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Ministry of Northern Development and Mines
Hon. Rene Brunelle, Minister
Stan Gorvey-Metcalfe, Deputy Minister of Mines

Mines and Minerals Division
Ontario Geological Survey

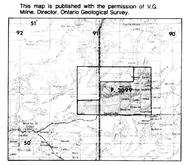
MAP P.3099
Geological Series—Preliminary Map

PRECAMBRIAN GEOLOGY
SAVANT LAKE AREA
DISTRICTS OF THUNDER BAY AND KENORA

Scale 1:50 000

Metres 1000 0 1000 2000 3000 4000 5000
Miles 1 0 1 2 3 4 5 Miles

NTS References: 52 J/6, 7, 8, 9, 10
ODM-GSC Aeromagnetic Maps: 1109G, 1119G, 1129G, 820G
ODM Geological Compilation Map: 2442



LOCATION MAP Scale: 1:1 584 000 or 1 inch = 25 miles

SOURCES OF INFORMATION

Basemap from maps of the Forest Resources Inventory, Lands and Waters Group, Ontario Ministry of Natural Resources.
ODM-GSC Aeromagnetic Maps 1109G and 1119G, scale 1:50 000.
Published and unpublished maps, plans, and files of mining companies.
Assessment work data on file with the Ontario Ministry of Northern Development and Mines.
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Conant, Jutten and Smye Townships, Kenora District (Patricia Portion), by N.F. Trowell, 1981. Ontario Geological Survey, Map 2466, scale 1:31 680 or 1 inch to 1/2 mile.
Houghton Lake-Hough Lake, Thunder Bay District, by W.D. Bond, 1980. Ontario Geological Survey, Map 2424, scale 1:31 680 or 1 inch to 1/2 mile.
Beckington Lake, Thunder Bay District, by N.F. Trowell, 1981. Ontario Geological Survey, Map 2431, scale 1:31 680 or 1 inch to 1/2 mile.
Geology not tied to surveyed lines.
Magnetic declination approximately 2°E in 1977.
Metric conversion factor: 1 foot = 0.3048 m.

CREDITS

Geology by N.F. Trowell and assistants, 1976 and 1977.

Every possible effort has been made to ensure the accuracy of the information presented on this map; however, the Ontario Ministry of Northern Development and Mines 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 assessment files at the Resident Geologist's Office and the Mining Recorder's Office nearest the map area.

Issued 1980

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

Trowell, N.F.
1988 Precambrian Geology of the Savant Lake Area, Districts of Thunder Bay and Kenora. Ontario Geological Survey, Map P.3099, Geological Series-Preliminary Map, scale 1:50 000. Geology 1976, 1977.

LEGEND

PHANEROZOIC
CENOZOIC
RECENT

Swamp and stream deposits, local lake deposits (unconsolidated)

PLEISTOCENE

Silt, sand and gravel; boulders

UNCONFORMITY

PRECAMBRIAN
LATE PRECAMBRIAN
MAFIC INTRUSIVE ROCKS

10 | 10 Diabase

INTRUSIVE CONTACT

EARLY PRECAMBRIAN (ARCHEAN)
UNMETAMORPHOSED FELSIC TO INTERMEDIATE INTRUSIVE ROCKS

9 | 9 Unsubdivided
9a Granodiorite, quartz monzonite
9b Granodiorite
9c Quartz monzonite
9d Xenolithic granitic rocks
9e Aplite

INTRUSIVE CONTACT

METAMORPHOSED FELSIC TO INTERMEDIATE INTRUSIVE ROCKS

8 | 8 Unsubdivided
8a Trondhjemite
8b Granodiorite
8c Porphyritic trondhjemite
8d Granodiorite, quartz monzonite
8e Porphyritic granodiorite
8f Xenolithic granitic rocks
8g Quartz diorite
8h Aplite
8i Pegmatite

INTRUSIVE CONTACT

METAMORPHOSED FELSIC TO INTERMEDIATE PORPHYRITIC INTRUSIVE ROCKS

7 | 7 Unsubdivided
7a Quartz and feldspar porphyry
7b Xenolithic granitic rocks

INTRUSIVE CONTACT

MAFIC, INTERMEDIATE, AND ULTRAMAFIC INTRUSIVE ROCKS

6 | 6 Unsubdivided
6a Diorite, quartz diorite
6b Gabbro, feldspar-phyric gabbro
6c Xenolithic mafic intrusive rocks
6d Peridotite, pyroxenite

INTRUSIVE CONTACT

METASEDIMENTS AND METAVOLCANICS
METASEDIMENTS
Chemical Metasediments

5 | 5 Unsubdivided
5a Quartz-magnetite iron formation
5b Jasper iron formation
5c Chert

Fine Clastic Metasediments

4 | 4 Unsubdivided
4a Sandstone
4b Siltstone, mudstone
4c Arkosic siltstone
4d Tuffaceous metasediments

Conglomeratic Metasediments

3 | 3 Unsubdivided
3a Volcanic-clast conglomerate
3b Granitoid-clast conglomerate

METAVOLCANICS
Felsic to Intermediate Metavolcanics

2 | 2 Unsubdivided
2a Flows
2b Tuff
2c Lapilli-tuff
2d Tuff breccia
2e Flow breccia
2f Porphyritic flows
2g Volcaniclastic sandstone
2h Debris flow deposits
2i Porphyritic metavolcanics

Mafic to Intermediate Metavolcanics

1 | 1 Unsubdivided
1a Flows
1b Pillowed flows
1c Porphyritic flows
1d Tuff, lapilli-tuff, tuff breccia
1e Autoclastic breccia
1f Amygdaloidal flows
1g Varioltic flows
1h Volcanic conglomerate

NOTES:
a) This is a field legend and may be changed as a result of subsequent laboratory investigations.
b) The Precambrian legend is lithological, and stratigraphic order is not implied by numerical order.

MARGINAL NOTES

INTRODUCTION

The Savant Lake area, in the Districts of Thunder Bay and Kenora, is centred approximately 85 km northeast of Sioux Lookout. The town of Savant Lake, in the junction of Highway 599 and the Canadian National Railway Transcontinental Line, is 1.2 km south of the southern boundary of the area.

Access is provided by Highway 599 originating 1.6 km east of Ignace and by provincial Highway 808 (Pickle Lake Access Road) that extends from Sioux Lookout to join Highway 599, 10 km north of the town of Savant Lake. Several logging roads extend from Highway 599 and provide access to the south-central part of the area. Canoe routes along the Turtle-Wabigoon-Eagle-Lake-Machigonish River and Chukuni Lake-Kawastogama Lake systems provide access respectively, to the western and northern parts of the area. Float-equipped aircraft provide access to the more remote lakes.

The elevation of Savant Lake is 397 m (1306 ft) above sea level and the maximum local relief is not higher than 85 m above this datum.

A river-system divide, separating two major drainage basins, passes through the area. All lakes and rivers west of Handy and Whimbrel Lakes drain to the northeast and are part of the Albany River Drainage Basin, which eventually drains into James Bay. Lakes and rivers to the west are part of the English River Drainage Basin which drains eastward into Lake Winnipeg.

PROSPECTING AND MINING ACTIVITY

The Savant Lake area has been prospected since the turn of the century. Initial exploration was directed toward the search for gold. Attention shifted to iron in the 1910s and 1920s with the discovery of extensive iron deposits south of Kashewegamba Lake.

In 1928 and 1946, minor gold discoveries led to increased exploration activity in the area (see Bond 1977, p. 4 for a more complete discussion).

The discovery in 1968 of the zinc-copper-silver-lead Mattabi Mine at Sturgeon Lake (Trowell *et al.* 1980) led to increased exploration activity in the adjoining northern Savant Lake area.

In the 1980s, exploration has been primarily for gold though base metals are again presently receiving attention.

GENERAL GEOLOGY

Figure 1 on the map face summarizes the stratigraphic terminology and provides the structural details for the map area.

The Savant Lake volcanosedimentary belt stretches from the Marchington River in the west to beyond the eastern limits of Whimbrel Lake. The belt is a northeast-trending supracrustal unit within the Wabigoon Subprovince of the Canadian Shield. To the north, the volcanosedimentary belt is flanked by the English River Subprovince.

The bedrock of Archean age is partly covered by unconsolidated deposits of Pleistocene and Recent age the result of continental glaciation during the Pleistocene epoch.

A discussion of the regional geology follows in the context of the stratigraphic breakdown proposed on Figure 1. For the original detailed maps and reports covering the area, refer to the Selected References.

The Jutten group, an apparently, though likely fault repeated, sequence of mafic flows and pyroclastic rocks, forms the northern part of the volcanosedimentary belt. Bite and one definite flow of ultramafic composition are present at Armit Lake. A unit of intercalated chert and magnetite ironstone forms a distinctive semi-continuous marker horizon near the base of the Jutten Group in the west and northwest parts of the area. Felsic pyroclastic rocks and associated occurrences of intermediate tuffaceous rocks and volcanogenic metasediments.

In the north, northwest, and southwest parts of the map area, the Jutten group is unconformably overlain by the Savant Narrows formation (Pflegsohl 1976) comprised of a 1, lowermost polymictic and volcanic conglomerate member, and 2 an upper volcanic-clastic conglomerate member.

The Savant Narrows formation is interbedded with and shows a lateral facies change to, the Whimbrel Lake formation in the area north of Whimbrel Lake and along the west shore of Savant Lake. In the northern part of Savant Lake, the Savant Narrows formation is represented by mafic metavolcanic flows that comprise the Savant Lake formation.

The Handy Lake group consists of a complexly intercalated sequence of mafic flows and pyroclastic rocks, felsic to intermediate flows and pyroclastic rocks, and volcanogenic metasediments. The Handy Lake group is subdivided into 3 units: 1, a lowermost bedded iron-formation, iron silicate, and magnetite ironstone laminae subdivides the Handy Lake group into lowermost (Evans Lake formation) and upper (Conant Lake formation) formations.

The sedimentary Savant group comprises fine wacke and siltstone with subordinate conglomerate of intercalated chert and magnetite ironstone. Shegelski (1978) interpreted both the clastic and chemical sediments to be turbidites of deep-water origin.

Both early and late stocks, plutons and batholiths of granite intrude the volcanosedimentary belt. Scattered diabase intrusions of uncertain age occur locally.

STRUCTURAL GEOLOGY

Both stratigraphic interpretation and deformation are somewhat conjectural. Originally, the Savant Narrows formation was interpreted to define the base of the sedimentary Savant group with the fine wackes and siltstones, and iron formation representing infilling of a sedimentary basin. Likewise, the Whimbrel Lake formation was interpreted to be the lateral facies of the lower Handy Lake group and to be correlative to the Savant Narrows formation.

A zircon date of 2745±2 Ma was obtained previously from a felsic tuff within the Handy Lake group (Davis and Trowell 1982). The stratigraphic position of the Savant Narrows formation (Davis *et al.* 1987) shows that the unconformity present in the Savant Lake area was very late in development and probably is being correlative to the base of the Handy Lake group.

Deformation was a continuum beginning with the deformation of the Jutten group prior to deposition of the overlying sequences and ending with folding and faulting associated with the final emplacement of the granitic batholiths. Deformation has left the complex fold patterns of the Savant sedimentary group, and the similar, but less intense, fold patterns of the Handy Lake group as a result of multiply-oriented compression of these units against the more rigid blocks of the Jutten group. A discussion of the evolution of the Savant Lake volcanosedimentary belt in light of recent age dating and in the context of regional tectonic developments, can be found in the paper by Davis *et al.* (1987).

MINERAL PRODUCTION AND RESOURCES

Occurrences of iron, gold, silver, and the base metals copper, lead, and zinc are present in the Savant Lake area. Iron deposits occur in both the Jutten volcanic group and the Savant sedimentary group. These deposits are not exploitable at present. Gold and gold-silver mineralization, locally accompanied by minor amounts of base metals, occur in quartz veins and silicified zones in the Jutten volcanic group. Base metal massive sulphide occurrences are found in the stratigraphic upper part of the Handy Lake volcanic group. Sand and gravel deposits in the area are used for road construction and maintenance.

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1978c: Grace Lake Area, District of Thunder Bay; Sioux Lookout Data Series, Ontario Division Mines, Map P.1094, scale 1:15 840 or 1 inch to 1/4 mile.
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SYMBOLS

- Small bedrock outcrop
- Area of bedrock outcrop
- Bedding, top unknown; (inclined, vertical, unknown)
- Bedding, top indicated by arrow; (inclined, vertical, overturned)
- Bedding, top (arrow) from grain gradation; (inclined, vertical, overturned)
- Lava flow, top(arrow) from pillows shape and packing
- Schistosity; (inclined, vertical, unknown)
- Gneissocity; (inclined, vertical)
- Foliation (inclined, vertical, unknown)
- Bedding (inclined, vertical, unknown)
- Geological boundary, position interpreted
- Fault, assumed
- Lineament

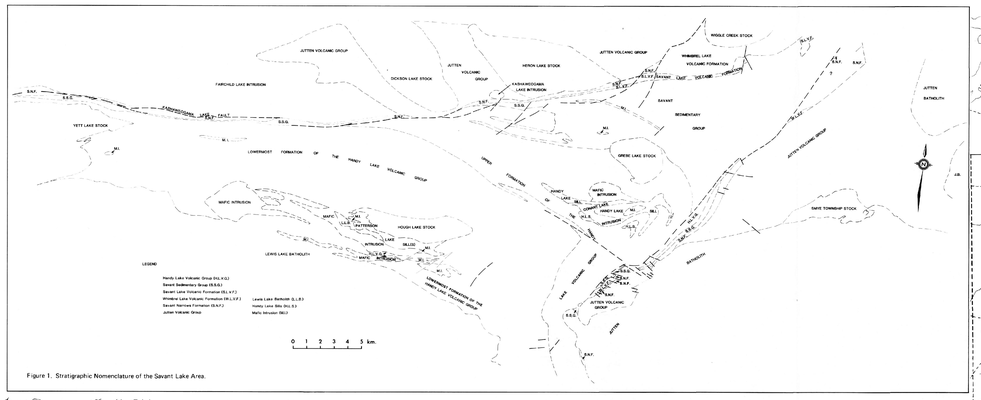

Figure 1. Stratigraphic Nomenclature of the Savant Lake Area.