

GEOLOGICAL SURVEY

LEGEND

PROTEROZOIC (LATE PRECAMBRIAN)

KEWEENAWAN
 8 Diabase

ANIMIKIE
 7 ROVE FORMATION; shaly sediments

6 SUNFLINT FORMATION; iron formation and shaly sediments
 KAKABEWA FORMATION; conglomerate

5 Granite, gneiss, biotite, etc. and granitic phases; possibly not all of one age; some bodies may be older than the Stone and Animikie series

ARCHAEN (EARLY PRECAMBRIAN)

4 Metakalke gabbro, diorite and related rocks; probably of more than one age; Fe, peridotite, serpentinite

3 Sediments in the Seine series, sediments in the Steeprock series, sediments and volcanic rocks in the Wapikwan series, sediments and volcanic rocks in the Abram Lake series, sediments

KEEWATIN
 2 Subvolcanic volcanic rocks with minor amounts of sediments including iron formation in places; considerable amounts of possibly younger sediments or volcanic rocks may be present

COUCHICHING
 1 Most schist, paragneiss, slate, greywacke, igneous quartzite

Iron formation, differentiated in places

Geological boundary

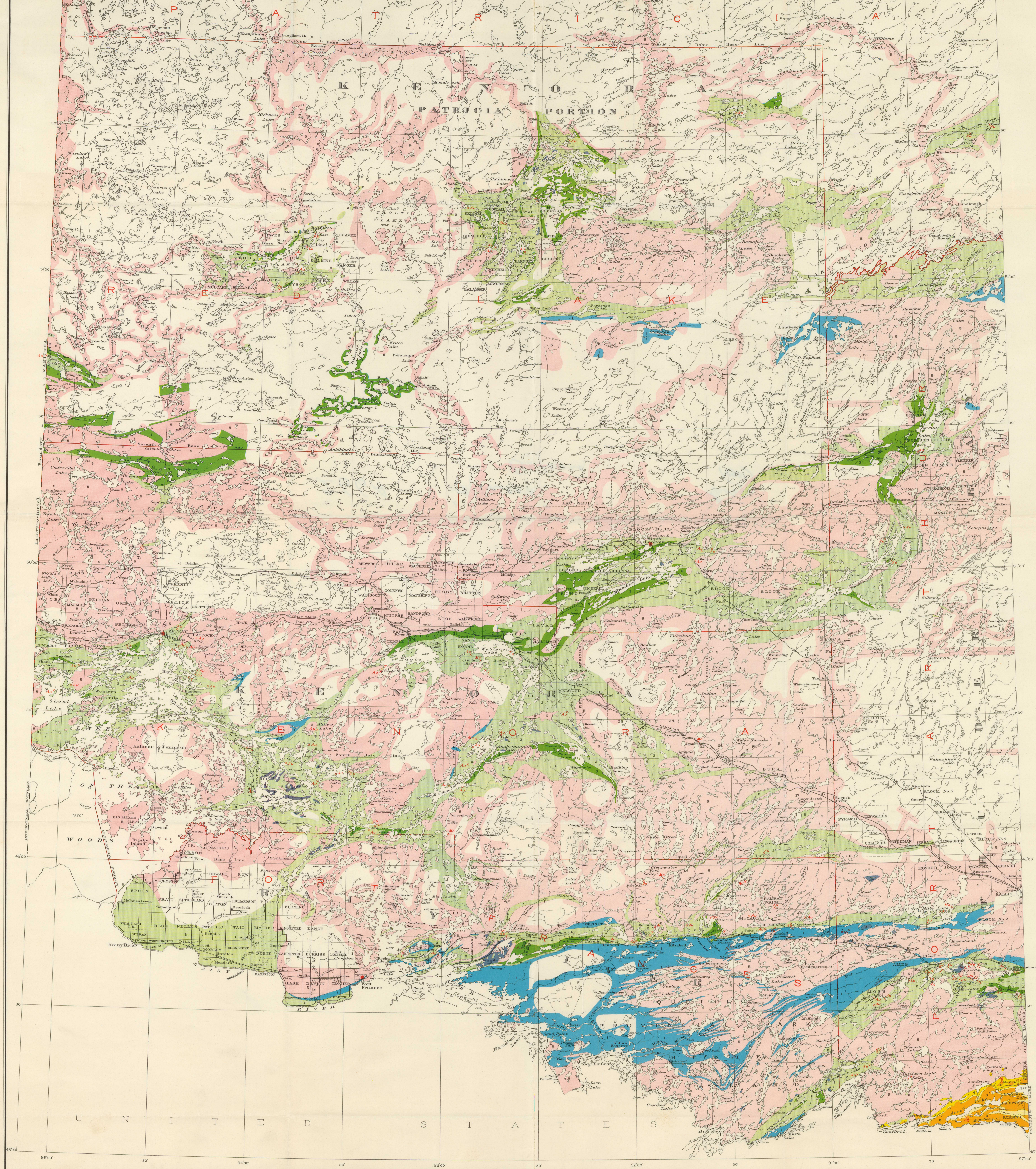
Mining Division boundary

Mining Recording Office

Road, trail or passage

PRINCIPAL MINERAL OCCURRENCES

- xAg Silver
- xAu Gold
- xBa Beryl
- xCr Chromite
- xCa Calcite
- xCu Copper
- xFe Iron
- xMo Molybdenum
- xNi Nickel
- xPb Lead
- xS Sulphur (pyrite)
- xSi Silica
- xT Talc or Soapstone
- xV Vanadium



PHYSICAL FEATURES

This area is from 1000 to 1800 feet above sea-level and averages about 1400 feet. The greater part, underlain by early Precambrian formations, is a chain of low, mostly rounded hills and ridges, rarely over 50 feet high, and is a sandy limestone consisting mainly of glacial drift, mostly collected in the low ground. In the north and southwestern parts extensive and comparatively thick deposits of sand and gravel cover all but the higher parts of the rock floor. In the southeast part, underlain by late Precambrian rocks, there are high tablelands, with rocky cliffs up to 40 feet high along their northwesterly sides, that slope gently toward the southeast and smaller rocky mesas detached by areas from the main tablelands. Sand and gravel plains occur in the lowlands of this part.

In the greater part of the area the vicinity of drift and underlain of the rock floor has produced a myriad of ponds and lakes of the most diverse size and shape. These spill from one to another by short streams in which the drift marks and falls up to 50 feet in height are common. These conditions and the fairly steady annual flow are well suited for power development. Where the drift marks are thicker there are extensive muskegs, fewer lakes, and streams of more constant width and course, and with few rock outcrops except at falls and rapids.

Game travel, which governs the prospecting season, usually lasts from early in May until mid-October. Game and fish are fairly plentiful. Except in the wettest parts there is plenty of timber for camping, prospecting and mining purposes.

GENERAL GEOLOGY

The solid rocks comprise two major groups associated by a profound unconformity. The ARCHAEN (Early Precambrian) consists of metamorphosed and folded strata, and batholithic intrusions of granite and related rocks. The PROTEROZOIC (Late Precambrian) consists of slightly altered and nearly flat-lying sediments, basic lavas and diabase intrusives.

The COUCHICHING (1) in Rainy Lake basin consists of steeply folded, banded meta-schists, locally gneissitic, paragneisses, and all grades from highly metamorphosed sediments recognizable as slate, greywacke and impure quartzite. The essentially sedimentary group is overlain by Keweenaw volcanics without pronounced unconformity. It is overlain unconformably by the Seine series; and is intruded by all granitic and related igneous rocks that have been found in contact with it. Areas other than those in Rainy Lake basin that are shown as Couchiching are underlain by highly metamorphosed sedimentary rocks that seem to be older than Keweenaw volcanic rocks.

The KEEWATIN (2) is an assemblage of two series, chiefly of andesitic iron formations, including banded iron formation. These rocks are highly altered; large parts are schists and, judging from the thickness of strata, are younger than any Archaen sedimentary rocks. This dominantly volcanic assemblage is unconformably overlain by the Seine series and has been cut by highly metamorphosed sedimentary rocks that seem to be older than Keweenaw volcanic rocks.

The SEINE SERIES (3a) consists of a basal conglomerate, quartzites, grits, greywackes, shales and shaly metapelite, and all grades from highly metamorphosed and folded, and they unconformably overlie the Keweenaw and Couchiching. The SEINE SERIES (3b) consists of a basal conglomerate and also limestone, iron formation and shales. The Seine series has been metamorphosed and folded, and they unconformably overlie the Keweenaw and Couchiching. Other names for the Seine series are the Steeprock series, and the symbol on this map resembles the Seine or Steeprock series. Some of the unnamed sedimentary (3) that are shown on this map are younger than any Archaen sedimentary rocks. The Seine series has as basal members, conglomerates holding pebbles of granite. These pebbles were derived from granitic intrusions that are younger than the Seine series and possibly younger than the Keweenaw volcanic assemblage but nowhere have the pebbles been identified as such.

The GRANITES and closely related rocks (4) wherever they have been observed in contact with the Couchiching, the Keweenaw, or the still younger sedimentary series such as the Seine series, definitely cut these rocks. Presumably by far the greater part of the batholithic rocks are younger than any Archaen sedimentary or volcanic series and, therefore, are to be classed as being Algonian. Whether any older granites are present in this area is not known. The presence of more basic granitic rocks such as HORNBLENDE GABBRO AND DIORITE (4) has been indicated, but they are not shown on this map. In some places they may be earlier phases of the granitic intrusions; in other places they grade into volcanic rocks as those which derived from them.

The ANIMIKIE SERIES (5 and 7) in the southeastern part of the map-area consists in ascending conformable strata, the Keweenaw formation, up to 4 feet thick; the Gurlitt formation more than 85 feet thick; and the Rove formation, formation with, at some horizons, interbedded beds of fragmental rocks including shales, and, locally, volcanic rocks. The Rove formation consists of shaly sediments. This series lies on a peneplained erosion surface of Archaen rocks; it dips gently toward the southeast and is dissected along numerous nearly vertical faults. The rocks do not seem metamorphosed except within a few feet of some diabase intrusives.

The KEWEENAW (8) diabase is up to 250 feet thick in the Animikie. The diabase is fresh and more resistant to weathering than the sediments, consequently the hills form prominent caps on the mountains of the area. They are about parallel to the bedding of the Animikie and have been faulted in the same way. Some of the faults are occupied by thin beds of diabase and have been cemented by veins. The diabase intrusives are the youngest solid rock in the map-area. Similar intrusives as Keweenaw, commonly as dykes and sills.

ECONOMIC GEOLOGY

The mineral occurrences shown by symbols provide clues for appraising the mineral potentialities of the area. The Couchiching schists are not known to contain valuable mineral deposits. Near batholithic intrusives there are up to certain depths of porphyry intrusives and related rocks. Valuable mineral has been found in them except some molybdenum in one quartz vein at Bear Pass. The Keweenaw in the area contains iron formation and iron ore. Deposits of iron, talc and asbestine have been derived from rocks originally forming part of this group. These talc and asbestine deposits are associated with gold-bearing veins from mineralizing processes that found in the volcanic complex conditions especially favourable for deposition.

Some of the Archaen sedimentary series include an iron formation that may yet be found to contain iron ore. As a repository for mineral deposits introduced by igneous agencies the Archaen sedimentary series have potential economic interest equivalent to the Keweenaw. Sulphide deposits and gold-bearing veins have been found in these strata.

The Archaen batholithic intrusives carry pegmatite deposits in which beryl and molybdenite have been found; but otherwise are characteristically barren. A variety of small intrusives, including porphyry, granodiorite and diorite, that occur marginal to the major batholiths contain veins and sulphide replacement bodies. These deposits usually occur at the footwalls of the intrusives and in the fractures and metamorphosed intruded rock adjacent. One or several of the following metals are known to occur there in veins and replacement bodies: gold, copper, lead, cobalt, nickel and vanadium.

Animikie strata include a thickness of 100 feet or more of iron formation in the Gurlitt formation. The latter is equivalent to the Elwaka formation in Minnesota that contains important bodies of iron ore. Valuable concentrations of silver minerals have been found locally in veins near diabase intrusives.

Keweenaw intrusives are at some places cut by veins that contain local concentrations of silver.

The Gold deposits occur characteristically in quartz veins that cement fractures in a composite assemblage of porphyry intrusives and the adjacent Archaen strata, which are altered to chlorite schist, sericite schist, ferrous carbonate and highly siliceous replacement bodies, amphibolite, etc. The gold-bearing quartz veins were presumably deposited from hot solutions that were given off by the porphyry magma that is probably an offshoot from the great margins of the batholiths. The hot solutions given off percolated and altered the overlying rocks; those of a later stage, richer in gold and some other metallic constituents, may have collected under the frozen roof of the magma chamber and seeped into fractures in the overlying rock. Where granitic rocks are extensively exposed erosion must have removed much of the roof material and any veins that may have sealed in small masses of granite and porphyry on the other hand, sulphide veins will remain. Consequently the favourable area for prospecting are around small intrusions of porphyry or granite, and less so near main batholiths.

Deposits of lead, copper, nickel and cobalt occur in veins and replacement bodies in Archaen strata near the margins of porphyry or granitic intrusives. The largest of the known nickel occurrences, near the west end of Lower Shebang-down lake, are in sulphide replacement bodies that contain also copper, cobalt and platinum group metals.

Concentration of iron minerals, of which the most abundant is magnetite, occur in iron formations in the Keweenaw some of the younger Archaen sedimentary series, and in the Gurlitt formation of the Animikie series.

Vanadium has been found in the titaniferous magnetite deposits along the northwest side of Bad Vermilion lake, near Mine Centre, in metamorphic rocks resulting from the interaction of batholithic intrusives and Keweenaw iron formation.

Serpentine in large and small masses has resulted from alteration of early Precambrian basic lavas near porphyry or granitic intrusives. Seams of talc occur in the asbestine deposits, and some schists and early Precambrian strata. The deposits are believed to originate from neighbouring intrusive rocks. Silver-bearing veins occur characteristically near Keweenaw intrusives, from which they originated. They occupy nearly vertical faults and cut formations of all ages involved in the folding. The contents include native silver and argentite, fluorite and amethystine quartz, together with galena, zinc blende, chalcocite and pyrite in varying proportions. Occasional native silver and argentite occur in cleavage cracks and small cavities among all of the other vein minerals. Such pockets, found just east of this province have yielded several thousand ounces of silver to the ton. They are regarded as secondary concentrations.

Geology compiled by T.L. Eaton, from surveys by the Geological Survey and the Ontario Department of Mines.

This map has been approved from a corrected version of the original map. Reproduction per nomenclature d'une carte au papier.