite, quartz monzonite

*INTRUSIVE CONTACT*

3 — 3 Migmatite

MAFIC INTRUSIVE ROCKS

2 — 2a Metagabbro
2b Anorthositic metagabbro

*INTRUSIVE CONTACT*

"LEVACK GNEISS COMPLEX"

1 — 1a Granodioritic gneiss
1b Mafic and ultramafic gneissic rocks
1c Migmatites granodioritic gneiss; granitic gneiss

NOTES

a This is basically a field legend and may be changed as a result of subsequent laboratory investigations.

b The Breccia and Whitewater Group rocks are possibly of similar age. Order of listing between these does not imply age relationships.

c Small occurrences or dikes of Sudbury type breccia are shown by Δ

### SYMBOLS

- Glacial Striae
- Small bedrock outcrop
- Area of bedrock outcrop
- Gneissosity, (horizontal, inclined, vertical)
- Geological boundary, observed
- Geological boundary, position interpreted
- Fault; (observed, assumed), Spot indicates down throw side, arrows indicate horizontal movement.
- Lineament.
- Shatter cone
- Water Tank

## MARGINAL NOTES

### INTRODUCTION

Levack Township lies in the District of Sudbury about 30 km northwest of the city of Sudbury. Its centre is near Latitude 46°40'N and Longitude 81°24'W.

Levack Township was previously mapped by Langford (1960). Lumsden and Morgan Townships to the east were mapped by Muir and Taylor (1981) in 1980.

### MINERAL EXPLORATION

Mineral exploration in the Sudbury mining camp dates back to the 1880s. In 1888 and 1889 James Stobie and two indians employed by Rinaldo McConnell discovered the Levack Mine and the Big Levack showings. In 1913 the Levack Mine was put into operation by Mond Nickel Company. In 1929 Inco Limited (No. 3) became owner. In the early 1930s the mine was closed but was reopened in 1937 and has been in operation since that time.

In 1889 several occurrences of copper-nickel mineralization were found by M. Windekenisaw near what is now known as the Strathcona Mine. Originally held by Strathcona Mines Limited, the property and adjoining claims were acquired between 1928 and 1944 by Falconbridge Nickel Mines Limited (No. 2). In 1951 a diamond drill program was initiated. Production commenced in 1968.

Most of the mines within Levack Township came into production in the 1950s and 1960s.

At present Inco Limited operates three mines in the area, the Coleman Mine, the McCreedy Mine (formerly known as Levack Mine) and the McCreedy West Mine (the former Levack West Mine). Falconbridge Nickel Mines Limited operates two mines: the Strathcona Mine and the Onaping Mine, and has one mine, the Fraser Mine, under development. The Fecunis Mine of Falconbridge is scheduled to reopen in 1981 or 1982. Most of the exploration in the area was conducted by the two above mentioned companies. Numerous holes were diamond drilled and all the ground near the Nickel Irruptive-Footwall contact was covered by detailed geophysical surveys.

In the southwestern part of the township, Canada Radium Corporation Limited (No. 1) diamond drilled sixteen holes up to 90 m in length (reported in 1955). In 1956 Inspiration Mining and Development Company Limited diamond drilled one 618 m hole, also in southwestern Levack Township.

In the late 1950s Levack Nickel Mines Limited (No. 5) diamond drilled five holes, totalling 680 m, approximately 1.2 km west of the Town of Levack. The exact location of the holes are not known to the author.

### GENERAL GEOLOGY

The bedrock in the area is of Precambrian age and is covered by a discontinuous mantle of Pleistocene and Recent deposits.

The oldest rocks are Early Precambrian granodioritic gneisses, mafic metavolcanics, migmatites, granitic rocks, and diabases. In the southern sectors of the map-area, just north of the Nickel Irruptive, the gneisses and metavolcanics exhibit granulite facies mineralogy; in the central and northern township they exhibit amphibolite facies mineralogy. Most of the northern portion of the area is underlain by granitic rocks. Late Early Precambrian diabase dikes are numerous and cut all other Early Precambrian rocks. Middle Precambrian rock units related to the Sudbury basin present in the map-area are the Onaping Formation, the Sudbury-type breccia, the Sublayer and the Nickel Irruptive.

Only the Basal Breccia member and the lower portion of the Onaping Formation (Whitewater Group) are present in the area. The Basal Breccia member consists of Huronian quartz sandstone and arkose fragments, and of granitic and metavolcanic fragments set in a grey, very fine-grained matrix that resembles the matrix of the Sudbury type breccia or the fine groundmass of the Onaping tuff. The rocks of the Onaping Formation consist of country rock fragments and recrystallized glass fragments. The matrix of the rock is composed of fragments of quartz and feldspar, glass shards, and submicroscopic mineral fragments.

The Sudbury-type breccia is abundant in the map-area. It forms large zones, smaller patches and dikes, and consists mostly of locally derived subangular rounded rock fragments in a fine-grained, dark grey rock flour matrix.

The copper-nickel ores of the Sudbury mining camp are associated with the "Sublayer" that occurs along the lower contact of the Nickel Irruptive. Two variants of Sublayer rocks can be recognized; the "leucocratic breccia" and the "igneous sublayer" (Pattison 1979). The leucocratic breccia is very well exposed just north of the Strathcona and Coleman Mines and consists of fragments of footwall rocks and of mafic and ultramafic rocks set in a fine-grained, light-grey to pinkish matrix. The matrix is described as "mosaic-granoblastic-metamorphic" by Pattison (1979, p. 262). The igneous sublayer is best exposed near the intersection of the Seal Lake road with the Coleman Mine road. It commonly lies between the main Irruptive and the leucocratic breccia and is characterized by a great variety of mafic and ultramafic rock fragments set in a medium-grained gabbroic matrix. It is probably post-Irruptive in age.

The rocks of the Sudbury Nickel Irruptive intrude between the leucocratic breccia, or where absent, the footwall, and the Onaping Formation. It consists of a lower norite part and an upper granophyre (micropegmatite) part. These two rocks are separated by a rock unit commonly termed "transition zone norite".

Late Precambrian northwest-striking olivine diabase dikes intrude all the above-mentioned rock units.

### ECONOMIC GEOLOGY

Literature on the economic geology of the Sudbury basin is voluminous. No attempt is therefore made to discuss it here. The reader is referred to Dressler (1980) for some details on the geological setting of the mineral occurrences associated with the Irruptive in Levack Township.

In the southwestern part of Levack Township minor disseminated pyrite, pyrrhotite, and chalcopyrite occur in migmatitic gneisses in a narrow zone paralleling a northwest-striking diabase dike. The dike can be traced for a length of about 425 m[1]. The exact location of the mineralization is not known to the author and is therefore not known on the map.

About 0.8 km west of the town of Levack a surface showing of chalcopyrite, pyrrhotite, and pyrite is located in the northeastern corner of claim S31981[1]. The mineralization forms stringers and blebs within a 3 m wide zone in a granitic breccia. To the northwest the zone terminates prior to intersecting a diabase dike. Two samples taken from the zone and analyzed for platinum and palladium returned the following assays (Levack Nickel Mines Limited):

Platinum 0.01 and 0.12 ounce/ton
Palladium 0.02 and 0.19 ounce/ton

The exact location of this mineralization is not known to the author.

[1]Assessment Files, Resident Geologist's Office, Ministry of Natural Resources, Sudbury.

## REFERENCES

Dressler, B.
1980: Footwall of the Sudbury Irruptive, District of Sudbury; p.83-86 in Summary of Field Work, 1980, by the Ontario Geological Survey, edited by V.G. Milne, O.L. White, R.B. Barlow, J.A. Robertson and A.C. Colvine; Ontario Geological Survey Miscellaneous Paper 96, 201 p.

Langford, F.F.
1960: Geology of Levack Township and the Northern Part of Dowling Township, District of Sudbury; Ontario Department of Mines, P.R. 1960-5, accompanied by Preliminary Map P.91

Muir, T.L. and Taylor, A.B.
1981: Precambrian Geology of the Morgan Lake-Nelson Lake Area, Sudbury District; Ontario Geological Survey Preliminary Map P.2419,Geological Series. Scale 1:15 840 or 1 inch to ¼mile. Geology 1980.

Pattison, E.F.
1979: The Sudbury Sublayer; Canadian Mineralogist, Vol. 17, p.257-274.

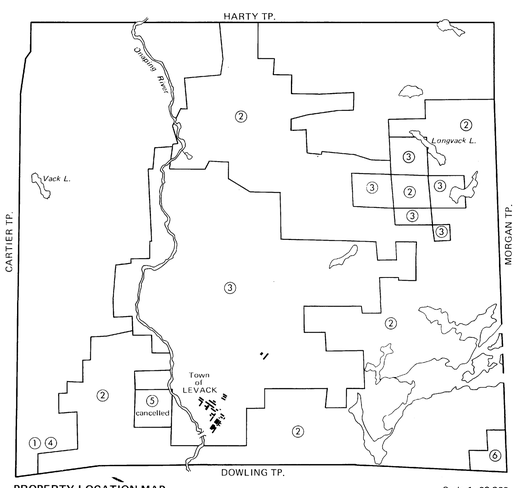
## LIST OF PROPERTIES

1 Canada Radium Corporation Limited (approximate location)[1955]*
2 Falconbridge Nickel Mines Limited.
3 Inco Limited.
4 Inspiration Mining and Development Company Limited (approximate location)[1956]*
5 Levack Nickel Mines Limited (approximate location)[1959]*
6 Sandcherry Mines Limited

* Date in square bracket indicates last date of exploration activity.

## MINERAL ABBREVIATION

**S** ..... Sulphide minerals (excluding footwall -Nickel Irruptive contact occurrences)




PROPERTY LOCATION MAP. Scale 1: 63 360

## SOURCES OF INFORMATION

Levack Township: Ontario Department of Mines Preliminary Map P.91, by F.F. Langford, 1960. Scale 1:15 840 or 1 inch to ¼mile.

Sudbury Mining Area; Ontario Department of Mines Map 2170, by K.D. Card, 1969. Scale 1:63 360 or 1 inch to 1 mile.

Assessment work on file at Resident Geologist's Office, Sudbury, and Assessment Files Research Office, Toronto.

Base-map derived from the Forest Resources Inventory maps, Lands and Waters Group, Ontario Ministry of Natural Resources.

Geology is not tied to surveyed lines.

Magnetic declination approximately 8°03' in 1980.

## CREDITS

Geology of B. O. Dressler, and assistant, 1979 and 1980.

Every possible effort has been made to ensure the accuracy of the information presented on this map; however, the Ontario Ministry of Natural Resources does not assume any liability for errors that may occur. Users may wish to verify critical information; sources include both the references listed here, and information on file at the Resident or Regional Geologist's office and the Mining Recorder's office nearest the map-area.

This project is part of the Northern Ontario Geological Survey program and is funded by the Ontario Ministry of Northern Affairs.

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Information from this publication may be quoted if credit is given. It is recommended that reference be made in the following form:

Dressler, B.O.
1981: Precambrian Geology of Levack Township, Sudbury District; Ontario Geological Survey Preliminary Map P.2428, Geological Series, Scale 1:15 840 or 1 inch to ¼mile. Geology 1979 and 1980.