GEOLOGICAL SURVEY OF CANADA
DEPARTMENT OF MINES AND TECHNICAL SURVEYS

SHEET 31 C/16

LEGEND

PALÆOZOIC

ORDOVICIAN
LOWER ORDOVICIAN
BEEKMANTOWN (15,16)

16 — *OXFORD FORMATION:* dolomitic limestone

15 — *MARCH FORMATION:* interbedded sandstone and dolomite

ORDOVICIAN (?)
LOWER ORDOVICIAN OR EARLIER

14 — *NEPEAN FORMATION:* sandstone, some conglomerate

PRECAMBRIAN

12, 13 — **12.** *Pegmatite, lamprophyre*
13. *Meta - diabase*

11 — *Granite*

8, 9, 10 — **8.** *Syenite, quartz syenite*
9. *Diorite*
10. *Pyroxenite syenite*

7 — *Diorite; minor anorthosite; undifferentiated granite*

6 — *Migmatitic rocks:* **6a**, *limestone - migmatite;* **6b**, *paragneiss - migmatite;* **6c**, *amphibolite - migmatite;* **6d**, *syenite - migmatite*

GRENVILLE SERIES (1–5)

4, 5 — **4.** *Amphibolite; undifferentiated granite*
5. *Hornblende rock*

3 — *Mainly biotite-garnet gneiss, with interbedded quartzite; minor biotite gneiss, biotite-feldspar gneiss, and biotite-hornblende gneiss; granitized sedimentary gneiss*

2 — *Quartzite; minor sedimentary gneiss*

1 — *Crystalline limestone and dolomite; some garnet gneiss; metamorphic pyroxenite*

A — *Conglomerate; post-Grenville series, but possibly pre-Palæozoic*

Rock outcrop, outcrop area
Geological boundary (defined, assumed)
Bedding (dip unknown)
Bedding (vertical, tops not known)
Bedding (dip known, top of bed unknown)
Foliation (inclined, vertical, dip unknown)
Fault
Glacial striæ
Quarry or pit

MINERAL SYMBOLS

Barite	ba
Feldspar	fel
Graphite	gf
Hematite	hem
Magnetite	mag
Mica-apatite	ma
Vermiculite	vm

Geology by M. E. Wilson, 1930, and Jean Dugas, 1949
Descriptive notes by Jean Dugas

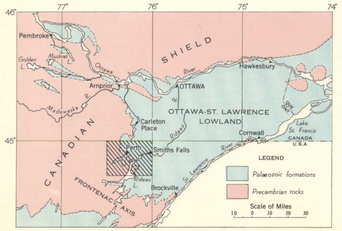
Main highway
Other roads
Trail
Power transmission line
Buildings
Post Office
Horizontal control point
County boundary
Township boundary
Concession and lot number
Intermittent stream
Marsh
Contours (interval 25 feet)
Height in feet above mean sea-level

Base-map compiled from published maps of the Army Survey Establishment, R. C. E., Department of National Defence

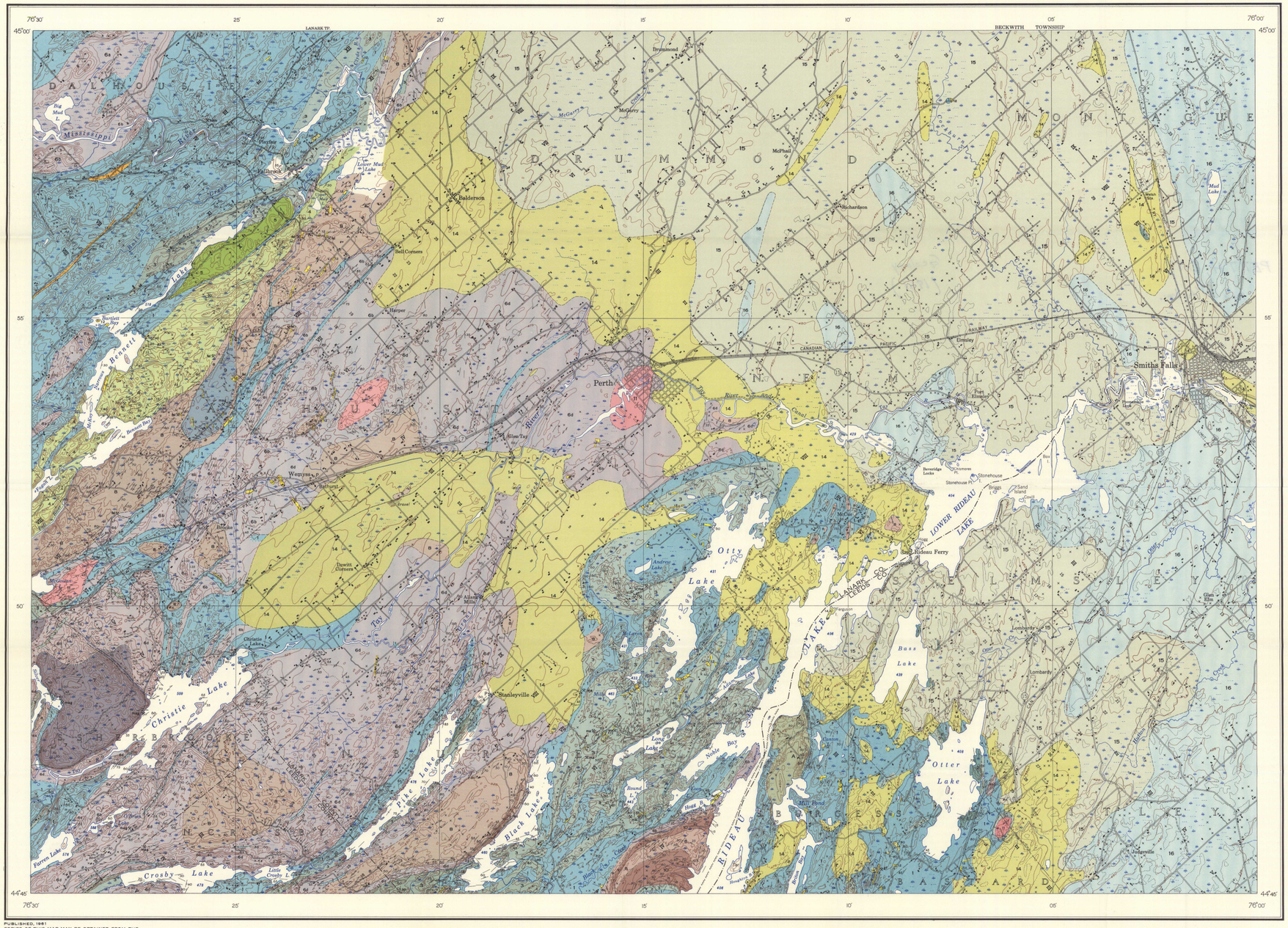
Cartography by the Geological Survey of Canada, 1959

Air photographs covering this map-area may be obtained through the National Air Photographic Library, Topographical Survey, Ottawa, Ontario.

Approximate magnetic declination, 12° 27' West



Index map, showing position of Perth map-area with relation to the Precambrian-Palæozoic boundary of the Canadian Shield and Ottawa-St. Lawrence Lowland



PUBLISHED, 1961
COPIES OF THIS MAP MAY BE OBTAINED FROM THE DIRECTOR, GEOLOGICAL SURVEY OF CANADA, OTTAWA

MAP 1089A
GEOLOGY
PERTH
LANARK AND LEEDS COUNTIES
ONTARIO

Scale: One Inch to One Mile = 1/63,360
Miles 1 ¾ ½ ¼ 0 1 2 3

DESCRIPTIVE NOTES

The area comprises a lowland underlain mainly by Palæozoic formations, and a more hilly country occupied by Precambrian rocks and rarely rising more than 200 feet above the level of the Palæozoic plain. Outcrops are particularly numerous in the Precambrian terrain.

Sedimentary rocks of the Grenville series consist mainly of crystalline limestone (1), garnet gneiss (3), amphibolite (4), and quartzite (2). The limestone is generally coarsely crystalline and contains phlogopite and graphite. In the northwest corner of the area it is rich in tremolite. Most of the quartzite is found interbedded with biotite-garnet gneiss and is commonly as abundant as the gneiss in the area mapped as sedimentary gneiss (3). The amphibolite is well banded and is, to a large extent, intermixed with granite. The hornblende rock (5) is a coarse-grained massive unit composed almost exclusively of hornblende, with minor amounts of feldspar, calcite, apatite, and sphene, and is probably of metasomatic origin.

Migmatitic rocks are rocks of mixed origin, showing stratification or banding, but transformed into, or injected by, granitic rocks, and constitute a transition between rocks of sedimentary and igneous origin. They are classified by their non-granitic component as limestone (6a), paragneiss (6b), amphibolite (6c), and syenite (6d) migmatites. In all these rocks parallelism is strictly preserved, and there are no crosscutting relationships.

Diorite (7), with anorthositic facies, is associated with irregular patches of granite between Christie and Silver Lakes. It is composed essentially of medium-grained andesine and hornblende.

Syenite or quartz syenite (8) comprises the largest igneous rock bodies of the area. Though variable in grain size and texture, this rock is characteristically composed of microcline and oligoclase, biotite and hornblende, with accessory magnetite-ilmenite, apatite, and sphene, the last commonly forming a rim around the magnetite-ilmenite. Due to high magnetite content, sharp magnetic anomalies occur over most of these intrusive masses, particularly over a dioritic oval-shaped body (9) north of Brooke, which much resembles, and occurs within, the syenite. Much higher magnetite content, coarser grain, and lack of an anorthosite facies distinguish this diorite from that of the Silver Lake body (7). There is, however, no definite evidence that the diorites are of different ages. The pyroxene syenite (10) is a greenish, gneissic rock composed of about 40 per cent diopsidic pyroxene, microcline, some sphene, and minor quartz.

Small bodies of granite (11) are exposed in various parts of the map-area. Among these, and too small to be mapped separately, are exposures of an 'orbicular' granite, composed of granite ovoids with basic rims. These can be best observed on lot 20, con. I, North Crosby township.

Pegmatite and lamprophyre dykes (12) are the only rock bodies in the area that exhibit undoubted crosscutting relationships with other Precambrian formations. Alternatively, they may cut one another, but their age relative to the meta-diabase (13) could not be determined in this map-area.

Most of the Precambrian sedimentary rocks have been closely folded and contorted in a manner typical of plastic flowage at great depths. Apparently, plutonic masses within the area have been emplaced through processes of metasomatism and by doming of the adjacent sedimentary strata, resulting in gradational contacts and migmatite zones, particularly where the invaded rock is most susceptible to impregnation, as in the case of garnet gneiss. Gradation from massive rock, in the centre of the plutonic body, to banded syenite-gneiss, syenite-migmatite, and garnet gneiss may be plainly observed. The syenite itself was originally more basic, as testified by the abundance of magnetite, the uralitization of pyroxene, and the replacement of oligoclase by microcline. Both the original sedimentary rocks and the invading materials were probably subjected to considerable chemical adjustment as a result of the granitizing process. As a whole, the syenite-migmatite complex appears to be a result of transformation of quartzite into granite and of garnet gneiss into syenite.

A conglomerate (A) different from the Nepean conglomerate and lying unconformably on Precambrian formations outcrops on the south shore of Rideau Lake. It consists of very diverse boulders—limestone, granite, pegmatite, volcanic rocks, and a few pebbles of quartz—in a matrix of limestone or fine-grained breccia. The boulders may attain 2 feet in diameter. The formation, limited at its southern end by a scarp from 50 to 100 feet high, is not cut by pegmatite and contains pegmatite boulders, the youngest Precambrian rock in adjacent formations. Accordingly, it would seem to be of post-Grenville and probably pre-Nepean age. The conglomerate differs from descriptions of Hastings conglomerates, particularly in that it carries boulders of pegmatite, which has been considered post-Hastings. It may represent a basal Palæozoic unit not hitherto recognized in this region, but further information is required before a definite conclusion can be reached.

The Palæozoic rocks of the lowland area indicate continuity of deposition from sandstone (14) to dolomitic limestone (16), with transitional beds (15) ranging upward from those characterized by a high sand content, with dolomitic cement, to almost pure dolomite carrying recognizable sand grains and interbedded at the base with layers of sandstone. Ripple-marks and crossbedding are common features of the Palæozoic rocks. Peculiar bands showing cylindrical or conical structures noted in the Nepean formation, and best observed on lot 24, con. VI, North Elmsley tp., are of same composition as the surrounding sandstone, but cut sharply across the beds and are themselves bedded parallel with the walls of the structures. They were probably formed by slumping of the sand due to water action. Supposed fossil-tracks, known as ***Climactichnites,*** are a typical feature of the Perth area, and were seen on lot 6, con. III, Drummond township. In addition, the Oxford formation contains many gastropods, ***Leconospira*** being the dominant genus.

Potash feldspar has been mined periodically in the area since 1926 by Bathurst Feldspar Mines Limited, on lots 15 and 16, con. VIII, Bathurst township. The quarry produces about 10 tons of feldspar daily from a pegmatite body. Many other pits have been worked, particularly in Bathurst township, and deposits of good grade are still available.

Mica and apatite have been mined from many pits in the area, particularly in North Burgess township, but at present only a couple of deposits are being intermittently quarried. Most of the pits are confined to the garnet gneiss formation south of the town of Perth. The deposits occur as irregular bodies with a tendency toward elongate, lenticular shapes. They consist mainly of large crystals of apatite, phlogopite, pyroxene, and pink calcite and lie between wall-rocks that are most commonly paragneiss, but in some instances consist of limestone. Most occurrences are concordant with the enclosing rocks, but crosscutting relationships are not uncommon. In some deposits there is a suggestion of crustification and drusy cavities, and polished or striated walls are common. Such features are characteristic of veins. The deposits are commonly lined with pyroxene crystals, or are associated with metamorphic pyroxenite (1), a rock that is thought to have formed from limestone by the action of siliceous emanations from igneous intrusions.

A vermiculite deposit was discovered in 1950 on lot 17, con. VIII, North Burgess tp., as an alteration product of pyroxenite, parallel with the enclosing gneisses. The favourable zone is 1,500 feet long, 300 to 400 feet wide, and was tested by pits and trenches to an average depth of 5 to 6 feet.

The Dalhousie hematite mine, in the east half of lot 1, con. IV, Dalhousie tp., produced 11,100 tons of 57 per cent iron ore between 1866 and 1871. The deposit occurs as a lens-shaped body in a band of crystalline limestone.

Many magnetite pockets have been explored by small surface workings, but apparently none has developed sufficient tonnage for commercial exploitation.

Barite veins are of good grade but are generally small. The best showing is on lot 20, con. X, North Burgess township.

Graphite has been mined on lots 21 and 22, con. VI, North Elmsley township. It occurs at the crest of an anticlinal fold in crystalline limestone.

Radioactive minerals were detected by the writer in pegmatites of Bathurst township, particularly on lot 21, con. IX, and more sparingly in lots 20 to 23 of the same concession.

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