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MARGINAL NOTES

LOCATION AND ACCESS: The Zarn Lake area is bounded by Latitudes 50°00′ and 50°11′N and by Longitudes 91°33′ and 91°45′W, including portions of NTS sheet 52J/4E. The easternmost portions of Block 10 and Drayton Township, and a portion of Benedickson Township, are also included within the area. Thunder Bay lies about 240 km to the southeast while the closest population centre, Sioux Lookout, is about 15 km to the west of the map boundary. Some locations within the map-area require float plane service or canoe portaging, but general access can be gained from Sioux Lookout via paved road (Highway 642), boat, or Canadian National rail service.

HISTORY OF EXPLORATION: Exploration for mineral resources was slow in coming to the Zarn Lake area, primarily because of easier access to adjoining metavolcanic terrain to the east and west in the early 1900's (Sturgeon and Minnitaki Lakes). Discovery of gold-bearing quartz veins in 1929 stimulated the first extensive prospecting and staking activity in the map-area. Numerous gold occurrences were evaluated during the periods 1930-1936 and 1947-1952, and again around 1963. No production has been obtained, but sporadic exploration (primarily for gold) has continued up to December 1978.

Base-metal exploration is a relatively new development, commencing in the area in the early 1960's. Based on information compiled from the Assessment Files Research Office, Ontario Geological Survey, Toronto, it seems reasonably apparent that no in-depth, phased program of exploration has been conducted over the area for base-metal (massive) sulphide deposits.

Mineral deposits known within the Zarn Lake area to December 1978 include gold associated with quartz-sulphide and quartz-carbonate-sulphide veins, silver associated with quartz veins in sheared quartz-sericite-carbonate rocks, and iron contained within sulphide-bearing ironstones. Copper, lead, and zinc sulphides are commonly associated with the precious metal occurrences in the area, which in turn are contained within a variety of mafic to felsic host rocks, but no distinctly stratabound sulphide occurrences are known.

GENERAL GEOLOGY: Bedrock within the Zarn Lake area is apparently all of Early Precambrian age. Roughly two-thirds of the area is underlain by mafic to felsic metavolcanics, several hypabyssal intrusive bodies, and minor metasedimentary units. This primarily metavolcanic terrain is bordered on the southeast by a salient of the Lake of Bays batholith, and to the north, is in fault contact with intrusive and gneissic rocks of the English River Subprovince.

Felsic metavolcanics occurring to the south of the west end of Botsford Lake consist mostly of coarse fragmental rocks and massive to flow-banded lavas. Bedded pyroclastic rocks are very rare, a feature believed by the author to be a primary characteristic, as exposure is adequate and deformation is minor for much of the unit. Bedding characteristics (or lack thereof), combined with fragment morphologies and gradations into flow rocks, suggest that most of these felsic metavolcanics are the products of partial to complete disintegration of flows and/or domes. The felsic rocks, along with the overlying mafic and intermediate metavolcanics exposed in the Kirk-Star-Michaud Lakes area, may be inferred to have their origin within a major volcanic centre some 10-15 km southwest of Alcona (Page and Clifford 1977).

Intermediate and felsic metavolcanics elsewhere in the map-area are notably more deformed than those of the Kirk Lake area, generally occurring as aphyric to quartz-'eye' quartz-sericite schists. Garnet and muscovite are developed in felsic extrusives at the margin of the Lake of Bays batholith in the southeastern corner of the map-area, whereas carbonate is a minor to abundant constituent in both intermediate and felsic metavolcanics in the Rosnel siding - Black Lake area.

Mafic metavolcanics throughout the area are quite uniform, with only local occurrences of fragmental units. Mafic rocks have generally attained greenschist facies metamorphic grade, but also occur as amphibolites, or hornfels, in close proximity to the Lake of Bays batholith and the trondhjemite stock of Split Lake. Pyrope-almandine garnets are prominent in mafic metavolcanics only in a small area about 0.8 to 1.2 km to the north of the Split Lake Mines prospect.

Vein-quartz- and quartz-porphyry-bearing conglomerates, along with well bedded, quartz-poor pebbly sandstones and minor slate occur in the southwest corner of the map-area. These metasediments are the eastern extension of the Minnitaki Group, first described by Pettijohn (1936) and defined by Walker and Pettijohn (1971). The inferred source rock for the quartz porphyry detritus, an oval plug outlined by Horwood (1937), has been shown, however, to consist only of several isolated masses of porphyritic trondhjemite surrounded by the sediments. Age relations between the two rock types were not defined in observed outcrops.

Sulphide-bearing magnetite-grunerite-quartz ironstone, wacke, and slate are found within mafic metavolcanics at various locations along the length of Botsford Lake. These units may represent the eastern extension of Abram Group metasediments (Daredevil Formation?) as defined by Turner and Walker (1973). Quartz-bearing metasediments occur at several other locations within the metavolcanic succession and are apparently of volcanic derivation.

STRUCTURAL GEOLOGY: Several major structures defined within the map-area may have a bearing on mineral exploration; these include the syncline(s) in the Kirk Lake area, a dome produced by intrusive rocks of Split Lake, and the regional fault (zone) along Botsford Lake. Precious metals (Au, Ag) appear to be concentrated in quartz-sulphide or quartz-carbonate-sulphide veins within the map-area. This veining seems to be controlled by dilatant zones, or shear zones, associated with late faults (Botsford Lake and Forty Mile Lake faults). Substantial shear zones could be present in the mostly covered ground between Out and Black Lakes, associated with splays off the main Botsford Lake zone. Two, major, inferred dilatant zones are apparently present in areas where overburden has had limited prospecting activity, namely, the area due south of Forty Mile Creek (between Split and Enira Lakes), and the area northeast of Black Lake.

Documentation of a volcanic succession in the Kirk Lake syncline provides a starting point for stratigraphic reconstruction of the area. In general, a unit of mafic metavolcanics containing gabbroic sills may be traced around the Split Lake dome. Lack of continuity of major felsic metavolcanic units, also exposed within the domal structure and apparently younger to time-equivalent with the mafic unit, suggests that the felsic units are not rock-stratigraphic although they may have been deposited at about the same time (i.e. felsic units of Forty Mile Lake, Enira Lake, and in the Black Lake area probably originated from a vent or vents *other than* those which produced the Alcona area felsic pile). Extension of these relationships into the Black Lake area can only be made on a tentative basis due to complexities imposed by alteration, intrusive bodies, and limited exposure. Contacts within this area suggest, however, that the stratigraphy is more readily traceable along a north-south, rather than east-west, major direction.

ECONOMIC GEOLOGY: With the exception of one low-grade iron deposit, all current properties and mineral deposits in the Zarn Lake area are concerned with precious metals. Silver is notable in only one of these and gold is the metal of interest in all others. Past exploration has been primarily directed at gold mineralization, but in recent years there has been some activity regarding base-metal potential.

Kerr Addison Mines Limited conducted a major drilling program during 1968-69 on a low-grade iron deposit (no. 6). Iron contents ranging between about 15 to 30% total Fe were found to be sufficient for concentrating, but apparently tonnage was not enough to warrant further development at that time. Gulf Minerals Canada Limited holds 10 claims (as of 31 December 1978; no. 5) covering a portion of the Kerr Addison Prospect, as part of a larger claim block extending west out of the map-area; no work has been reported on the current property.

Gold exploration was begun in earnest with the discovery of a vein system at the Alcona Mines Prospect (R. S. Rosenblat property, no. 11). Other work in the early 1930's located gold mineralization at the Alkenore-Buffalo Occurrence (no. 1) and Prospect (R. S. Rosenblat property, no. 12), and at the Split Lake Mines Prospect (no. 14). Underground development was conducted on nos. 11 and 14 and considerable diamond drilling was used to explore nos. 11, 12, and 14; deposit no. 1 was trenched. All of these showings yielded sporadic high gold values, but lack of lateral continuity, narrow vein widths, or lack of consistent grade prevented their coming into production.

A gold-bearing vein system and shear zone (R. Moretti property, no. 7) was discovered in 1938, drilled and bulk sampled by Coniagas Mines Limited in 1940-1941, and redrilled and sampled by Floregold Red Lake Mines Limited in 1950-52. This deposit is notable as visible gold is reported (Hutchison 1941a, b; McCombe 1950, 1951) and assays for some 15 tons of material from two locations along the veining returned 0.41 to 0.67 ounces gold per ton, across an average width of 2.8 feet (0.8 m). In 1963, Consolidated Bellekeno Mines Limited (no. 3) examined a gold occurrence in the northeastern portion of the map-area.

Considerable exploration activity in the late 1940's and early 1950's also resulted in a gold discovery by E. S. Richards (no. 10) and exploration of veining by other groups (nos. 2 and 16). No assays are reported for the latter, but additional work in 1963 at no. 10 for Bankfield Consolidated Mines Limited yielded erratic values from nil to 2.5 ounces gold per ton (Holbrook 1963). The Richards Occurrence is somewhat anomalous, as silver values are reported (Bergmann 1951) and the country rock for the veining is partially to extensively carbonatized, as is the ground in the vicinity of the only major silver mineralization in the map-area (W. M. Thompson property, no. 15).

Exploration of quartz-carbonate veining in highly sheared quartz-sericite rocks at no. 15 was begun around 1964, and options have been taken on the ground by Asarco Exploration Company Limited (1970-71) and New Insco Mines Limited (1975). Diamond drilling conducted on the shear zone during these two options totalled about 578 m in seven holes but failed to outline continuous economic mineralization. An additional 348 m of diamond drilling in nine other holes has been similarly unsuccessful, but there is some evidence that the majority of this other drilling, along with geophysical surveys run in 1970-71, may have been misdirected by anomalies associated with magnetic ironstones (and the CNR main line) paralleling the south shore of Botsford Lake (just north of the no. 15 showing).

Exploration apparently directed at base-metal (massive) sulphide potential has been conducted in the map-area by Conwest Exploration Company Limited (no. 4) and Selco Exploration Company Limited (no. 13). These two companies participated in a 1971 joint venture, conducting airborne geophysical surveys over felsic metavolcanics north of Alcona and Kirk Lake, but their surveys only covered ground *west* of the Drayton Township boundary line, extending west out of the map-area. No favourable anomalies were disclosed by these surveys. Selco Exploration Company Limited also tested conductive zones (probably located by airborne surveys), drilling five short holes in the southwest corner of the map-area, and running ground geophysical surveys over several claims north of Split Lake. No significant mineralization or suggestive anomalous zones were encountered and there is no report of additional exploration.

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LIST OF PROPERTIES, MINERAL DEPOSITS, AND AREAS OF EXPLORATION

1. Alkenore-Buffalo Occurrence
2. Auralee Gold Mines Limited [1947]
3. Consolidated Bellekeno Occurrence
4. Conwest Exploration Company Limited [1971]
5. Gulf Minerals Canada Limited
6. Kerr Addison Prospect
7. Moretti, R. (Floregold Prospect)
8. Price, W. H., Jr.
9. Regan, F. V.
10. Richards Occurrence
11. Rosenblat, R. S. (Alcona Mines Prospect)
12. Rosenblat, R. S. (Alkenore-Buffalo Prospect)
13. Selco Exploration Company Limited [1971]
14. Split Lake Mines Prospect
15. Thompson, W. M. (Rosnel Prospect)
16. Tweten, D. and Tweten, J. (Young and Spencer Prospect)

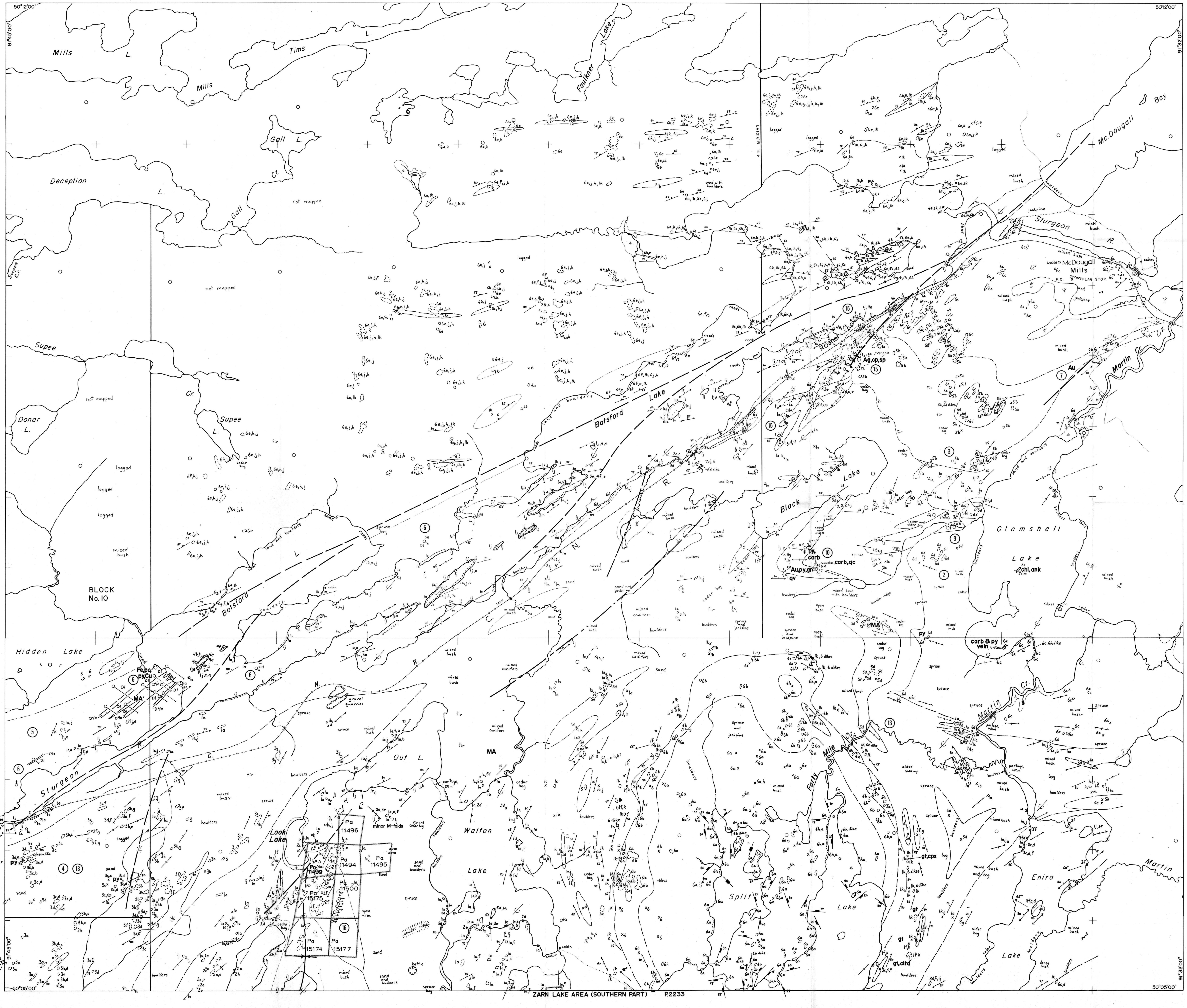
Information current to 31 December 1978. Former properties on ground now open to staking are shown only where exploration information is available. A date in brackets indicates the last year of major exploration activity.

METAL AND MINERAL REFERENCES

Ag	Silver	mag	Magnetite
ank.	Ankerite	mus	Muscovite
Au	Gold	Pb	Lead
carb	Carbonate	po	Pyrrhotite
chl	Chlorite	py	Pyrite
cltd.	Chloritoid	q	Quartz
cp.	Chalcopyrite	qc.	Quartz carbonate vein
cpx.	Clinopyroxene	qv.	Quartz vein
Cu	Copper	sp.	Sphalerite
Fe	Iron	Zn	Zinc
gt.	Garnet		

GEOLOGICAL AND MINING SYMBOLS

- Glacial striae.
- Small bedrock outcrop.
- Area of bedrock outcrop.
- Bedding, top unknown (inclined, vertical).
- Bedding, top (arrow) from grain gradation (inclined, vertical, overturned).
- Bedding, top (arrow) from cross bedding (inclined, vertical, overturned).
- Lava flow, top (arrow) from pillows shape and packing.
- Schistosity (horizontal, inclined, vertical).
- Gneissosity (horizontal, inclined, vertical).
- Foliation (horizontal, inclined, vertical).
- Lineation with plunge.
- Geological boundary, observed.
- Geological boundary, position interpreted.
- Fault (assumed).
- Lineament.
- Jointing (horizontal, inclined, vertical).
- Anticline, syncline.
- Drill hole (vertical, inclined).
- Drill hole (projected vertically).
- Shaft; depth in feet.
- MA Magnetic attraction.



Ministry of Natural Resources
Ontario
Hon. James A.C. Auld, Minister
Dr. J.K. Reynolds, Deputy Minister

ONTARIO GEOLOGICAL SURVEY
PRELIMINARY MAP P.2232
GEOLOGICAL SERIES

ZARN LAKE AREA (NORTHERN PART)

DISTRICT OF KENORA

Scale: 1:15 840

Mile ¼ 0 ¼ ½ Mile
Metres 100 0 0.2 0.4 0.6 0.8 1 Kilometre

NTS Reference: 52J/4E
ODM-GSC Aeromagnetic Map: 1138G
ODM Geological Compilation Map: 2169

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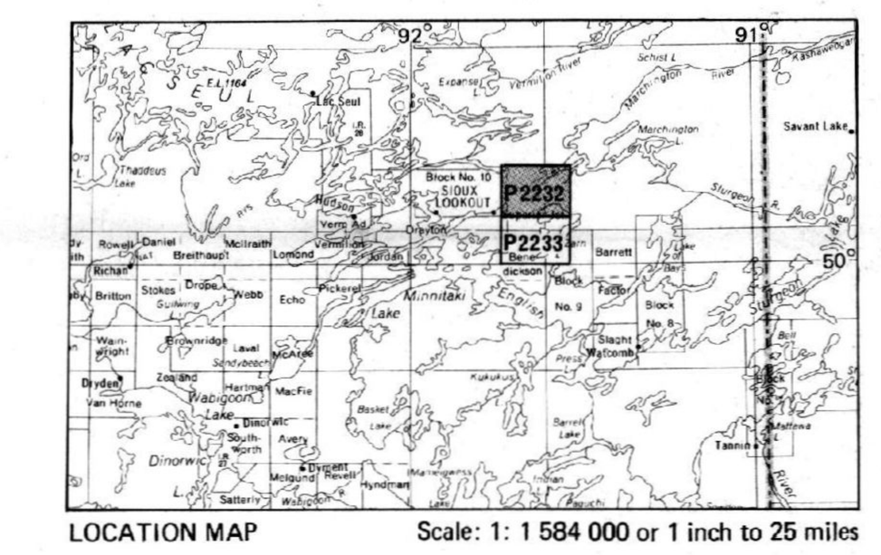

LOCATION MAP Scale: 1: 1 584 000 or 1 inch to 25 miles

LEGEND[a]

PHANEROZOIC
CENOZOIC[b]
QUATERNARY
RECENT

Lake, stream, and bog deposits

PLEISTOCENE

Sand, gravel, and ground moraine deposits

UNCONFORMITY

PRECAMBRIAN[c]
EARLY PRECAMBRIAN (ARCHEAN)

FELSIC TO INTERMEDIATE INTRUSIVE ROCKS[d]

- 6 Unsubdivided
- 6a Homogeneous biotite trondhjemite, hornblende-biotite trondhjemite
- 6b Inhomogeneous biotite-hornblende trondhjemite, quartz diorite, mafic xenolith-bearing hornblende-biotite trondhjemite
- 6c Chlorite trondhjemite[e]
- 6d Quartz porphyry, quartz-feldspar porphyry, felsite, quartz-sericite schists
- 6e Foliated to gneissic trondhjemite, granodiorite
- 6f Porphyroblastic to porphyritic granodiorite, quartz monzonite
- 6g Cataclastic granodiorite, quartz monzonite
- 6h Fine-grained to aphanitic leucocratic granodiorite, quartz monzonite, aplite
- 6j Pegmatitic quartz monzonite, granite
- 6k Hornblende-biotite trondhjemite gneiss[g]

INTRUSIVE CONTACT

MAFIC INTRUSIVE ROCKS[d]

- 5 Unsubdivided
- 5a Biotite-hornblende diorite
- 5b Hornblende diorite, porphyritic diorite
- 5c Foliated epidote-biotite-hornblende diorite, quartz diorite
- 5d Equigranular to ophitic gabbro[f]

INTRUSIVE CONTACT

METASEDIMENTS[d]

- 4 Unsubdivided
- 4a Quartzose wacke
- 4b Slate, graphitic slate
- 4c Quartz porphyry and vein quartz boulder and cobble conglomerate
- 4d Quartz porphyry and vein quartz pebble conglomerate, and pebbly sandstone
- 4e Sulphidic magnetite-quartz-grunerite ironstone
- 4f Volcanic and quartz porphyry boulder conglomerate
- 4g Pebbly volcanic wacke, lithic arkose wacke

FELSIC METAVOLCANICS[d]

- 3 Unsubdivided[h]
- 3a Massive or flow-banded[h]
- 3b Massive or flow-banded, porphyritic[h]
- 3c Breccia, tuff-breccia, agglomerate
- 3d Lapilli tuff, lapilli-crystal tuff
- 3e Crystal-lithic tuff, lithic tuff
- 3f Quartz-sericite schist[h]
- 3g Quartz-'eye' quartz-sericite schist[h]

INTERMEDIATE METAVOLCANICS[d]

- 2 Unsubdivided
- 2a Massive and brecciated
- 2b Pillowed
- 2c Breccia, tuff-breccia, agglomerate
- 2d Lapillistone, lapilli tuff, lapilli-crystal tuff
- 2e Crystal-lithic tuff, lithic tuff
- 2f Schistose, lineated intermediate metavolcanics
- 2g Hornfels, biotite-quartz-plagioclase schists

MAFIC METAVOLCANICS[d]

- 1 Unsubdivided
- 1a Massive, aphanitic to holocrystalline
- 1b Plagioclase phenocryst (megacryst) massive
- 1c Mafic phenocryst to ophitic, massive
- 1d Pillowed, with internal concentric structures and/or 10% intrapillow hyaloclastite
- 1e Pillowed, unsubdivided
- 1f Breccia, tuff-breccia, agglomerate, intraflow hyaloclastite (pillow breccia)
- 1g Bedded tephra, lapilli tuff
- 1h Lithic tuff, crystal-lithic tuff
- 1j Schistose, lineated mafic metavolcanics
- 1k Mafic hornfels, epidote-amphibolite, amphibolite
- 1m Variolitic

Carbonatized rock

Sil — Silicified rock

NOTES:

a) The lithologic codes given constitute basically a field legend and may be changed as a result of subsequent laboratory investigations.

b) Unconsolidated deposits. Cenozoic deposits are not differentiated on the map.

c) Bedrock geology. Where in places a unit is too narrow to be shown with separate contacts and must be represented as a line, a short black bar appears in the appropriate place.

d) Rocks in these groups are subdivided lithologically and the order does not necessarily imply age relationship within or among groups.

e) Partially carbonatized in the southern Clamshell Lake area.

f) May be extrusive in part. Map unit 6d probably includes some felsic metavolcanics (3f, 3g) in the immediate vicinity of the Rosnel siding.

g) The origin of these rocks is unknown.

h) May be intrusive in part.

The letter "D" preceding a code refers to data compiled from diamond drill logs filed for assessment work credits.

SOURCES OF INFORMATION

Geology by R. O. Page, E. B. Moller, and assistants, Ontario Geological Survey, 1978.

Geology is not tied to surveyed lines.

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

Assessment Files Research Office, Ontario Ministry of Natural Resources, Toronto.

Alcona-Split Lake Area; Map No. 46e, to accompany Ontario Department of Mines Annual Report Volume 46, Part 6, 1937, by H. C. Horwood.

Abram Lake Sheet; Ontario Division of Mines Map 2243, 1972, by F. J. Johnston.

Magnetic declination in the area was approximately 1°E, 1978.

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Metric Conversion Factor: 1 foot = 0.3048 m

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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:

Page, R. O. and Moller, E. B.
1979: Zarn Lake Area (Northern Part), District of Kenora; Ontario Geological Survey Preliminary Map P.2232, Geological Series. Scale 1:15 840 or 1 inch to ¼ mile. Geology 1978.