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PROVINCE OF ONTARIO

DEPARTMENT OF MINES

HON. JAMES A. MALONEY, *Minister of Mines*

H. C. RICKABY, *Deputy Minister*

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SIXTY-SIXTH ANNUAL REPORT

OF THE

ONTARIO DEPARTMENT OF MINES

BEING

VOLUME LXVI, PART 7, 1957

Geology of Bristol Township

By

STEWART A. FERGUSON

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COLOURED GEOLOGICAL MAPS

Map No. 1957-7—Bristol Township, District of Cochrane, Ontario.	
Scale, 1 inch to 1,000 feet	<i>map case</i>

See back pocket for "Sand dunes and Pleistocene sand bar near the southeast corner of the Township" frontispiece.

Geology of Bristol Township

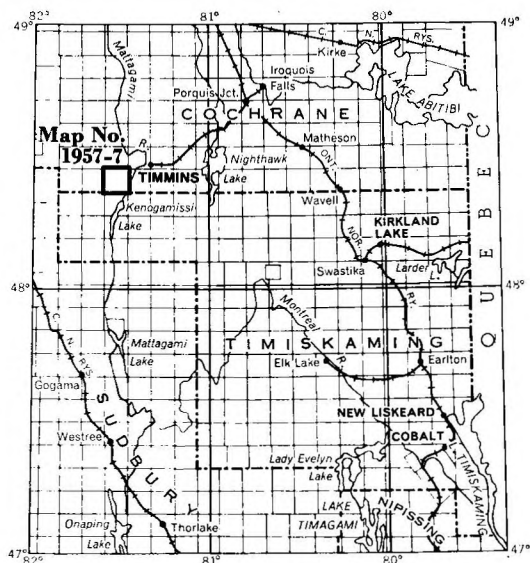
BY

Stewart A. Ferguson

INTRODUCTION

Bristol township was mapped in detail in an attempt to locate the western extension of the Destor-Porcupine fault and also the extension of the Porcupine lavas. It was hoped that a better understanding of the structure and distribution of particular rock types would be obtained by a restudy of the geology and a compilation of information.

The first known discovery of gold in the township was made in 1911 although the area was included in a reconnaissance geological survey made in 1899. In



Key map showing the location of Bristol township, district of Cochrane. Scale, 1 inch to 50 miles.

that year Alexander Niven (O.L.S.) ran a base line due west from mile 120 on the north-south base line that passes west of Nighthawk Lake. Bristol township is on the south side of Niven's base line between mile 18 and mile 24.

The base map of the township was compiled by the cartography section of the Ontario Department of Mines, using the original notes of the township survey and survey notes of individual claims. The author added further information, which was obtained from air photographs taken in 1946 and 1947 for the Forestry Resources Inventory, Ontario Department of Lands and Forests, and from many compass-and-chain surveys. The surveys of all main roads and many bush roads were tied in to township and claim surveys.

The geology was mapped on a scale of 1 inch to 800 feet. The north-south claim lines were reopened and chainage pickets established at 200-foot

intervals along the line, in known outcrop areas. If the outcrops could be seen on the photograph, the claim lines and pickets were located on a transparent photograph overlay, which was used as a work sheet. Where the outcrops were small, or trees obscured them, plotting was done on a field work sheet. In outcrop areas traverses were made at 200- or 300-foot intervals between the claim lines or other surveyed lines.

In order to locate diabase dikes and other strongly magnetic zones, magnetometer traverses were made in drift-covered parts of the township where mining companies had not filed magnetic maps. Generally, these traverse lines were at 800- or 1,200-foot intervals running N.80°E. Where no anomaly was found, the magnetic readings were taken at 100-foot intervals along the line. Where the magnetic value was changing rapidly, readings were taken at 50-foot intervals. More detailed work was done in strongly magnetic zones at a line-spacing of 400



View of the Tatachikapika (Redsucker) River looking upstream.

or 200 feet. Magnetic profiles were plotted on the geological base map except in strongly magnetic areas, which were contoured.

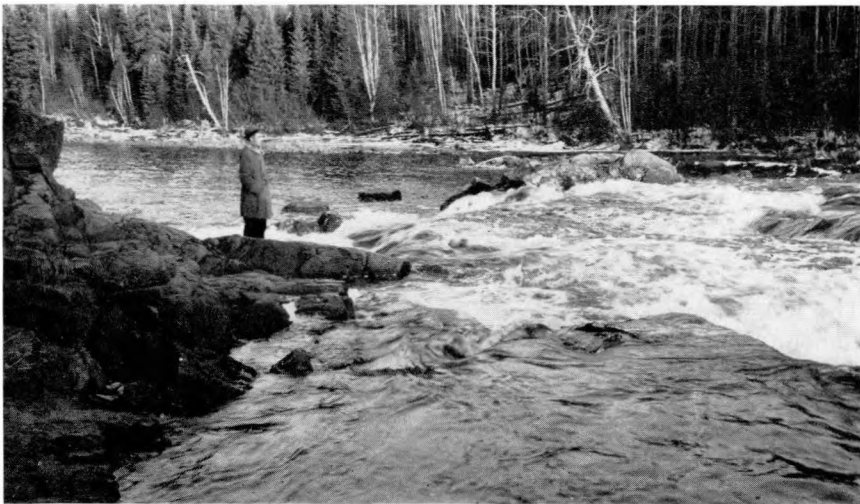
When the original boundary lines of the township could be located, they were recut and chained. A trial line was cut when the original survey line could not be found. The northeast corner post of the township had been removed; the bearing tree still exists although it has fallen. Milepost III (wooden) was located on the east boundary. The claim lines and witness posts of a surveyed claim in the northwest corner of Price township were used to locate the southeast corner post of Bristol township. This corner post lies within the Mattagami River and is the corner post for the four adjacent townships. The original steel posts for the southwest and the northwest corners are still in place. Over 150 corner posts of surveyed claims were located and used for control during the survey. Claim posts were located by cutting a trial line and chaining from a known corner post. A search was made near the line for the post at the distance given by the claim survey. When the post was found it was used to establish the position of the trial line.

Traversing throughout much of the township is difficult because of slash, windfalls, and alders. Partly for this reason magnetometer work was done on snowshoes during the winter months.

Acknowledgments

Geological and geophysical maps and reports submitted by mining companies have been of great help to the author. J. A. M. Haddon, chief cartographer of the Ontario Department of Mines, compiled the base map. He was most considerate and helpful. Nelson Hogg, formerly resident geologist in Timmins for the Ontario Department of Mines, collected a substantial file of information on the mining properties in Bristol township. M. F. O'Rourke, mining recorder, co-operated in making available the records of claim ownership and assessment work performed. Owen Hughes of the Geological Survey of Canada examined and commented upon many of the sections of the Pleistocene deposits. The previous map and report by J. E. Hawley¹ have been invaluable.

During the summer of 1954, Stanwell Oil and Gas, Limited, permitted the



View of the chute on the Tatachikapika (Redsucker) River.

field party to use the company's buildings at the old Piccadilly mine. A. Doplihar, a lumber operator, was most courteous to the party; he maintained the road to his lumber camp throughout the year so that the field party had access to that part of the township.

R. R. Waterhouse and L. M. Augustine served as geological assistants during part of the summer of 1953. In October, November, and December, 1953, A. R. Hubert acted as chainman. During the summer of 1954, G. R. Pearson and C. A. Hunt were geological assistants. Mr. Pearson, as senior assistant, worked at field mapping. Frank McKinley was chainman during October, November and December, 1954. Ernest Jutila was chainman from February to December, 1955. To all these men the author owes his sincere thanks for cheerful and competent performance of their duties.

Means of Access

Bristol township is located six miles west of Deloro township, which contains the producing mines at the southwest end of the Porcupine camp. Highway No. 101 runs westward from Timmins through Mountjoy township to Cook Lake.

¹J. E. Hawley, *Ogden, Bristol and Carscallen Townships*, Ont. Dept. Mines, Vol. XXXV, 1926, pt. 6 (with map No. 35g, scale, 1 inch to $\frac{3}{4}$ mile).

From the lake the highway swings southwest. It crosses Bristol township diagonally from near the northeast corner to the southwest corner. During 1956 this highway was hard surfaced about half-way across the township. Mountjoy Timber Company maintains a road, that leads southward from highway No. 101 through Bristol and Thorneloe townships. This road is open to the public as far as the Tatachikapika (Redsucker) River bridge. On the north side of the Tatachikapika (Redsucker) River a good sand road leads northeast from the Mountjoy Timber Company road. In Bristol township this road is passable for 2½ miles. A poor motor road leaves the highway on the east side of Bristol (Wright) Lake and extends northwest for 2¼ miles to a lumber camp. There are a few other short, sand roads that are passable with an ordinary motor vehicle.

The old Whitesides road crosses the township from east to west, but is now partly overgrown and is wet for long distances. The wagon road from Bristol Landing to the Stanwell Oil and Gas, Limited, property is still open for most of its length. There are many winter roads, which have been used for cutting pulp wood or moving diamond-drill equipment. Some bush roads are used to provide access to the Mattagami and Tatachikapika (Redsucker) rivers when the log drive is in progress.

The Mattagami River is a good water route, but the Tatachikapika (Redsucker) River in Bristol township is an almost continuous series of boulder rapids, with one rock chute. Travel by canoe is now largely used to supplement motor travel in areas that cannot be reached by road.

Previous Geological Work

The following is a bibliography of the previous work done in the area by government geologists:

- WILLIAM A. PARKS, *Niven's Base Line, 1899*, Ont. Bur. Mines, Vol. IX, 1900, pp. 125-42.
 A. G. BURROWS, *The Porcupine Gold Area (Second Report)*, Ont. Bur. Mines, Vol. XXI, 1912, pt. 1, pp. 205-49.
 A. G. BURROWS *The Porcupine Gold Area (Third Report)*, Ont. Bur. Mines, Vol. XXIV, 1915, pt. 3.
 J. E. HAWLEY, *Ogden, Bristol and Carscallen Townships*, Ont. Dept. Mines, Vol. XXXV, 1926, pt. 6, pp. 1-36.

GEOLOGICAL AND GEOPHYSICAL REPORTS

A number of geological and geophysical reports have been submitted as assessment work to the Ontario Department of Mines. Other reports cover information that has been approved for publication or concern areas that have reverted to the Crown. The reports with their file numbers in the office of the resident geologist at Timmins are as follows:

PROPERTY NAME	TIMMINS FILE NO.
Britaura Porcupine Mines	T-625 (placer operations)
H. Charbonneau	T-243 (geophysical)
Continental Kirkland	T-33 (geophysical)
Cortez Explorations	T-63 (geological, geophysical)
Foley-O'Brien Mines	T-552 (geological)
Hoyle Mining Co.	T-129 (geological)
P. A. Kindree	T-551 (geological)
J. B. McClinton	T-300 (geological)
Milroy-Wilson-Harris-Paul	T-285 (geological)
Minedel Mines	T-559 (geological)
Mineral Estates	T-88 (geophysical)
Penrose Gold Mines	T-572 (geophysical)
Rusk Porcupine Mines	T-542 (geological)
Spina Porcupine Mines	T-553 (geological)
Stanwell Oil and Gas	T-105 (geological)
Trident Porcupine Mines	T-169 (geophysical)
Thomas Wright	T-137 (geological, geophysical)

Topography and Drainage

Since much of the area is covered by clay deposited in a glacial lake, the topography of Bristol township is one of gentle relief. Only the higher outcrop areas, some boulder ridges, and some shoreline deposits were above the lake level. Swamps cover large areas. Elsewhere there are jackpine ridges in sandy areas or along sandy shorelines.

Highway No. 101 has an elevation of 957 feet where it enters Bristol township from the east. Southwestward along the highway there is a gradual upward slope throughout the township, at the average rate of 12 feet per mile. The valley of the Mattagami River and the lower part of the valley of the Tatachikapika (Redsucker) River are both deeply incised, so that the river levels are about 100 feet below the general elevation. The highest point in the township is believed to be a large hill about a mile southwest of McDonell Lake and west of the pond in Thunder Creek.

All of the township lies within the Mattagami River basin. Waterhen and Little Waterhen creeks flow northward; but Bristol Creek and the Tatachikapika River, with its tributary Thunder Creek, flow directly to the Mattagami River. Bristol (Wright), McDonell, and Waterhen lakes are all shallow depressions with low shorelines.

Natural Resources

The Porcupine fire of 1911 burned over most of the areas of higher ground in Bristol. These areas are now covered by a new generation of jackpine of 10-inch diameter. A few mature white pine that escaped the Porcupine fire are seeding small areas. Stands of poplar grow on boulder ridges and near the edges of areas of higher ground. Large areas of swamp consist mainly of spruce, with balsam, cedar, and alders in small areas. The spruce bud worm has killed all the mature balsam trees. Wind storms blow down the dead balsam trees as well as many of the cedars that are over two feet in diameter and make travelling difficult.

Some game is present although nearness to the Porcupine camp insures a large number of hunters each fall. Moose are fairly plentiful, and there are also a few deer and bear. Beaver and muskrat are trapped, particularly near the Mattagami and Tatachikapika (Redsucker) rivers. In wintertime, marten tracks are seen in the jackpine areas. Many partridges are seen during spring and summer, but only a few survive to reproduce in the following season.

Thunder Creek and the Tatachikapika (Redsucker) River attract many trout fishermen. In the larger pools there are some pickerel and pike.

GENERAL GEOLOGY

The country rocks of the area are early Precambrian volcanics and sediments that have been cut by later intrusives. These intrusives are mainly pyroxenite, hornblendite, monzonite, and quartz-feldspar porphyry. All the consolidated rocks are cut by diabase dikes. Particularly in the eastern part of the township, the total amount of rock exposed is small because Cenozoic deposits of clay, sand, and peat cover most of the area. An electromagnetic survey that located the volcanics-sediments contact has been made. In the southeastern part of the township the few outcrops, supplemented by some diamond-drill information and magnetometer surveys, have made it possible to assume with reasonable assurance that the area is underlain by sediments.

The classification of Precambrian rocks follows closely the one used by Nelson Hogg¹ in his report on Godfrey township. In this classification the terms Haileyburian and Algoman have been avoided, and rocks that are normally assigned to these age groups are designated as post-Keewatin. The quartz-feldspar porphyries that outcrop near Bristol (Wright) Lake are similar to those considered to be of Algoman age elsewhere in the Porcupine area.

The term Keewatin is used to apply to all volcanics and sediments occurring in the area. The volcanics-sediments contact is thought to be conformable. In a previous geological report on Bristol township, by Hawley,² these rocks were considered to be of Timiskaming age. At that time the sediments in the Porcupine area had not been subdivided into two age groups.³ The present usage of Keewatin, applied to this group, agrees with more recent mapping of the Porcupine area by Hurst.⁴

TABLE OF FORMATIONS

CENOZOIC	
RECENT:	Peat, humus, silt.
PLEISTOCENE:	Stratified clay, sand, boulder clay, gravel.
	<i>Great Unconformity</i>
PRECAMBRIAN	
MATACHEWAN (?):	Quartz diabase.
	<i>Intrusive Contact</i>
	{ Lamprophyre.
POST-KEEWATIN:	{ Quartz feldspar porphyry, feldspar porphyry.
	{ Monzonite.
	{ Pyroxenite, hornblendite.
	<i>Intrusive Contact</i>
KEEWATIN:	
Sediments:	Greywacke, argillite.
	{ Rhyolite: quartz rhyolite, massive lava, fragmental lava, tuff, agglomerate.
Volcanics:	{ Andesite: Pillow lava, massive lava, fragmental lava, tuff, dioritic andesite (in part sills).

Precambrian

KEEWATIN

The Keewatin series in Bristol township consists of three distinct groups: andesitic volcanics, rhyolitic volcanics, and sediments. Little is known about the contact relations of these three groups since they tend to occur in separate areas in the township; consequently very few contacts are exposed. The sediments are believed to overlie both the andesite and the rhyolite. Thin bands of andesite occur within the rhyolite and are part of the same sequence of lavas. However, no rhyolite flows are intercalated with the andesite flow series. In the Porcupine syncline in Tisdale township a rhyolitic member underlies Keewatin sediments and overlies andesitic volcanics.

Intermediate Volcanics

The intermediate volcanics include all the darker-coloured lavas, since no basic volcanics have been identified. The most common types are pillowed and amygdaloidal lavas, with small amounts of fragmental lavas and tuffs. In a few

¹Nelson Hogg, *Geology of Godfrey Township*, Ont. Dept. Mines, Vol. LXIII, 1954, pt. 7, p. 6.

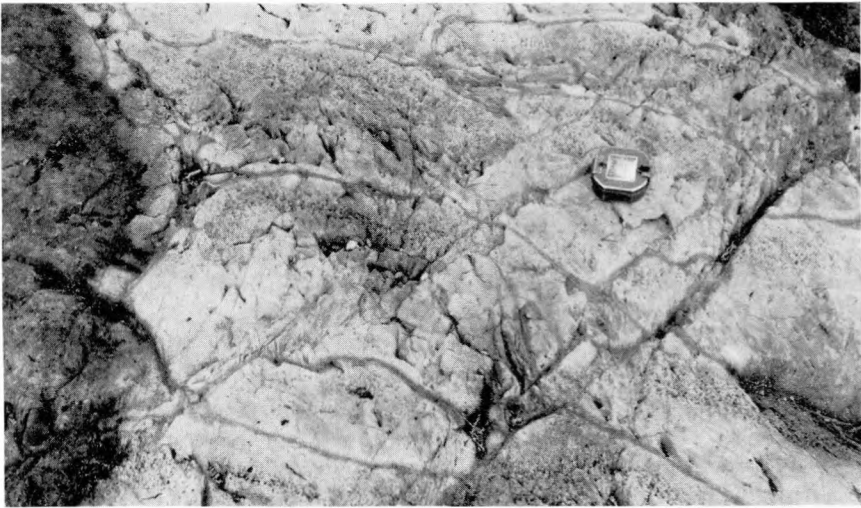
²J. E. Hawley, *Ogden, Bristol and Carscallen Townships*, Ont. Dept. Mines, Vol. XXXV, 1926, pt. 6, p. 6.

³A. G. Burrows, *The Porcupine Gold Area*, Ont. Dept. Mines, Vol. XXXIII, 1924, pt. 2, p. 12.

⁴Map No. 47a—*Porcupine Area*, District of Cochrane, Ontario, Scale, 1 inch to 2,000 feet. Ont. Dept. Mines, 1938, by M. E. Hurst. (Does not accompany a report.)

localities there are lenses and irregular bodies of dioritic andesite, which are believed to have been intruded as sills between adjacent flows. With the exception of these coarser-grained andesites all the other members of the group are believed to be of extrusive origin. The andesitic flows are almost exclusively pillow lava. Some outcrops on the map are shown as massive lava, but at these localities, there are usually a few poorly outlined pillows or discontinuous selvages. No outcrops of uniform, structureless andesite have been found.

Generally the pillow lavas have small pillows with a maximum diameter of about 18 inches. The pillow selvages consisting of fine-grained, unaltered lava are about $\frac{1}{4}$ inch thick. A few pillows show a concentration of amygdules, but most pillows do not show any primary or secondary features that tend to emphasize pillow structure. Consequently the pillow outlines are often obscure, par-



Andesite with narrow pillow selvages and zones of vesicles near the top of the pillows, claim H.R.1190.

ticularly on outcrops that have a thin coating of lichen. Scattered amygdules filled with either calcite or chlorite are usually associated with the pillow lavas.

The lava flows are of very uniform type so that no distinctive flows have been recognized. Within particular flows there is no differentiation of a pillowed flow top with a more uniform, coarser-grained base. Since the flows on many outcrops show symmetrical, ellipsoidal pillows throughout, and since adjacent flows appear to be identical, the tops of such flows cannot be identified, or individual flow contacts correlated on adjacent outcrops. On claim P.26766 a flow contact between a normal andesitic lava and a more highly feldspathic andesite is exposed. All the other flow contacts that have been recognized are schistose zones, 3–5 feet wide.

The andesites vary somewhat in colour, but in general are light-grey or green on the freshly broken surface, and on the weathered surface range from light-grey to white. All these rocks are partially saussuritized and chloritized. Weak carbonatization is also fairly general in some areas and causes the rocks to have a rusty colour on the weathered surface. In a few places the andesites have been almost completely replaced by carbonate.

The most distinctive lava type occurs north of the highway, on the east side of a bush road that leads into claim P.26400 (O'Shea property). Although no

outcrop is exposed in this area, bulldozing has loosened blocks of rock. This rock consists of a grey-green chloritic matrix, which includes pinkish spheres or more irregularly rounded bodies, $\frac{1}{4}$ - $\frac{1}{2}$ inch in diameter. The lighter-coloured material weathers in relief. A thin-section examination showed that the pinkish material consists of cloudy, altered feldspar with some patches of clear feldspar and fine, disseminated magnetite crystals. There was no evidence of radial structure, but the rock is considered to be an altered variolitic lava. The spherulitic (variolitic?) lavas shown on Map No. 35g could not be located, but a feldspar porphyry dike has been mapped near that locality.¹

Acid Volcanics

Rhyolitic volcanics occur in the northwest quarter of the map area. These represent the southward extension of similar rock types found in Godfrey and Turnbull townships. They include quartz rhyolite and massive rhyolite as the predominant rock types, with small amounts of tuff and agglomerate.

The rhyolite is usually white on the weathered surface, and on the fresh surface ranges from almost white to grey. The fine-grained massive rock is hard and cherty in appearance, and the porphyritic varieties contain quartz "eyes" up to $\frac{1}{16}$ inch in diameter. Outcrops of this rock type usually show two systems of closely spaced, conjugate joints, which produce a pattern of small parallelograms on the rock surface. In many areas the quartz rhyolite and massive rhyolite are structureless, but in small areas some banding may be seen. Two tuff bands were observed on an outcrop about 6,800 feet northwest of McDonell Lake. Both of these bands were cherty in appearance, only a few inches wide, and exposed for a few feet. They showed fine laminae, about $\frac{1}{16}$ inch thick, of alternating light and dark colours.

Rhyolites have long been assumed by volcanologists and geologists to represent lava flows. However, Cotton² and Enlows,³ who have described volcanic activity of more recent times, point out that rhyolite flows are extremely viscous, move with a steep front, thin rapidly towards the edges, and cover small areas. The large area of rhyolite in Turnbull, Bristol, Godfrey, and Jamieson townships presents a problem in this regard.

Williams⁴ and Enlows⁵ point out that many rocks, which have been considered to be acid lavas, are flows of intensely welded tuff (ignimbrite), which was erupted as incandescent clouds of pumice and dust. These pyroclastic flows may escape from volcanic cones, but one of the largest deposits known came from swarms of narrow fissures. An enormous volume of material may be extruded in a short time and accumulate rapidly without stratification. Such deposits are laid down as an extremely hot, glass dust, rich in gas, and carrying with it large clots of molten glass. After coming to rest, the small particles are sticky enough to weld together firmly, and the large clots are flattened into slender streaks by the heavy load above.

Such an origin seems probable for the rhyolites of Bristol and the adjacent townships. The fact that these rhyolites cover a large area, that they are generally

¹No. 35g—*The Townships of Carscallen, Bristol, and Ogden*, District of Cochrane, Ontario, Scale, $\frac{3}{4}$ mile to 1 inch, Ont. Dept. Mines, Vol. XXXV, 1926, pt. 6, by J. E. Hawley.

²C. A. Cotton, *Volcanoes as Landscape Forms*, Whitcome and Tombs, Ltd., Auckland, New Zealand, 1944, pp. 154, 172.

³Harold E. Enlows, "Welded Tuffs of Ciricahua National Monument, Arizona," *Bulletin*, Geol. Soc. Amer., Vol. 66, 1955, Oct., p. 1239.

⁴Howel Williams, "Calderas and Their Origin," *Bulletin*, Dept. Geol. Science, Univ. California, Vol. 25, 1941, pp. 279, 280, 317.

⁵Harold E. Enlows, *op. cit.*, p. 1239.

structureless, and that no rhyolite flow contacts have been recognized, is quite consistent with the character of similar rocks of ignimbritic derivation.

A band of rhyolitic agglomerate extends across the Whitesides road in central Bristol township. The band ranges in width from 450 to 700 feet and is well exposed for a strike length of 4,000 feet. At the east end the agglomerate band maintains its width to the edge of the outcrop area. At the west end the main series of exposures ends against a fault. A few other outcrops of agglomerate appear 3,000 feet to the southwest and may represent the faulted extension of this member. The agglomerate contains abundant rhyolitic fragments in a schistose, chloritic matrix. East of the Whitesides road there are many outcrops where the fragments range in size from 1 to 4 inches, with a few fragments up to 1 foot in diameter. Farther west the size of the fragments becomes smaller, with the maximum diameter usually less than $1\frac{1}{2}$ inches. The fragments are tabular, with the major diameters conforming to the strike and dip of the schistosity.

Sediments

A large part of the southeastern part of Bristol township is believed to be underlain by sediments. Throughout this area there are very few exposures, but diamond-drill holes provide some additional information.

In 1928, Foley-O'Brien Limited, drilled seven holes on the east side of the porphyry intrusives southeast of Bristol (Wright) Lake. The country rocks in these holes were logged as basalt and schist. In 1939, Ventures, Limited, did some drilling east of Bristol (Wright) Lake. Ventures hole No. 8 was drilled to check Foley-O'Brien hole No. 4, and the country rocks logged by Foley-O'Brien as volcanics were logged by Ventures as sediments. In 1945, Hoyle Mining Company, Limited, drilled one hole 3,200 feet northeast of the above holes. In this hole the country rocks were logged as rhyolite and tuff. None of this drill core has been preserved so that the original drill logs are the only record. The author believes that the logging of the drill-holes by Ventures is probably correct. The rocks intersected in the Hoyle drilling could be rhyolite, since rhyolitic agglomerate underlies Keewatin sediments in Tisdale township.

The sediments are mainly argillite with some greywacke. No conglomerate or coarse greywacke has been observed on any outcrop or in the drill core that has been examined. The argillite and greywacke range from dark to light-grey on the weathered surface, and are usually somewhat lighter-coloured on the fresh surface. Thin bedded sections of argillite contain many beds up to 2 inches thick. The softer, finer-grained sections are usually darker in colour and alternate with lighter-coloured, more arenaceous beds. As the mineral fragments in the argillite increase in size, the rock grades into a fine greywacke.

POST-KEEWATIN

Pyroxenite and Hornblendite

Outcrops of these rock types occur in a zone that extends from the Stanwell Oil and Gas, Limited, property southwest to the township boundary. These intrusives are at or near the sediments-volcanics contact. One narrow dike or sill occurs southeast of the shafts on the Stanwell Oil and Gas property. Another larger intrusive area lies within a strongly magnetic zone.

The pyroxenite in drill-holes on the Rusk Porcupine Mines, Limited, property is fairly fresh and coarse grained, with individual ferromagnesian crystals up to $\frac{1}{2}$ inch long. Since the individual pyroxene and hornblende crystals are so large, the relative amounts of each exposed in a thin section may not be representative.

An estimate of the mineral composition from one thin section was 40 percent pyroxene, 40 percent hornblende, 15 percent magnetite, 4 percent biotite, and some crystals of apatite. A small amount of fibrous alteration occurs along fractures. Another thin section was made from a specimen taken from an outcrop near the west boundary of claim P.10922. The hand specimen showed the rock to be considerably altered, with some cleavage faces up to $\frac{1}{2}$ inch long. The mineral composition was estimated as: hornblende, 50 percent; biotite, 15; chlorite, 15; magnetite, 10; apatite, 5; and epidote, 2 percent.

In the area east of the Mountjoy Timber Company road the intrusive rocks have been mapped as hornblendite. These rocks contain recognizable hornblende crystals up to $\frac{1}{2}$ inch long, but near the andesite contact these crystals are much smaller. The hornblende in these rocks is of more striking appearance than in the outcrops farther to the east. Thin-section examination indicates that a considerable amount of hornblende is present throughout.

Acid Intrusives

Monzonite.—A stock of monzonite is located in the southern part of the township. Most of this monzonite is quite fresh and consists of feldspar crystals about $\frac{1}{16}$ inch in diameter. In parts of the intrusive there are feldspar phenocrysts up to $\frac{1}{4}$ inch in diameter, and the colour of the phenocrysts ranges from cream, through pink, to deep red. Some phenocrysts have a central core of red or white feldspar with an outer shell of grey feldspar.

Burrows¹ gives the analysis of a specimen of this rock type taken from "Granite-porphry dike, Thomson claim, Bristol township." Four claims, Nos. P.8010, P.8011, P.8387, and P.8388, cover most of the outcrop area of the stock, and were held at that time by F. H. and R. T. Thompson. The analysis is as follows:

	Percent
Silica.....	65.42
Alumina.....	15.80
Ferrous oxide.....	0.91
Ferric oxide.....	2.75
Lime.....	1.33
Magnesia.....	0.53
Potash.....	6.26
Soda.....	5.18
Water.....	2.46
Total.....	100.64

Hawley² has described the rock as follows:

The mineral constituents are orthoclase, microcline, albite, quartz, and small amounts of biotite, chlorite, and iron oxides. It is largely porphyritic, the phenocrysts of feldspar showing excellent zonal growths. The feldspars are partly sericitized and replaced by rusty-weathering rhombs of carbonate.

The author's examination of thin sections made from three specimens of unaltered rock generally confirms the above report, except that no quartz grains could be identified. No quartz grains have been recognized on weathered surfaces of the rock, although many outcrops contain veins and stringers of quartz. An attempt was made to calculate the amounts of the minerals observed in thin section from the chemical analysis. It was found that there was not enough alumina present to combine with alkalis to form feldspar. This might be due to the fact that some carbonate was present, although carbon dioxide was not determined in the analysis. A calculation that leaves the magnesia, water, and

¹A. G. Burrows, *The Porcupine Gold Area*, Ont. Dept. Mines, Vol. XXXIII, 1924, pt. 2, p. 38.

²J. E. Hawley, *op. cit.*, p. 15.

part of the lime unsatisfied gives the mineral composition as: albite (An₄), 44.8 percent; orthoclase, 37.5; quartz, 10.9; magnetite 2.9; hematite, 0.2; and unused, 3.7 percent.

Outcrops of sediments near the northeast corner post of claim P.8010 are baked and reddened up to 200 feet from the intrusive contact. Here the country rock is a fine-grained mosaic of sericite, with a clear mineral believed to be feldspar. Carbonate veinlets make up about 20 percent of the rock. Near the carbonate veinlets, parts of the groundmass have been recrystallized to feldspar porphyroblasts. These feldspar crystals show albite twinning and give extinction angles characteristic of albite. Sericite occurs along veinlets, with or without carbonate.

Quartz-Feldspar Porphyry.—Elongated stocks of quartz feldspar porphyry occur adjacent to Bristol (Wright) Lake and near the northwest corner of the township. The weathered surface of the outcrops adjacent to Bristol Lake are



"Andesitic" dike cutting rhyolite, on the north boundary of the township.

pink and contain recognizable crystals of quartz and feldspar. Hawley¹ has examined thin sections of these rocks and gives the following analysis and description from a specimen taken from claim P.8537.

	Percent
Silica.....	65.5
Alumina.....	18.75
Ferrous oxide.....	1.14
Ferric oxide.....	0.75
Lime.....	3.08
Magnesia.....	0.61
Potash.....	1.15
Soda.....	5.72
Titanium dioxide.....	0.51
Water.....	1.07
Carbon dioxide.....	1.85
Total.....	100.13

Thin sections show that the porphyry contains phenocrysts of quartz and feldspar, orthoclase and albite, which are partly sericitized. These lie in a matrix of sericite, quartz, and some calcite. In places epidote and chlorite are fairly abundant.

An attempt was made to calculate the amounts of the minerals seen in thin section from the constituents in the chemical analysis. This calculation would

¹J. E. Hawley, *op. cit.*, p. 14.

give a possible mineral composition of: oligoclase (An_{10}), 52.7 percent; quartz, 25.7; orthoclase, 5.7 or, using potash as sericite, 9.1; and calcite, 3.0 percent.

Andesitic intrusives related to the quartz feldspar porphyries have been described by Hogg.¹ Similar intrusives, which are also associated with rhyolite, occur in the northwestern part of Bristol. Where these rocks are best exposed they are sills, which in many places are not over 20 feet wide but are persistent for distances up to 2,000 feet along strike. The most abundant rock of this type is andesitic in appearance. The weathered surface is uniformly green and fine-grained. The fresh surface is a dark-grey colour, and a few small phenocrysts of quartz and feldspar may be present. The outcrops of this rock type, located 6,000 feet southwest of McDonnell Lake, are coarser grained.

Under the microscope the fine-grained type was found to consist of at least 50 percent chlorite, which is mainly developed in the groundmass. The feldspar phenocrysts are cloudy and considerably altered to saussurite. Other minerals are quartz phenocrysts, carbonate, biotite, apatite, and pyrite.

Feldspar porphyry is exposed along the south edge of an outcrop on claim P. 8527 (Cortez property). This rock contains light-grey phenocrysts, which range from $\frac{1}{16}$ to $\frac{1}{2}$ inch in diameter. The matrix is fine-grained and light-to-medium grey. A thin-section examination showed that the rock is strongly altered and the original minerals destroyed. The phenocrysts and groundmass now appear to be of similar composition although the phenocrysts are lighter in colour. The rock is a fine-grained aggregate of feldspar, probably albite, sericite, and saussuritization products such as zoisite, etc.

Lamprophyre

One lamprophyre dike is exposed north of the Whitesides road on claim P.11520 (Cortez property). This dike can be traced east-west along strike for 400 feet and has a maximum width of about 30 feet. Some other lamprophyre dikes have been intersected by drill-holes near Bristol (Wright) Lake.

The dike on claim P.11520 is a fine-grained, grey rock, with elongated light-greenish phenocrysts up to $\frac{1}{8}$ inch long. Examination of a thin section showed the rock to contain phenocrysts of actinolite in a matrix consisting mainly of feldspar with an index higher than balsam. The feldspars are not cloudy, but secondary micas are beginning to form, and there are some patches of clinozoisite.

Carbonatized Rocks

The volcanics, sediments, monzonite, and porphyries have been carbonatized by circulating solutions. Weak carbonatization is widespread, and locally the alteration is so intense that carbonate bodies have been formed. In places where carbonatization has occurred along the contact of sediments and volcanics it is impossible to determine the original rock type. The most intense carbonatization has taken place near the sediments-volcanics contact and along strike faults or shears. Carbonatized rocks are shown on the map by a red symbol superimposed on the appropriate rock colour, if the original rock can be identified.

The carbonate is either white, cream, grey, or pink and weathers to yellowish or reddish brown. The weathered surface of some carbonatized outcrops is rusty with a coating of iron oxide. Much of the carbonate is accompanied by quartz veins or stringers and a little sulphide mineralization. The carbonate bodies are of considerable economic interest because the Kerr-Addison mine at Larder Lake is a deposit of this type. The best gold deposit known in Bristol township occurs

¹Nelson Hogg, *Geology of Godfrey Township*, Ont. Dept. Mines, Vol. LXIII, 1954, pt. 7, p. 24.

in these rocks. The only exposures of rocks of this type are on claims P.4039, P.4040, and P.8396 (Stanwell and Rusk Porcupine properties).

Diamond-drilling south of Hubert's camps on claim P.8527 (Cortez property) has cut a carbonatized shear zone that strikes east-west. The rocks in the Bristol fault zone are believed to be carbonatized, but no drill-holes have intersected this zone within the township.

The source of the hydrothermal solutions that caused the carbonatization may be the same magma that produced the monzonite, porphyry, etc. The alteration appears to have taken place after the intrusion of the porphyries and before the time of vein formation.

MATACHEWAN

Dikes of quartz diabase cut all the earlier rocks and are the latest consolidated rocks in the area. Mapping of outcrops together with magnetic methods have located twenty-two dikes in the central part of the township. These individual dikes are part of a larger zone that extends in both directions along strike. Many of the larger dikes are less than 100 feet wide, but a few of these persist along strike for more than 2 miles. Some dike zones are fairly well defined so that where a particular dike ends, another dike appears nearby to maintain the trend. A repetition of this pattern produces an *en échelon* effect.

Most of the longer dikes have an arcuate strike. The most pronounced trend is about N.5°W., but a few dikes trend about N.30°W. Because of the large number of dikes and the variety of strikes, many dike intersections have been located by geophysics. On claim H.R.1263 an outcrop on the Tatchikapika (Redsucker) River shows that a dike striking at N.20°W. cuts a dike striking at N.35°W. The former dike shows a chilled edge against the latter dike indicating that it is of a later age. All the larger dikes avoid the central part of the monzonite stock in southern Bristol and the porphyry stocks southeast of Bristol (Wright) Lake. In the central part of the porphyry stock one dike occurs, but it is narrow and discontinuous. All the diabase dikes that reach the Bristol fault end abruptly at the edge of the fault zone.

A study of five thin sections of diabase showed that all five dikes were of similar mineralogical composition regardless of any strike or age differences that exist. They all contain augite, labradorite, quartz or micrographic intergrowth, and magnetite. The ophitic texture is more pronounced in some of the thin sections than in others, but variations also occur within a particular dike.

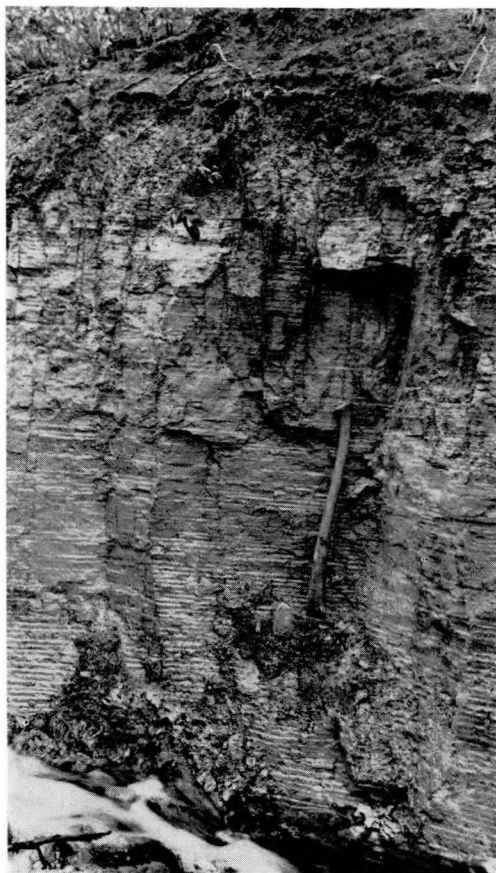
Cenozoic

PLEISTOCENE

The area is covered by thick glacial and glacial lake deposits. Glacial striae indicate that the general movement of the ice was almost due south, although in river valleys the striae tend to be parallel to the valley. Many of the larger hills show a crag-and-tail effect, with outcrops on the north face of the hill and a boulder train south of the outcrop area. The hill west of the large pond in Thunder Creek is an excellent example of this phenomenon. There is a very persistent boulder ridge east of McDonell Lake, which extends southward from the Godfrey-Bristol boundary for 2½ miles. Some other, smaller boulder ridges do not appear to be related to outcrops.

Sections of the glacial deposits are only partially exposed along the banks of the rivers and creeks because in most cases the base of the section is covered by debris, which has slumped from the higher part of the section. An examination of

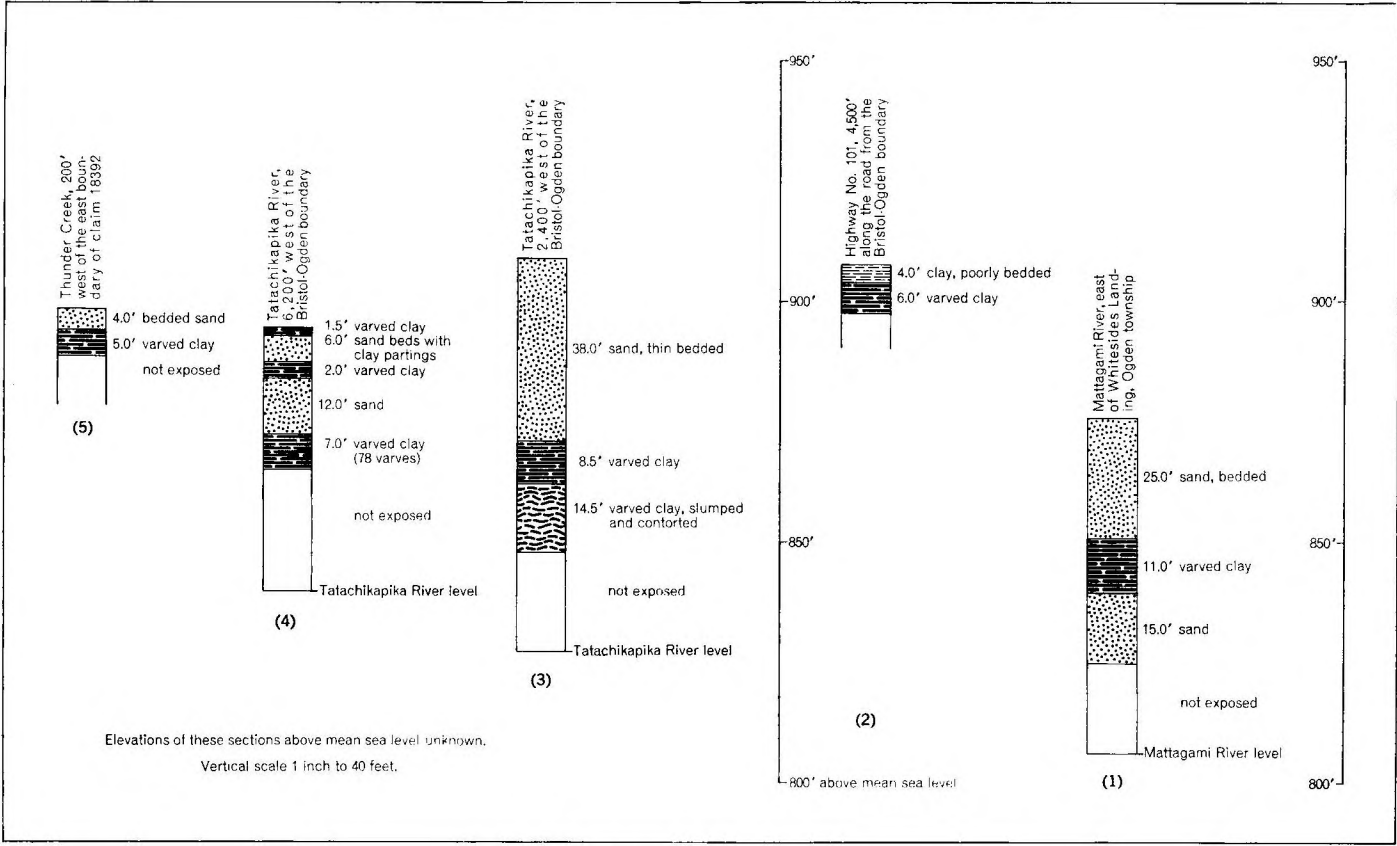
these deposits shows that they consist of varved clays, poorly-bedded clays, and bedded sands. The subdivision is difficult to apply since the three types are not readily separable. The well-bedded clays grade into thicker sandy beds with clay partings. Such beds are also believed to be varves in which the coarser base of the bed is represented by sand. In other places, some of the clays, have been classed as poorly bedded although there is no sharp break with the well-bedded clays. These clays may also be varved, but the annual layering is not marked by contrasting colour changes emphasizing the bedding.



Varved clay, highway No. 101.

Five sections are shown on the accompanying sketch. The Mattagami River and Highway No. 101 sections represent a combined vertical thickness of just over 100 feet, but 40 feet of this total is not exposed. These sections indicate that at least two, and possibly three, bands of varved clays are interbedded with sand deposits. The sections examined showed that all the members were deposited in a glacial lake.

Varved clays and the overlying poorly bedded clays are exposed along the highway for $1\frac{1}{2}$ miles from the edge of the outcrop area east of the Thunder Creek bridge to near Bristol (Wright) Lake. These clays are the western extension of the clays exposed (section No. 2 of accompanying drawing) where the eastern branch of Bristol Creek crosses the road. This uppermost clay is probably th

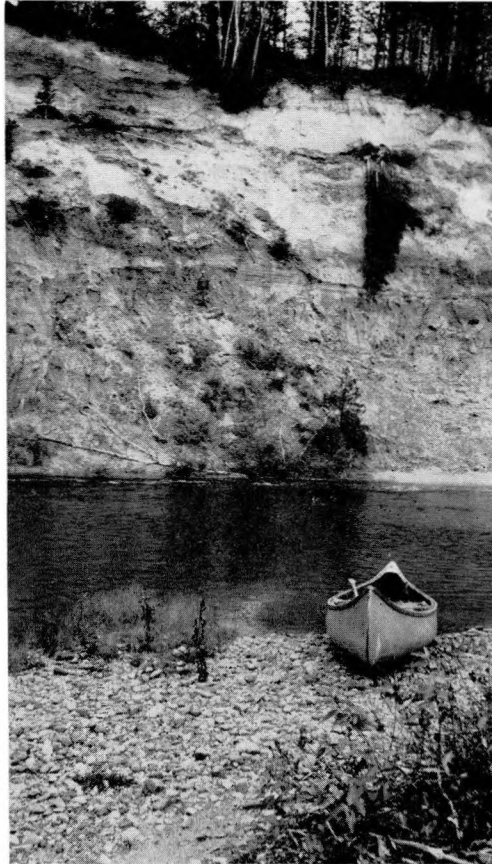


Five sections of glacial lake deposits.

one shown in section No. 5. The clays of the central part of sections Nos. 1, 3, and 4 are considered to represent a lower unit.

At some locations the glacial beds have a gentle dip. From elevations on the road the slope towards the east is calculated to be 12 feet per mile. Within the varved clays the average thickness of each annual deposit is about 1 inch.

Boulder till is exposed in the roadside ditches along highway No. 101 from Thunder Creek eastward for 2,000 feet. This till contains boulders of various sizes enclosed in a sandy matrix.



Varved clay overlain by sand, Tatachikapika
(Redsucker) River.

A large sand dune is located just west of the east boundary of the township, between mileposts I and II. (See frontispiece.) From a point 2,000 feet northwest of the dune a sand bar extends northwest for $1\frac{1}{2}$ miles. This large dune may represent a sand spit that has been modified by wind action. The dune has a steep outside face, which rises about 25 feet above the surrounding terrain. On the inside of the dune there is a gentle inward slope. Where a pit was dug in the dune, the material was found to be a uniform, unbedded sand. Other smaller sand dunes are located farther to the northwest.

The sand bar has a steep northeast face. Towards the southwest it has a gentle slope with small, irregular sand hills, which may have resulted from wind action. Wave action of the lake produced the steep face on the northeast side of

See back pocket for "Aeromagnetic map of Bristol and part of Ogden township".

the bar. The former lake bottom is now covered by spruce swamp, and the bar rises about 30 feet above this level. At the southeast end the sand bar gradually slopes down to the level of the old lake bottom. At the northwest end a single sand hill is separated from the continuous ridge by a small valley. As the creek in this valley is extremely small, it appears likely that this was the original land form.

There are sand deposits on the east side of Bristol (Wright) Lake. These low hills are composed of flat-lying beds of very fine sand. Farther to the northwest at the lumber camp and along the boulder ridge east of McDonell Lake, small deposits of gravel are exposed along the road. This gravel probably resulted from wave action on the boulder clay, which was originally associated with the large boulders.

RECENT

Recent deposits consist mainly of organic material now collecting in the swamps and muskegs. Some detrital material is also being deposited along stream valleys.

GROUND GEOPHYSICAL SURVEYS

Magnetic Surveys

Several magnetic and two electrical surveys are included in the assessment-work reports on properties in Bristol township. During the course of the present survey a large amount of magnetometer work was carried on to supplement these surveys. The main purpose of this work was to obtain a detailed knowledge of the location of the diabase dikes. Where strongly magnetic areas were encountered during the course of the work, additional traverses were made so that magnetic contours for these local areas could be drawn. Anomalies considered to be due to diabase dikes, as indicated by geophysical observations, are shown on the geological map at these locations.

During the survey, a Sharpe, one-man, vertical-intensity type magnetometer was used, with a scale constant of 21.8 gammas per scale division. A magnetic base station was established on the Bristol township-Ogden township boundary immediately north of highway No. 101. The base station consists of a concrete block with a brass plate inscribed, "Magnetic Base Station, Ontario Department of Mines." The value of the vertical magnetic force at this station was established at $58,445 \pm 15$ gammas by relating it to the Cook Lake magnetic base station, which has a value of $58,395 \pm 15$ gammas. The base value for plotting was taken as 58,465 gammas, which was a magnetometer reading of 30 scale divisions at the beginning of the survey. Because of the reconnaissance nature of the work, the base station could be read only at the beginning and at the end of the day. In spite of this difficulty excellent checks were usually obtained by rereading particular stations, and the general accuracy is considered to be high. Magnetic profiles were plotted on the geological field map at a vertical scale of 800 gammas to the inch.

The accompanying aeromagnetic map¹ shows a comparison between the results of fairly detailed ground magnetic work and aeromagnetic traverses. These traverses were made at 500 feet above the ground level and spaced at half-mile intervals.

¹Compiled from Aeromagnetic Maps Nos. 292G and 293G, Geophysics Papers 292 and 293, Geol. Surv. Can., 1956.

Lundberg¹ who conducted extensive geophysical surveys in Bristol township gave the following magnetic interpretation:

600-720 gamma areas are believed to be due to sediments, acid porphyries and acidic lavas or tuffs. The magnetic readings over porphyry are generally slightly lower than over sediments.

700-900 gamma areas are believed to indicate greenstone and other medium to basic lavas. Also in greenstone the magnetic minerals are more erratically distributed than in the sediments so that the readings show more variation. Heavy overburden somewhat modifies this effect.

The magnetic base for plotting is approximately equal to the 700-gamma level in the Lundberg reports. The author is entirely in agreement with the above general conclusions and with the conclusions regarding the porphyry near Bristol (Wright) Lake. However, the porphyry, which extends into the township from the northwest corner, has an erratic profile ranging from 100 gammas below the magnetic plotting base to 1,000 gammas above the plotting base. On the north township boundary, 100-400 feet east of mile 22 on Niven's base line, a small anomaly may indicate the southern extension of a porphyry mapped in Godfrey township.

The change between the magnetic values for such rock types as rhyolite, andesite, and sediments is so small that magnetic surveys do not locate the contacts. This difficulty is increased by the abundance of strongly magnetic dikes that cut all the earlier rock types. Lundberg was able to locate the northern contacts of the porphyry intrusives near Bristol (Wright) Lake. Low magnetic readings were obtained over the porphyry, but a distinct rise in magnetic intensity was found to exist north of the contact.

The most strongly magnetic intrusive rocks are the pyroxenite and hornblendite that are exposed in the southwestern part of the township. In the central part of such intrusives, the magnetic intensity rises to more than 5,000 gammas above the plotting base. All areas within the 2,000-gamma contour are believed to be underlain by these rock types.

Diabase dikes usually have a characteristic profile since they are steeply dipping, tabular bodies. The magnetic intensity shows a slight decrease near the dike and then a sharp rise almost immediately over the contact. The usual magnetic relief is 400-800 gammas, but anomalies as low as 100 and as high as 2,000 gammas have been obtained.

In the western part of the township there are four areas where the magnetic intensity rises to 1,500 gammas above the plotting base. The rock type underlying these areas is unknown. Magnetic surveys have established the fact that iron formations that outcrop in adjacent townships, particularly in Ogden township, are not present in Bristol.

Electrical Surveys

The Lundberg² survey was able to locate some zones of stronger conductivity using a radiograph instrument. These zones of stronger conductivity may mark the trend of beds of slate or graphitic schists. The widest and most persistent zone of conductivity extends northeast from Bristol (Wright) Lake. Diamond-drill holes beneath this conductor have intersected a mineralized, graphitic band, which appears to follow the andesite-sediments contact.

¹H. Lundberg, *Thomas Wright Property, Bristol Township, 1940*, Ont. Dept Mines, Timmins, File No. T-137.

H. Lundberg, *Mineral Estates Claims, Ogden and Bristol Townships, 1939*, Ont. Dept Mines, Timmins, File No. T-88.

²H. Lundberg, *op. cit.*

See back pocket for "Generalized geological map of the Porcupine area".

STRUCTURAL GEOLOGY

Owing to the extensive overburden and scarcity of good outcrops, structural interpretation in the area has been restricted. The field criteria noted were the strikes, dips, and tops of lava flows and sediments; horizon markers and contacts; and the displacement of minor faults. Diamond-drill holes and geophysical data have been used to supplement the surface information. Magnetic surveys have been particularly helpful in outlining areas underlain by pyroxenite-hornblendite and diabase. Zones of electrical conductivity have shown the continuity of certain shears and sedimentary beds. The author's interpretation of the structure is shown by the lighter colours on the map and the locations of fold axes and faults.

Top determinations in the volcanics were made from the shapes of pillows and the vesicular tops of pillows. Strikes were obtained from the elongation of pillows, by tracing flow contacts, and mapping an agglomerate band. Dips of the flows can often be observed from the shape of pillows on the nearly vertical ends of the outcrops. The plunge was obtained on bedding planes at the noses of folds. Many quartz veins are drag folded and show plunge that is believed to correspond with the regional plunge. In places lineation is developed on planes of schistosity.

On many outcrops, strikes and dips can be observed in the sedimentary strata, and in a few outcrops the tops of beds can be determined. In drill core, graded bedding is well developed in places. In a few instances beds have been partly eroded by scour so that overlying beds truncate the lower beds at a small angle.

A few cross-faults can be observed in outcrop areas, and some faults are known from the displacement of a marker horizon. From the interpretation of geophysical data, larger faults and shears in drift-covered areas may be inferred.

Folding

The major structures cannot be related to anticlines and synclines by direct observation. The sediments are known to overlie the intermediate volcanics. Because of this fact, the andesite band that crosses Bristol township diagonally is considered to be anticlinal. In Mountjoy and Ogden townships the rocks on both sides of this andesite band are sediments. The synclinal areas are occupied by the younger rocks, which are the sediments. Both these structures are very large, and many small axes would be expected to complete the detailed picture.

Not enough geological information on Bristol township is available concerning the structural and age relationships between the main sequence of rhyolitic rocks and the main sequence of andesitic rocks. In Tisdale township the most complete rock sequence is andesitic lavas overlain by rhyolitic agglomerate, which is overlain in turn by Keewatin sediments. In some places in Tisdale township the rhyolitic agglomerate appears to be missing. The author believes that the rhyolite in Bristol and Godfrey townships underlies Keewatin sediments and occupies a similar stratigraphic position to the rhyolitic agglomerate in Tisdale township. A drill-hole collared about half a mile west of the southeast corner of Godfrey township extends into Bristol township and is shown on both the Godfrey and Bristol maps. The rocks intersected in the upper part of this hole are rhyolite, rhyolitic agglomerate, and tuff, followed by a band of argillite. In Tisdale township a similar band of graphitic slate underlies the rhyolitic member.

In Godfrey and Price townships the general strike is north or northeast, which is almost at right angles to the general trend in Bristol township. This extreme divergence of trend must represent two periods of folding. If the rhyolite originated as a great thickness of welded tuff, it may not be as deeply folded as the rocks along the Porcupine belt.

An anticline and a syncline have been outlined in the volcanic rocks north of highway No. 101 by determining the facing of pillows. Near the highway the axial trend is northeast, but farther along strike the trend becomes N.60°E. Some small outcrops of sheared, rhyolitic agglomerate are present near the east end of the synclinal axis. It is probable that this agglomerate is the faulted extension of the agglomerate that outcrops farther to the northeast. If the main agglomerate band outlines the keel of a syncline, it would account for the fact that this band is up to 700 feet wide. The facing of the flows near the agglomerate band is unknown, so that there is no direct evidence to confirm or deny this hypothesis. The rhyolitic agglomerate in this syncline is interpreted as part of the main overlying group of rhyolitic rocks.

Another anticline, trending northeast and then swinging almost easterly, is present on the Stanwell Oil and Gas, Limited, and Rusk Porcupine Mines, Limited, properties. On the northwest side of the axis the facing of the pillows can be observed, but on the southeast side the facing is known from the stratigraphic sequence.

The major structural trends within the rhyolite are best shown on the generalized geological map of the Porcupine area (facing page 34). In Godfrey township the trend is south, and the flow sequence faces east. In Turnbull township the andesite bands within the rhyolite trend southeast. One band of andesitic pillow lava is exposed near the northwest corner of Bristol township and extends west into Carscallen township. The change of strike of these flows, together with the known facing in Godfrey, suggests that an anticlinal fold may be present within the rhyolite. The minor folds, outlined by the "andesitic" phase of the porphyry intrusives in the large outcrop area a mile west of McDonell Lake, would be related to this major structure.

Porphyry sills also outline some minor folds on the large outcrop north of McDonell Lake. These folds show a plunge to the west, and this westward plunge is also shown by quartz veins on the outcrops southeast of McDonell Lake.

Faulting

A major fault, which the author has named the Bristol fault, crosses the township in an east-west direction. This fault was first located in Bristol township by Koulomzine¹ who made the following statement:

We interpret the magnetic pattern outlined above as caused by a strong zone of shearing. The same phenomenon of diabase dykes stopping against a strong shear zone has been observed by us at the east extension of the Porcupine Break in Wilkie and Carr townships.

The Bristol fault is nowhere exposed, and no drill-holes intersect it within the township. In the area southwest of the highway bridge across Thunder Creek, the fault passes between two outcrops, which are 60 feet apart; but these outcrops do not show strong shearing or alteration. The location of the fault is shown by the fact that many diabase dikes extend up to the fault, but none are known to cross it. The author's opinion is that the fault existed before the intrusion of the diabase dikes. These dikes occupy a series of fractures, which did not extend into the weak rocks of the fault zone. No correlation of any particular dike or group of dikes has been made across the fault zone; and, if the above hypothesis is correct, the dikes were never continuous across this zone. No precise correlation of the sediments or volcanics can be made across the fault.

¹T. Koulomzine, *Report on the Magnetometer Survey of the Property of Trident Porcupine Gold Mines Limited, Bristol Township, 1947*, Ont. Dept. Mines, Timmins, File No. T-169, p. 4.

The volcanics-sediments contact does not show a large displacement; and similar lava types, without iron formation, are present on both sides.

The Bristol fault has been located in Carscallen township about a mile west of Bristol township, in claims held by Mining Corporation of Canada, Limited. Drilling on these claims has shown that the rocks in that fault zone are strongly sheared and altered to carbonate and sericite. At this locality the fault is about 150 feet wide and dips 69°N.

The Bristol fault is believed to represent the westward extension of the Destor-Porcupine fault. However, the Bristol fault is a weakly magnetic zone of carbonate-chlorite-sericite schist, whereas the Destor-Porcupine fault in many places is strongly magnetic and contains serpentized basic intrusives. An alternate position for the Destor-Porcupine fault would be along the south boundary of the sediments in Price, Thorneloe, and Denton townships. A cross-fault may follow the Grassy River in Price township and extend northwestward to the Mattagami River in Jamieson township. The existence of this fault is suggested by a topographic lineament and also by the aeromagnetic contours. Such a fault would be parallel to the Burrows-Benedict fault in Tisdale township, where the relative horizontal displacement is west side to the south. A similar small displacement may occur along such a fault. But, if the Destor-Porcupine fault is located along the southern contact of the sediments, the displacement on the west side of the cross-fault would be 4½ miles.

A few cross-faults with minor displacements have been indicated by mapping the agglomerate band. If all the known agglomerate in that vicinity is part of the same band, another cross-fault with a horizontal displacement of more than 1,500 feet is required. These faults have the same strike and the same relative displacement as the Burrows-Benedict fault in Tisdale township.

Shearing

Shearing is best developed in the andesites and less well developed in the rhyolite, porphyry, and sediments. The strike of the schistosity is N.35°-90°E., and the dip is vertical or steeply north. The strongest shearing occurs in the outcrops west of Waterhen Lake and farther southwest on claim P.8531.

ECONOMIC GEOLOGY

Prospecting for gold has been in progress since the earliest discoveries in the Porcupine area because Bristol township appears to lie directly along strike from the productive area. Early exploration was by trenching and stripping, and later exploration by diamond-drilling and geophysical surveys. There has been no mineral production.

Gold

Gold is found in quartz stringer zones in strongly carbonatized rocks and in quartz veins. The host rocks for the mineralizing solutions include all the country rocks and the acid intrusives. No quartz veins were observed in the diabase, pyroxenite, or lamprophyre. Pyrite, arsenopyrite, chalcopyrite, and visible gold occur in the veins. Some placer gold has been found in the Tatchikapika (Redsucker) River. Since most of the surface work was done many years ago the showings are overgrown, the trenches partly filled with debris, and many of the present owners know little of the prospecting history of their claims.

Copper and Nickel

A small amount of chalcopyrite is associated with pyrite in many of the quartz veins and adjacent wall-rocks. In a trench, 2,200 feet east of mile 22 of Niven's base line and 350 feet south of the north township boundary, a massive pyrite replacement in rhyolite has been observed. Copper and nickel might be expected to occur in, or near, the pyroxenite intrusive, but the author did not encounter any examples of this type of mineralization. However, Hawley¹ noted heavy sulphide mineralization near the sediments contact on claim P.7372, which would be within the pyroxenite.

Gravel

Some gravel has been found at the lumber camp in central Bristol township and along the large ridge southeast of McDonell Lake. These gravel deposits are thought to be of small extent and poor quality, so that it is doubtful whether they are of any use except for road-building in the immediate vicinity.

PROSPECTING AND EXPLORATION

Intensive prospecting of the outcrops was in progress from 1911 until 1926. Since 1926, diamond-drilling has been in progress sporadically, and much of it has been guided by geophysical surveys.

Magnetic and electrical surveys are a useful guide in drilling since it is possible to outline certain rock contacts that may be zones of structural weakness for the deposition of gold. By first locating the diabase dikes by magnetic surveys, useless drilling can be avoided. However, most gold deposits cannot be directly detected by geophysical instruments. Geophysical surveys can only hope to locate a favourable rock type or structural location.

Iron sulphides in rhyolite have been exposed by trenching some 2,200 feet east of mile 22 (Niven's base line) on the north boundary and 350 feet south of the township line. A partial sulphide replacement of sediments has been intersected near the north end of Bristol (Wright) Lake. These are the only known sulphide zones, and they contain very low values in gold and copper. Copper or nickel might be associated with the basic intrusives, but no showings were observed in these rock types by the author.

Hawley² reports as follows:

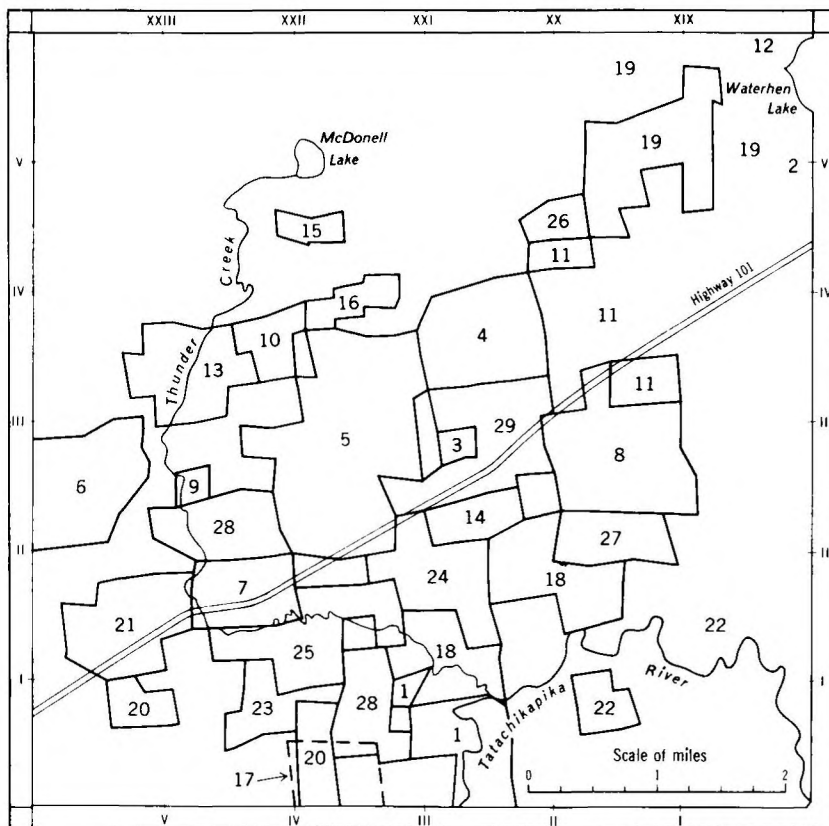
... on claim P.7372 and to the southwest, a schistose band of greenstone near the contact with the Timiskaming sediments is heavily mineralized with sulphides.

On the accompanying geological map, (No. 1957-7, in map case) the rocks adjacent to the sediments contact on the above claim are shown as pyroxenite. This showing would then be in sheared pyroxenite rather than lava.

The best concentration of gold known to exist in the township is located along the volcanics-sediments contact. This mineralization is located where there is a zone of strong carbonate alteration containing quartz stringers. Future prospecting for gold will probably be directed towards a more detailed exploration of this contact zone. Copper and nickel may be associated with the pyroxenite intrusive.

¹J. E. Hawley, *Ogden, Bristol and Carscallen Townships*, Ont. Dept. Mines, Vol. XXXV, 1926, pt. 6, p. 29.

²J. E. Hawley, *op. cit.*, p. 29.



Plan showing the Locations of Mining Properties in Bristol Township

- | | |
|-------------------------------------|--|
| 1. Britaura Porcupine Mines, Ltd. | 16. Frank McKinley and D. J. Molesky |
| 2. Henry Charbonneau | 17. Milroy-Wilson-Harris-Paul Group |
| 3. J. E. H. Chateauvert Estate | 18. Minedel Mines, Ltd. |
| 4. Continental Kirkland Mines, Ltd. | 19. Mineral Estates, Ltd. |
| 5. Cortez Explorations, Ltd. | 20. Mrs. G. Minthorn |
| 6. Empire Gold Mines, Ltd. | 21. Patrick O'Shea Estate |
| 7. Enrich Mines (1945), Ltd. | 22. Penrose Gold Mines, Ltd. |
| 8. Foley-O'Brien, Ltd. | 23. Rusk Porcupine Mines, Ltd. |
| 9. Harry Goldstein | 24. Spina Porcupine Mines, Ltd. |
| 10. Frank Hendrickson | 25. Stanwell Oil and Gas, Ltd. |
| 11. Hoyle Mining Co., Ltd. | 26. Thomas Toner and P. J. McCormick |
| 12. A. R. Hubert | 27. Trident Porcupine Gold Mines, Ltd. |
| 13. P. A. Kindree | 28. F. Wallingford |
| 14. J. B. McClinton | 29. Thomas Wright |
| 15. D. J. McDonell | |

DESCRIPTION OF PROPERTIES

1. Britaura Porcupine Mines, Limited¹

This company holds nine patented claims (P.23966, P.23967, P.23969-73, P.23977, P.24851), which are on the south boundary of the township between mileposts II and III. These claims were staked in 1937 by J. B. O'Neill and were transferred to Britaura Porcupine Mines, Limited. No outcrops are known to

¹ Properties are numbered to correspond with the plan above.

exist on the property, which is heavily overlain by sand. Work by the present owners has been confined to trenching.

Hawley¹ noted that placer gold had been found in Bristol township at the mouth of Thunder Creek and on the Tatchikapika (Redsucker) River. In 1931 Edward Gauthier panned sand from along the banks of this river and found that he was able to get from two to seventeen "colours" in the pan. Eleven claims were staked along the river north of the Bristol-Thorneloe townships boundary. A Syndicate was formed consisting of Edward Gauthier, P. Gauthier, F. Feldman, J. A. McInnis, and Herbert Bourne. A sluice box with a mercury-coated plate was installed on the north side of a sharp bend in the river, in the southern part of claim P.23971. A test run was made for a three-day period, when the number of buckets of sand put over the sluice was counted, and the gold recovered was weighed. The results of this test indicated a gold content of 65 cents per ton (0.03 ounces per ton).

Some sampling of the banks was done in 1934. A bulk sample of $\frac{1}{30}$ cubic yard was selected and carefully panned and the concentrate assayed. The bulk samples were taken on the east bank of the river. The location and assays of these samples, made by Hollinger Consolidated Gold Mines, Limited, are given below:

Location	Weight of Concentrate	Gold Assay per Ton	
		grams	ounces
Thorneloe township, 350 ft. south of Bristol boundary.....	190	\$0.06	0.003
South boundary, claim P.23970.....	18	trace
South side of bend, claim P.23971.....	157	0.11	0.0055
South side of bend, claim P.23967.....	132	0.07	0.0035
No. 1 post, claim P.23966.....	198	0.37	0.018

2. Henry Charbonneau²

The Charbonneau group consisted of one unsurveyed claim, in Bristol township, and six unsurveyed claims, in Ogden township. The north boundary of the claim group extended east and west from milepost V on the Ogden township-Bristol township boundary. The magnetometer survey was carried out with the object of locating the contact between the sediments and volcanics. The conclusion reached was that the part of the property in Bristol township was underlain by sediments.

3. J. E. H. Chateauvert Estate

(See Thomas Wright Property)

4. Continental Kirkland Mines, Limited³

The property consisted of nine surveyed claims (P.10625, P.10626, P.21763-67, P.21769, P.21770) north of Bristol (Wright) Lake. As no outcrops had been found on these claims, a magnetic survey and an electrical survey were made.

¹J. E. Hawley, *op. cit.*, p. 23.

²Reference: J. H. Low and N. B. Keevil, *Report on a Geomagnetic Survey of the Property of Henry Charbonneau, Bristol and Ogden Townships, 1946*, Ont. Dept. Mines, Timmins, File No. T-243.

³Reference: H. Lundberg, G. W. Lowther, and R. Grimes-Graeme, *Report on the Geophysical Survey of the East Claim Group, Bristol Township, Porcupine Area, Ontario, of Continental Kirkland, Limited, 1939*, Ont. Dept. Mines, Timmins, File No. T-33.

The magnetic survey outlined five diabase dikes striking north, and the country rocks were considered to be greenstone. Electrical survey work showed that the overburden was 120 and 130 feet in the two places where determinations were made, and the depth of overburden is thought to range from 100 to 150 feet. A series of weak, electrical conductors, considered to represent zones of fracturing, schisting, and shearing, was located. There has been no drilling done to explore these conductors.

5. Cortez Explorations, Limited¹

PROPERTY

The claim group is located west of Bristol (Wright) Lake and consists of 23 patented claims (P.8518, P.8527, P.8786, P.11520, P.17822, P.18163, P.19976-81, P.24362-64, P.24392-94, P.26762-66). Highway No. 101. crosses the southeast corner of the claim group. The old Whitesides wagon road and many other bush roads give access to the claims.

OWNERSHIP

Hubert Balboa Mines, Limited, a subsidiary of Cortez Explorations, Limited, acquired the claims from A. R. Hubert in 1945. The charter of this company was cancelled in 1954, and the claims reverted to Cortez Explorations, Limited.

HISTORY

A. R. Hubert recorded claim P.8518 in August, 1921, and since that time he has added many claims to the group. The early work consisted of excavating a large number of pits and trenches.

In 1926, J. A. Taylor of Philadelphia financed the drilling of six holes. Four of the drill-holes were put down on claim P.8527. Hole No. 1 was collared near the camps and drilled southeastward. Holes Nos. 2 and 3 were drilled northward to pass beneath the main pit. Holes Nos. 4 and 5 were collared near the Whitesides road, on claim P.11520, and were drilled to intersect the lamprophyre dike.

The property was optioned to Toburn Gold Mines, Limited, in 1939. Geological, magnetic, and electrical surveys were made by this company. An electrical conductor, strikes east near the south boundary of claims P.11520, P.8527, and P.18163. Three drill-holes were put down on claim P.8527; they located a soft, porous, rusty schist, which is believed to represent a zone of shearing and carbonate alteration.

The most recent exploration was by Hubert Balboa Mines, Limited. This company put down five drill-holes beneath the main showing from drill locations near the Whitesides road, and one drill-hole farther to the north.

GEOLOGY

The country rocks consist of andesitic lavas with one band of rhyolitic agglomerate. The andesites contain symmetrical oval pillows, and on most outcrops the shape of the pillows cannot be used to determine the facing. One outcrop on claim P.26766 shows a flow contact that can be identified since one of the flows is lighter-coloured, harder, and more feldspathic. In other places the adjacent flows are similar in composition and pillowed throughout. The flow contacts of these lavas are schistose bands about 5 feet wide. Lenticular patches of coarser-grained material are considered to be dioritic sills. Discontinuous bands of agglomerate up to 50 feet long occur on the outcrop south of the camps.

¹Reference: J. E. Hawley, *op. cit.*, pp. 29-31. [Hubert property.]

Reference: Hans Lundberg, Limited, *Surface Geological Plan, Geophysical Plan, and Diamond-Drill Logs and Sections*, Ont. Dept. Mines, Timmins, File No. T-63.

The rhyolitic agglomerate band maintains a width of 450–700 feet throughout the exposed area. The continuity of this marker bed shows that a uniform trend persists across the property.

The intrusive rocks are feldspar porphyry, lamprophyre, and diabase. One small outcrop of feldspar porphyry has been mapped in claim P.8527, and the eastern extension has been intersected in a sixth drill hole of Hubert Balboa. A lamprophyre dike has been mapped on two outcrops on claim P.11520. This dike conforms to the regional strike. It is known to be 400 feet long, ranging in width from 2 feet at the west end to 30 feet at the east end.

Five diabase dikes strike north, and two strike northwest. In addition to these larger dikes, there are some smaller branch dikes. Mapping of the outcrop, in conjunction with a magnetic survey on claim P.8527, shows how an individual dike pinches out, and an adjacent fracture opens up to maintain the continuity of the dike pattern.

STRUCTURE

The general trend of the rocks is slightly north of east, and the dip steep and usually north at 80 degrees. It seems probable that the agglomerate band lies along the keel of a syncline. In pillow lavas, only one good top determination was made; it indicates that the facing at that vicinity is towards the north.

Cross-faults, striking N.30°W., intersect the agglomerate band. The horizontal displacement along these faults is that the western fault block is relatively displaced towards the south. These cross-faults are parallel to one set of diabase dikes, and some displacement may occur along these dikes. A cross-fault on claim P.8527 shows the same relative displacement on a small diabase dike.

The andesites are locally sheared in well-defined shear zones, which conform to the regional strike and dip. The shear zones persist across individual outcrops and are up to 10 feet wide. Quartz veins were introduced as recurring lenses along these shears.

DESCRIPTION OF DEPOSIT

Lenticular quartz veins and stringers are widely distributed. The following descriptions are given for the more important discoveries.

Claim P.8527

The best showings are located in the outcrops north of the camp. On the eastern outcrop, an L-shaped trench, 35 feet long, 30 feet in maximum width, and 10 feet deep, has been excavated. This trench is now filled with water. Hawley¹ has described the showing as follows:

. . . a pit has been sunk on two lensing quartz veins, 100 feet in length and 4 to 8 inches wide. The quartz is greyish blue and in places banded. It carries pyrite, chalcopyrite, arsenopyrite, and native gold. The veins cut across a black graphitic slate or schist which is well mineralized over a width of about three feet. The wall rock is in part silicified and slightly carbonated, and carries abundant pyrite and fine needles of arsenopyrite.

Two of the Taylor holes were drilled north and northwest to intersect these veins. Five of the Hubert Balboa Mines, Limited, holes were drilled south to intersect the veins. Only low gold values were obtained from this latter drilling.

A persistent vein has been exposed in several pits on the outcrops directly north of the camp. This vein is slightly south of the direct extension of the veins previously described, but a diabase dike occupies a fracture between the two exposures. The vein is located in a shear zone about five feet wide along a flow

¹J. E. Hawley, *Ogden, Bristol and Carscallen Townships*, Ont. Dept. Mines, Vol. XXXV, 1926, pt. 6, p. 31. [Hubert property.]

contact. A diorite dike, less than 1 foot wide, has been intruded along the shear. The zone of white quartz is about 12 inches wide near the east edge of the outcrop and becomes narrower towards the west. A little pyrite and native gold are contained in the quartz.

Claim P.8518

The most northerly outcrop has a shear zone along its south edge. A feldspar porphyry dike, six feet wide, has intruded this zone on the west side of the diabase dike. Several pits have been sunk in the zone and along the porphyry contact. The rubble from these pits contains rusty quartz stringers.

A quartz vein with a little disseminated pyrite is located 400 feet farther south on both sides of the diabase dike. At one point this vein is 8 feet wide; a pit, 9 feet deep, has been excavated in it. A shear zone, parallel to the two veins described above, contains a quartz vein near the west side of the outcrop.

Claim P.8786

A quartz vein, 3–4 feet wide, is exposed along the north side of a ridge of bedrock and is located 450 feet south of the northern claim boundary and east of the diabase dike. A pit has been sunk on the vein that appears to be poorly mineralized white quartz. A similar quartz vein occurs 400 feet southwest of the above showing, on the west side of the diabase dikes. This vein is exposed for a length of 50 feet and is 1–2 feet wide.

6. Empire Gold Mines, Limited¹

HISTORY AND OWNERSHIP

Empire Gold Mines, Limited, holds a group of eleven patented claims, located north and east of milepost II on the west boundary of the township. D. A. MacKenzie staked claims P.18514 and P.18556 in 1932 and 1933, respectively. Empire Gold Mines, Limited, acquired these two claims and staked the remaining claims of the property (P.21772–79, P.26067). The company was incorporated in 1923 and is controlled by Paymaster Consolidated Mines, Limited.

DESCRIPTION OF DEPOSIT

The showing is located on claim P.18556. The country rocks are poorly pillowed andesite, which is cut by a diabase dike. In the northeastern part of the outcrop area the vein is exposed for 75 feet and strikes N.80°E. The mineral constituents are quartz and carbonate, with a little pyrite and chalcopyrite. Visible gold has been reported in the vein.

7. Enrich Mines (1945), Limited

Claims P.18749–51, P.19564, P.21980, and P.21981 were staked by Frank Wallingford. In 1941 these claims were transferred to W. R. Salter, who represented Enrich Mines (1945), Limited. Claim P.18751 was a restaking of claim P.9649, which had been held by S. B. Scobell. Hawley² has described this claim as follows:

In the centre of this claim a large mass of quartz, 85 by 50 feet, occurs in Keewatin greenstones derived from fragmentals and ellipsoidal lavas. The quartz is largely glassy and contains some sericite. There has been little mineralization in the vein material.

¹Reference: J. E. Hawley, *op. cit.*, p. 32. [Toner property].

²J. E. Hawley, *op. cit.*, p. 32. [Scobell property.]

8. Foley-O'Brien, Limited¹

The Foley-O'Brien property consisted of eighteen surveyed claims² (P.15462-79) located to the east of Bristol (Wright) Lake. The claims are covered by overburden and are on the eastern side of the outcrop areas of quartz-feldspar porphyry. Seven drill-holes, with a combined footage of 6,433 feet, were put down to investigate the bedrock. A considerable amount of the drilling was in diabase since the location of the dikes was unknown. Narrow quartz veins and some pyrite mineralization were intersected in the holes, but gold values were very low. A seam was encountered at 295 feet in hole No. 4 from which sand flowed into the hole. This sand assayed 0.14 ounces of gold per ton.

In 1939, Ventures, Limited, held an option on the adjoining Thomas Wright property and restaked the claims formerly held by Foley-O'Brien, Limited. A magnetic survey and an electrical survey of the property were made. Ventures drill-hole No. 8 was collared north of the claim line and drilled southward into claim P.15462 to check the Foley-O'Brien drill-hole No. 4.

9. Harry Goldstein

Harry Goldstein staked claim P.11388 in 1925. Hawley³ has described the property as follows:

On claim P.11,388 in a belt of schistose Keewatin greenstones, several quartz-calcite veins occur as drag folds. Quartz and calcite also impregnate the schist in fine stringers. The veins carry pyrite and galena in small amounts. The larger veins, which are lenticular, are sometimes six inches in width. Near them is a small dacitic dike cutting the schist. It contains eyes of quartz, with plagioclase feldspars, oligoclase andesine, zoisite, epidote, and iron oxides, and is probably of pre-Algonian age. During the summer of 1925, the property was prospected by trenching.

10. Frank Hendrickson

Claims P.8466-68 were staked by Frank Hendrickson in 1921 and patented in 1927.

Hawley⁴ gives the following description:

On these claims, sericitic and chloritic schists, similar in every respect to those of the McKinley claims, contain several small quartz veins in which sulphides and some native gold occur. The veins are of drag-fold shape, but pitch more steeply westward than those to the east. A shaft was sunk on claim P.8,468 in more massive Keewatin greenstone, in which a few narrow quartz stringers with sulphides are present.

11. Hoyle Mining Company, Limited⁵

Hoyle Mining Company, Limited, held a group of sixteen claims located northeast of Bristol (Wright) Lake. The northwest corner of the group included surveyed claims P.9203 and P.9204; and surveyed claims P.15468 and P.15471 along the southern boundary. There are no exposures of bedrock within the claims. One hole was collared in claim P.15468 and drilled northward for 1,195 feet. A continuous section of 730 feet of porphyry was intersected in this drill-hole. Assays shown on the drilling section gave very low values in gold.

¹Reference: R. C. Bryden, *Surface Plan and Diamond-Drill Logs, 1928-29*, Ont. Dept. Mines, Timmins, File No. T-552.

Reference: H. Lundberg, *Geological Plan, Geophysical Plan, and Diamond-Drill Logs*, Ont. Dept. Mines, Timmins, File No. T-137.

²Of these claims two later belonged to Hoyle Mining Co., Ltd., and three to Trident Porcupine Mines, Ltd.

³J. E. Hawley, *op. cit.*, p. 32.

⁴J. E. Hawley, *op. cit.*, p. 31.

⁵Reference: *Surface Plan and Diamond-Drill Hole Section, 1945*, Ont. Dept. Mines, Timmins, File No. T.129.

12. A. R. Hubert

(See Mineral Estates, Limited)

13. P. A. Kindree¹

In 1925, Wright Development Company, Limited, obtained by transfer claims P.8483 and P.10786. Hawley² reported as follows:

On the line dividing these claims is a small outcrop of schistose, quartz-feldspar porphyry which shows no certain evidence of volcanic origin, yet differs considerably from less schistose Algonian porphyry, in its higher content of ferromagnesian constituents. It resembles greatly rhyolitic porphyries of Keewatin age which are infolded with greenstones to the north and east.

Quartz veins fill fractures in the rock and cut across the schist, irregularly replacing it. Both schist and quartz carry sulphides, and gold has been reported.

P. A. Kindree acquired by restaking a group of nine surveyed claims in the western part of Bristol township; P.8481-83, P.9151, P.9327, P.9328, P.10785, P.10786, and P.11862; this group includes the two claims formerly held by Wright Development Company, Limited. These claims straddle the rhyolite-andesite contact, but only a few scattered outcrops of rhyolite and diabase are known on the property. In the northeast corner of claim P.8481 large trenches have been excavated across the rhyolite-d diabase contact and into the overburden on the northeast edge of the outcrop. Two drill-holes were put down on claim P.8483. These holes were laid out to intersect the rhyolite-andesite contact. As they were located too far to the south, all the rocks obtained in the drill core were andesite. There is no record of the assays obtained in these drill-holes.

14. J. B. McClinton³

A group of previously surveyed claims, P.18947, P.18946, and P.18945, was acquired by re-staking them as P.32083-85, respectively. The west end of a stock of quartz-feldspar porphyry is believed to underlie most of the property. One hole was drilled due south at a dip of 60 degrees, from the No. 1 post of P.18945. This hole encountered porphyry throughout its length except for a 10-foot inclusion of country rock. The drill core contained a few quartz-carbonate stringers and thin seams of pyrite and chalcopyrite. The McClinton group has now been reduced to claim P.18946 (P.32084).

15. D. J. McDonell

Two claims, P.1243 and P.1410, were staked by D. J. McDonell in 1910 and patented in 1916. Hawley⁴ has described the occurrence as follows:

To the south of McDonell lake lies a large outcrop of schistose Keewatin rhyolite in which quartz eyes are abundant. Small quartz veins appear on claim P.1,243 and are accompanied by a slight mineralization. A shaft was sunk on these some years ago, but has long since been abandoned.

16. Frank McKinley and D. J. Molesky⁵

HISTORY AND OWNERSHIP

Claims P.8404-6 were staked in 1921 and patented in 1927. They are held jointly by Frank McKinley and D. J. Molesky.

¹Reference: J. E. Hawley, *Ogden, Bristol and Carscallen Townships*, Ont. Dept. Mines, Vol. XXXV, 1926, pt. 6, p. 32. [Wright property.]

Reference: L. Whitman, *Surface Plan and Diamond Drill Logs, 1947*, Ont. Dept. Mines, Timmins, File No. T-551.

²J. E. Hawley, *op. cit.*, p. 32.

³Reference: N. Hogg, *Diamond-Drill Log, 1951*, Ont. Dept. Mines, Timmins, File No. T-300.

⁴J. E. Hawley, *Ogden, Bristol and Carscallen Townships*, Ont. Dept. Mines, Vol. XXXV, 1926, pt. 6, p. 32.

⁵Reference: J. E. Hawley, *op. cit.*, p. 31.

DEVELOPMENT

In 1926, Foley-O'Brien, Limited, drilled three holes on claim P.8405. Two of the drill-holes are located on the outcrop on the eastern part of the claim. Another hole was drilled from north to south and was reported to have intersected diabase.

GEOLOGY

The rocks are sheared andesite, which is fairly well carbonatized on claim P.8405. The shearing strikes N.70°E. and dips vertically or steeply south. Three north-south diabase dikes cross the claims.

DESCRIPTION OF DEPOSIT

The veins are drag-folded, lenticular structures and plunge 30°-45°SW. The maximum width of the veins is 4 inches, and they are generally less than 10 feet long.

Hawley¹ has described the veins as follows:

Associated with the quartz in the veins are carbonates, tourmaline, and a dull-green, chloritic mineral. Pyrite, chalcopyrite, and native gold occur in the veins and mineralized wall rock. Assays have been made of channel samples across the mineralized schist, and show a wide range of values going as high as \$17 [0.82 ounces] per ton per foot in gold.

17. Milroy-Wilson-Harris-Paul Group²

A. Milroy, W. B. Wilson, T. W. Harris, and F. L. Paul staked a group of six claims in 1911.

The southwest corner of this claim group was milepost IV on the south boundary of Bristol township. Three of the claims had, as their southern boundary, the Bristol-Carscallen townships boundary, and another three claims were located immediately to the north. These claims covered the southeastern part of the monzonite intrusive and some outcrops of argillite. Part of the area is now claims P.18914, and P.18915, held by Mrs. G. Minthorn, and claim P.19678, held by F. Wallingford.

The assay report gives the following information:

Sample No.	Type	Strike of Vein	Width	Gold Assay
			feet	ounces per ton
1.....	Quartz vein	Northwest	5	nil
2.....	Quartz vein	Northeast	8	0.001
3.....	Quartz vein	Northwest	0.001
4.....	Quartz vein	East	2	0.002

18. Minedel Mines, Limited³

Minedel Mines, Limited, acquired these claims from Manitoba and Eastern Company. The property consists of eight patented claims (P.24754, P.24755, P.25094, P.25618-20, P.26428, P.26429). No outcrops occur on the property, but it is believed to be underlain by sediments and diabase dikes. The Bristol fault crosses the northern part of the claim group. One hole was drilled on the west boundary of claims P.26428 and P.24754. The core is stored at the drill site.

¹J. E. Hawley, *op. cit.*, p. 31.

²Reference: *Sketch Plan, Milroy-Wilson-Harris-Paul Group, on the south boundary of Bristol Township, Porcupine Mining Division, 1911*, Ont. Dept. Mines, Timmins, File T-285.

³Reference: C. Erickson, *Diamond-Drilling Section, 1944*, Ont. Dept. Mines, Timmins, File No. T-559.

The rocks in the diamond-drill core were all argillites, which range from thin-bedded to thick-bedded. One top determination was made, but it is uncertain as to how the core should be oriented in the drill-hole.

Just southwest of this property, Minedel Mines, Limited, holds a second group of seven patented claims, P.23965, P.23978, P.24807, P.24808, P.24849, P.24850, and P.27010.

19. Mineral Estates, Limited¹

LOCATION AND HISTORY

Mineral Estates, Limited, held, by staking, a group of 29 claims in the north-eastern part of Bristol township. This claim group, and two additional claims held by A. R. Hubert, extended for 2 miles west and more than a mile south of the township corner.

In 1931 these 31 claims were optioned by Toburn Gold Mines, Limited, who contracted for geological, magnetic, and electrical surveys of the property. Two diamond-drill holes were then put down to investigate two of the anomalies outlined by the geophysical surveys.

GEOLOGY

Most of the property is covered by spruce, cedar, and alder swamp and some small boulder ridges. One outcrop occurs in, and adjacent to, Waterhen Creek, on the claims optioned from Hubert. A ridge extends from claim P.9238 southward for $\frac{1}{2}$ mile. Bedrock is exposed at the north end and near the south end of this ridge, which elsewhere is mainly covered by boulders; there are some sandy areas at the north end of the ridge. The outcrops near Waterhen Creek are andesites, which are strongly sheared and chloritized. The northern outcrop on the ridge farther west is also a strongly sheared andesite. The larger outcrop farther south is less sheared and consists of andesite with a few poorly defined pillows and a little fragmental lava. Two diabase dikes are present on this outcrop.

On all these outcrops the shearing strikes northeast and dips vertically or steeply northwest. The few primary structures, such as pillow selvages and fragmental zones in the lava, have the same trend and dip.

GEOPHYSICAL SURVEYS

A magnetometer survey by Hans Lundberg, Limited, established the continuity of the diabase dikes and indicated a northeasterly trend for underlying volcanic rocks. The more westerly diabase dike on claims P.9238, P.9254, and farther south along the strike, has a magnetic relief of about 100 gammas. Other diabase dikes have a magnetic relief of up to 500 gammas.

The main andesite zone extends northeastward across these claims. Magnetic contours in the area underlain by andesite have a general range of from 50 gammas below the base level to 150 gammas above the base level. In one small area the magnetic intensity is 350 gammas above the base level. This strongly magnetic area may be due to magnetite in a lava flow or to diabase intruded along strike of the lavas.

In the northwestern part of the claim group the magnetic intensity falls to more than 100 gammas below the magnetic plotting level. In Lundberg's original report this was taken to indicate that the area was underlain by rhyolite or sediments. Diamond-drilling to the northeast along strike has encountered rhyolite.

¹Reference: J. E. Hawley, *op. cit.*, p. 33. [Hubert property.]

Reference: H. Lundberg, *Report on Geophysical Survey, Mineral Estates Claims, Ogden and Bristol Townships, Ontario, 1939*, Ont. Dept. Mines, Timmins, File No. T-88.

Reference: *Diamond-Drill Logs and Sections*, Ont. Dept. Mines, Timmins, File No. T-88.

A number of zones of relatively higher electrical conductivity were located by Lundberg who used a ratiograph instrument. These zones conform to the regional strike and are thought to indicate graphitic schist zones or slate beds. Strong and persistent zones of electrical conductivity are taken to indicate the north and south contacts of the andesite with the adjacent sediments or rhyolite.

DEVELOPMENT

The property has been explored on surface by trenches and pits. There are a few outcrop areas within the claim group. Two diamond-drill holes supplement the information.

One hole was drilled to intersect a zone of strong conductivity. This hole, 764 feet in length, was collared in Godfrey township and drilled southeastward into Bristol township. The rocks intersected in the drill-hole were rhyolite, rhyolitic agglomerate and tuff, and slaty graphitic tuff and argillite. The zone of argillite and well-bedded graphitic tuff corresponds to the zone of higher conductivity.

A second drill-hole was located 500 feet west of Waterhen Creek and drilled southeastward for a total length of 796 feet. The drill-hole intersected a zone of weak electrical conductivity that passes south of the outcrop area. The rock encountered in the drill-hole consisted mainly of andesite with some porphyritic andesite. Vertically beneath the zone of conductivity there are three beds of black, graphitic tuff, with a combined thickness of 120 feet, and one zone of carbonatized lava 34 feet wide. Narrow sections of andesite separate the tuff beds.

DESCRIPTION OF DEPOSIT

At the southwest end of the outcrop west of Waterhen Creek a quartz vein has been exposed by trenching. This vein is up to 6 inches wide, dips steeply, and cuts across the schistosity. The smoky-grey quartz carries a little pyrite and chalcopyrite. The adjacent wall rock is weakly pyritized.

Another vein occurs on the outcrop at the sharp bend in Waterhen Creek. This vein is up to 8 inches wide and strikes and dips parallel to the schistosity. The vein material is fractured, smoky quartz, which contains a little sulphide.

A quartz vein is also found near the north end of the large outcrop located south of claim P.9254. This vein strikes east, dips vertically, and is exposed for a length of 50 feet. The narrow vein appears to be unmineralized.

No assays of surface outcrop samples are known to have been taken. According to file No. T-88 the highest assay obtained from samples taken from the drill core was 0.04 ounces of gold.

20. Mrs. G. Minthorn

(See Milroy-Wilson-Harris-Paul Group)

21. Patrick O'Shea Estate

The family of Patrick O'Shea hold a group of ten patented claims (P.26392-P.26400, P.26403). These claims were staked in 1939 and patented in 1948.

In 1946, Globe Diamond Drilling Company contracted for 570 feet of drilling. One hole was collared near the northeast corner of claim P.26392 and drilled southward under the outcrop. This hole is reported to have intersected a 12-inch quartz vein that assayed 0.17 ounces of gold.

Some pits have been put down on a quartz vein on the east side of claim P.26394. The vein is exposed for 100 feet and is about 1 foot wide. The extensions of this vein were intersected by two drill-holes. One hole was drilled southeast-

See back pocket for "Geological plan of part of the Rusk Porcupine Mines property".

ward, and the other northward. The vein carries a little pyrite, but no assays for gold were available to the author.

22. Penrose Gold Mines, Limited¹

In September, 1945, Penrose Gold Mines, Limited, acquired 26 claims from J. B. O'Neill and 3 claims from A. Wetmore. These claims extended along the east boundary for $1\frac{1}{4}$ miles southward from milepost II and westward for $1\frac{1}{2}$ miles.

Two small outcrops of sediments are known to exist along the Tatachikapika (Redsucker) River within the claim group. At the southern outcrop the strike is northeast, and the dip is 70°SE .

A contract was let for a magnetometer survey of the property. The general magnetic intensity ranges from the level of the Bristol township magnetic base down to 100 gammas below this level. This is believed to indicate sediments. Five diabase dikes extend in a northerly direction across the claims and have a magnetic relief of 250–600 gammas above the magnetic base level.

An area, 4,000 feet long and 400–800 feet wide, has magnetic values of 100–250 gammas below the magnetic base level. This weakly magnetic zone trends $\text{N.}35^{\circ}\text{E}$ and is divided into three parts by diabase dikes. It may be underlain by a porphyry intrusive.

23. Rusk Porcupine Mines, Limited²

HISTORY AND OWNERSHIP

Rusk Porcupine Mines, Limited, holds a group of five patented claims (P.7371–75) situated on the south side of the Stanwell Oil and Gas Company, Limited, property. For some years they also held five additional unpatented claims, two of which were surveyed claims P.10922 and P.8396.

In 1916, V. Walsh staked claims P.7371–73, and J. Robinson staked claims P.7374 and P.7375. This group of five claims was transferred to R. W. F. Mines, Limited, in 1922, and was later acquired by Rusk Porcupine Mines, Limited. Claims P.10922 and P.8396 have recently been restaked by J. P. Boissoneault.

GEOLOGY

The claim group straddles the contact between the volcanics and sediments. Most of the volcanics are uniform andesite in which no primary structure can be recognized and are now partially sheared and chloritized. The sediments are poorly bedded argillite.

A lenticular pyroxenite sill occupies part of the sediments-volcanics contact zone, and farther southeast, a monzonite plug intrudes the sediments. Two diabase dikes strike north on claim P.10922. Parts of claims P.7373 and P.10922 contain andesite that is strongly magnetic. In some of the contact areas the volcanic and sedimentary rocks are strongly carbonatized.

DEVELOPMENT

The early development of the property was by pits and trenches; 18 holes, with a total footage of 6,500 feet, were drilled in 1942.

¹Reference: J. H. Low and N. B. Keevil, *Geomagnetic Contour Map with Geological Interpretation, 1943*, Ont. Dept. Mines, Timmins, File No. T-572.

²Reference: J. E. Hawley, *Ogden, Bristol and Carscallen Townships*, Ont. Dept. Mines, Vol. XXXV, 1926, pt. 6, p. 29.

Reference: E. M. Flynn, *Report on Rusk Porcupine Mines, Limited, 1941*, Ont. Dept. Mines, Timmins, File No. T-542.

DESCRIPTION OF DEPOSIT

Two showings are located on claim P.8396. Near the northwest corner a pit, about 4 feet square, has been blasted in an outcrop of carbonatized andesite. The following channel samples from the pit are reported by Flynn:

Sample No.	Length	Location	Gold Assay
	feet		ounces per ton
1.....	4.0	South side	0.71
2.....	2.5	Centre	0.43
3.....	3.0	North side	0.24

Drill holes Nos. 8 and 9, 50 feet apart, were drilled southward to pass near this showing; 10 drill-holes explored the zone for 900 feet to the southwest.

On the central part of the claim, a carbonatized argillite zone with narrow quartz stringers is adjacent to the pyroxenite contact. This rock has been almost completely replaced by reddish carbonate, which carries a little pyrite. The outcrop has been explored by a trench along strike. Hole No. 11 intersected this carbonatized zone 550 feet southwest of the outcrop.

Hawley¹ gives the following description of a showing:

... on claim P.7,372 and to the southwest, a schistose band of greenstone near the contact with Timiskaming sediments is heavily mineralized with sulphides. They are reported to carry some gold. The greenstones here are intruded by small stringers of red felsite, containing orthoclase, microcline, and quartz. Quartz stringers are abundant. The same belt of schists outcrops near the No. 3 post of claim P.9,587 [P.17773, Stanwell property].

Holes Nos. 13, 15, and 16 were drilled to explore the zone along strike. No assay results from any of the drill-holes were available to the author.

24. Spina Porcupine Mines, Limited²

HISTORY

This company holds a group of nine claims in central Bristol township. In 1911, A. Phillips staked claims P.4492 and P.4493, and P. Spina staked claims P.4530 and P.4531. P. Spina acquired the claims held by Phillips in 1918 and patented the four claims. A. McDonald staked claims P.26743-46 in 1939 and transferred them to Spina Porcupine Mines, Limited, in 1941. Claim P.26416 was staked for Spina Porcupine Mines, Limited, in 1941.

DEVELOPMENT

The early work consisted of stripping and trenching. Exploration of the property was by a magnetic survey and diamond-drilling. The seven drill-holes have a total length of 1,747 feet.

GEOLOGY

Most of the property is covered by swamp, with some areas of low sand hills. Bedrock is exposed on claim P.4493 and shows the country rocks to be argillite. The strike is N.75°E., and the dip is steeply north. Diabase forms the western part of the outcrop. Magnetometer work has shown that there are four diabase dikes on the northern part of the property and two diabase dikes on the southern part. The Bristol fault is believed to pass between the ends of these dikes.

¹J. E. Hawley, *op. cit.*, p. 29.

²Reference: J. E. Hawley, *op. cit.*, pp. 19, 21.

DESCRIPTION OF THE DEPOSIT

The showing on claim P.4493 is a quartz vein exposed for a length of 30 feet. The quartz is mineralized with a little pyrite and arsenopyrite.

One drill-hole was located passing directly beneath the showing. Three other drill-holes, located at 100-foot intervals, explored the eastern extension of the vein zone. Vein material was intersected in each of the four drill-holes.

In an effort to obtain a cross-section of the projected strike of the Stanwell Oil and Gas, Limited, carbonate zone, drill-holes Nos. 1 and 2 were located along the west boundary of the property. At a vertical depth of 95 feet both these holes encountered large boulders and a sand layer under hydrostatic pressure. The sand flowed into the holes, and drilling was abandoned before reaching bedrock. Hole No. 3 was drilled southward on claim P.26744 and intersected argillite at 52-650 feet.

25. Stanwell Oil and Gas, Limited¹

HISTORY

Stanwell Oil and Gas holds a group of 10 patented claims: P.4039, P.4040, P.9392, P.9393, P.9580, P.9586, P.17773, and P.18390-92. T. McAuley staked claims P.4039 and P.4040 in May, 1911. These claims were patented in 1916 with one half interest being held by J. Brydgc, and the other half interest by the staker and his brother, J. L. McAuley. D. J. McCrea recorded claim P.9580 in 1922 and patented the claim in 1930.

A. E. Phillips staked claims P.9392 and P.9393 in 1923 and patented them in 1928. Claim P.17773 was patented in 1932 by A. E. Phillips who obtained the claim by transfer from D. J. McCrea. Phillips also staked claims P.18390-92, which were transferred to Orpit Mines, Limited, in 1940.

OWNERSHIP

Year	Company	Remarks
1937 . . .	Orpit Mines, Ltd.	Incorporated.
1938 . . .	Orpit Mines, Ltd.	Acquired McAuley-Brydgc property and eight adjacent claims.
1945 . . .	Piccadilly Porcupine Mines, Ltd.	Incorporated, acquired assets of Orpit Mines, Ltd.
1950 . . .	Piccadilly Petroleum, Ltd.	Acquired assets of Piccadilly Porcupine Mines, Ltd.
1951 . . .	Redwater Petroleum, Ltd.	Acquired assets of Piccadilly Petroleum, Ltd.
1953 . . .	Stanwell Oil and Gas, Ltd.	Acquired assets of Redwater Piccadilly Petroleums, Ltd.

DEVELOPMENT

The earliest work consisted of trenching and the sinking of two shallow shafts. Some 25,000 feet of diamond-drilling was done by Orpit Mines, Limited. Additional drilling was done by Piccadilly Porcupine Mines, Limited, in 1946. Some 87 drill-holes have been completed. The 60 holes for which drilling records are available have a total length of 41,350 feet. Most of the drilling was done on the main ore zone.

¹A. G. Burrows, *The Porcupine Gold Area, (Second Report)* Ont. Bur. Mines, Vol. XXI, 1912, pt. 1, p. 205.

A. G. Burrows, *The Porcupine Gold Area, (Third Report)* Ont. Bur. Mines, Vol. XXIV, 1915, pt. 3, p. 36.

J. E. Hawley, *op. cit.*, p. 29.

GEOLOGY

The country rocks on the property are andesites that are overlain by argillite. On claim P.4040 the andesite does not show any primary structures such as pillows or fragmental lavas. These rocks are now partially chloritized and carbonatized and, on some outcrops, are rusty on the weathered surface. On a few outcrops the sediments are well-bedded argillite. In diamond-drill core the argillite consists of thin-bedded sections alternating with more uniform, thick-bedded sections.

Pyroxenite and diabase are the intrusive rock types. A pyroxenite dike, which outcrops south of the shafts, is known to have a length of 500 feet and a width of 30 feet. Magnetic traverses showed that the dike does not persist along strike. The dike dips N.80°, which is steeper than the sediments-volcanics contact. Another pyroxenite body lies between the sedimentary and volcanic rocks on claim P.17773.

Three diabase dikes are exposed in, and near, the mineralized zone. Other dikes are known from geological mapping and geophysics. These dikes cut all the earlier rocks including the pyroxenite.

STRUCTURE

An anticlinal axis is located about 200 feet south of the showing and strikes a little north of east. The nose of this anticline is partly exposed near the central part of claim P.4039. The plunge of some drag folds and lineation is eastward, but on other similar structures it is westward. Drilling has shown that the north limb of the anticline dips N.60°, and that the southwest limb dips steeply southeast. In some of the drill-holes, top determinations can be made in the argillite by using graded bedding. Changes of dip can also be seen. These structures show that minor folds are present in the argillite.

The Bristol fault is located north of the mineralized zone and is approximately parallel to the anticlinal axis here. The fault is a major structure, which has been traced for several miles because of the discontinuity of the diabase dikes. Drilling in Carscallen township has intersected this fault and has shown that the dip is N.60°. The rocks in the fault are carbonatized, sericite schist.

DESCRIPTION OF DEPOSIT

One of the shafts is on claim P.4039; it was sunk on a quartz vein enclosed in argillite. The vein is about 1 foot wide and dips steeply north. This vein does not extend east of the shaft, but a quartz vein 2 feet wide is exposed 160 feet farther west along strike. The vein appears to be poorly mineralized, and no assays are available.

The shaft on claim P.4040 is located on the surface exposure of the main mineralized zone. Immediately east of the shaft, a shallow, irregular pit has been excavated along strike.

The rocks are strongly carbonatized along the contact between the andesite and the argillite. At the shaft the strong carbonatization is within the argillite, but near the nose of the anticline the andesite is strongly carbonatized. In some drill-holes the carbonatized rocks separate the andesite from the argillite. The amount of introduced carbonate, as well as the exact stratigraphic location, varies from place to place along the contact.

Near the shaft the carbonatized zone strikes east and dips N.60°. After passing the anticlinal axis, the contact swings southwest and is thought to dip steeply southeast. The east end of the strongly carbonatized zone in argillite

See back pocket for "Geological plan of part of the Stanwell Oil and Gas property".

extends down the dip from the surface outcrop to the 600-foot level. The west end of the zone rakes west. At 400 feet below the surface it is 500 feet west of the shaft, and at 600 feet below it is 650 feet west of the shaft. At the 600-foot level the carbonatized zone extends up to the large diabase dike. Three holes have been drilled on a section line west of this dike. The rocks in the drill core are partially carbonatized with narrow, parallel, carbonate stringers. No positive identification could be made, but the rock is thought to be altered andesite.

The mineralized zone consists of quartz-carbonate material in altered argillite. The zone has a width of 60 feet on surface, and this width has been maintained where it has been intersected down dip. The gold values are associated with quartz stringers in carbonate, particularly where there are inclusions of dark siliceous material. Pyrite occurs in these inclusions and small amounts of visible gold are fairly common. Arsenopyrite was found on the surface exposure, but only a small amount has been identified in drill core.

Drilling has been completed to the point where little new information can be gained above the 600-foot level. With the present information, grade and continuity are still a problem, and underground operations are required to clarify the picture.

26. Thomas Toner and P. J. McCormick

P. J. McCormick staked claims P.8508 and P.8511 in 1921. A half interest was transferred to Thomas Toner.

Hawley¹ gives the following description:

In a greenish-grey, rusty-weathering schist, partly sericitic and partly chloritic in composition, there are several veins ranging in width from two to six inches, striking N.68° E., and dipping steeply north. These are often closely spaced. Associated with the quartz is tourmaline in fine radiating needles. The schist is mineralized with sulphides of iron and copper, but no native gold has yet been found. The belt lies on the strike of the McKinley schist zone, to which it appears to be closely related. No intrusive rocks of Algonian age occur nearby.

27. Trident Porcupine Gold Mines, Limited²

R. MacDonald restaked surveyed claims P.15477-79 as claims P.28612-14 in 1943. Trident Porcupine Gold Mines, Limited, obtained the claims by transfer in 1947 and that year contracted for a magnetometer survey of the property.

No outcrops are known on the claims, which are covered with spruce swamp and sand ridges. The magnetic survey showed a uniform pattern of low magnetic readings, except for the areas underlain by diabase. The country rocks are considered to be sediments, which strike N.60°E. All the diabase dikes end against the Bristol fault, which is 200-300 feet wide and strikes east.

28. F. Wallingford

(See Milroy-Wilson-Harris-Paul Group)

29. Thomas Wright³

HISTORY

Thomas Wright staked claims P.8537-39 in 1921. He patented these three claims as well as three additional claims, P.17634, P.17784, and P.17785. An additional five claims were acquired by staking to form a group of eleven claims

¹J. E. Hawley, *op. cit.*, pp. 31, 32.

²Reference: T. Koulomzine, *Report on the Magnetometer Survey of the Property of Trident Porcupine Gold Mines Limited, Bristol Township, District of Cochrane, 1947*, Ont. Dept. Mines, Timmins, File No. T-169.

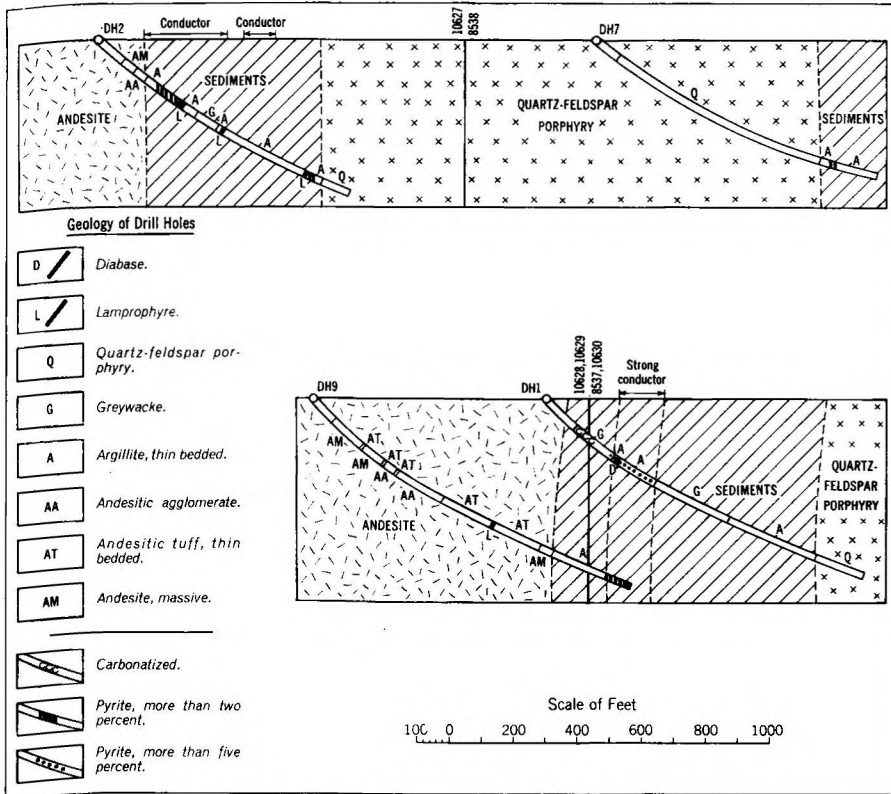
³Reference: J. E. Hawley, *op. cit.*, p. 29.

Reference: *Surface Geological Plan and Diamond-Drill Logs*, Ont. Dept. Mines, Timmins, File No. T-137.

surrounding Bristol (Wright) Lake. In 1939 this group of claims was optioned to Ventures, Limited. Part of this area is now held as patented claim P.27419 by the J. E. H. Chateauvert estate.

DEVELOPMENT

Large pits along the strike of the veins and shear zones were blasted by Thomas Wright. Ventures contracted with H. Lundberg to make a geological, magnetic, and electrical survey of the property. Eight drill-holes were then put down to test the mineralized or contact areas.



Composite vertical sections, Thomas Wright Property.

GEOLOGY

Most of the claims are overlain by sandy soil with lower areas covered by swamp, and by Bristol (Wright) Lake. Quartz-feldspar porphyry and diabase is exposed on, and near, claims P.8537 and P.8539. The northern contact of the porphyry intrusives was located by the magnetic survey since there was a distinct rise in magnetic intensity near these contacts. A few diabase dikes were also located magnetically although the larger dikes avoid the central part of the porphyry stocks. One zone of strong electrical conductivity extends northeast from the north end of Bristol (Wright) Lake.

Drilling has shown that the contact of the andesite and sediments is in the northern part of the claim group. An elongated porphyry stock, enclosed in sediments, lies mainly within this claim group. Another parallel stock, farther south, is partly within the group.

STRUCTURE

The general trend is N.55°E., and drilling has shown that the dip is nearly vertical. In two of the drill-holes, graded bedding shows that the tops of the beds face southeast. The porphyry intrusives are generally conformable with the strike and dip of the sediments. Shearing on the outcrop east of Bristol (Wright) Lake strikes S.80°E. and dips steeply north.

DESCRIPTION OF THE DEPOSIT

A report by Thomas Wright, president of Bristol Porcupine Gold Mining Syndicate, states:

The rock outcroppings on the syndicate claims are grey and red porphyries, in which there are three schistose zones with an east to west strike. In these zones are quartz veins up to five feet in width. Native gold can be seen over a length of one hundred feet in the No. 1 or South Vein, with pockets of pyrite and chalcopyrite, also a finely disseminated steel-gray mineral which is probably a telluride, as samples on assay have shown good results in gold and silver. A fifteen-foot pit has been sunk on this vein, and numerous samples showing native gold were found.

No. 2 vein, approximately one hundred feet north of No. 1 vein, is more consistent and has been exposed for a greater length by trenching and blasting than No. 1 vein, and in several cases, assay results were much better, grab samples running as high as \$74.00 in gold with 27 ozs. of silver, which would seem to substantiate the presence of tellurides "in the veins."

No. 3 vein is seventy-five feet north of No. 2 vein. It has not had as much work performed on it as the No. 1 and 2 veins but it is well sheared and gold may be panned in several places.¹

One hole was drilled northeastward to pass beneath the showings. The highest assay obtained in the drill-hole was 0.08 ounces of gold over a core length of 0.3 feet.

Drill-holes Nos. 1, 2, and 9 were drilled to intersect the zone of electrical conductivity. In drill-holes Nos. 1 and 9, the zone of strong conductivity corresponds to a band of graphitic slate, 130 feet thick, which contains 5-10 percent pyrite in blebs and lenses along the bedding planes. This pyritized zone is about 170 feet from the contact of the sediments and volcanics. The andesite near the contact has been partially carbonatized.

Drill-hole No. 2 intersected the same zone 1,900 feet northeast along strike. In this drill-hole, the zone of conductivity is weaker and corresponds to a wide band of graphitic slates lying between the porphyry intrusive and the andesite. Sections of the slate are mineralized with pyrite. The gold content of all the pyritized slates is low.

¹As quoted in, *Porcupine Mines Manual 1938-1939*, Northern Directory Company, Timmins, Ontario, pp. 43, 44.

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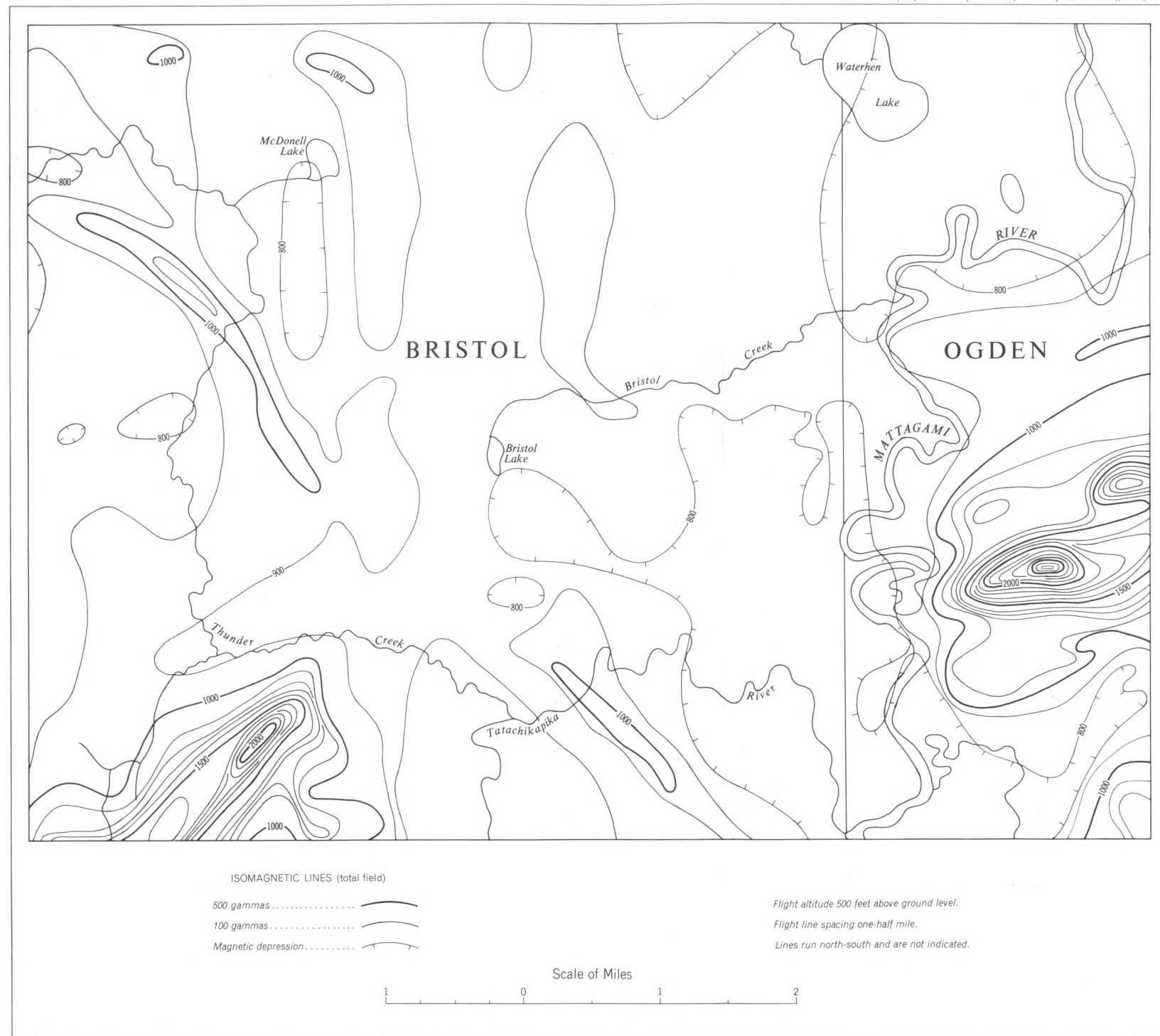
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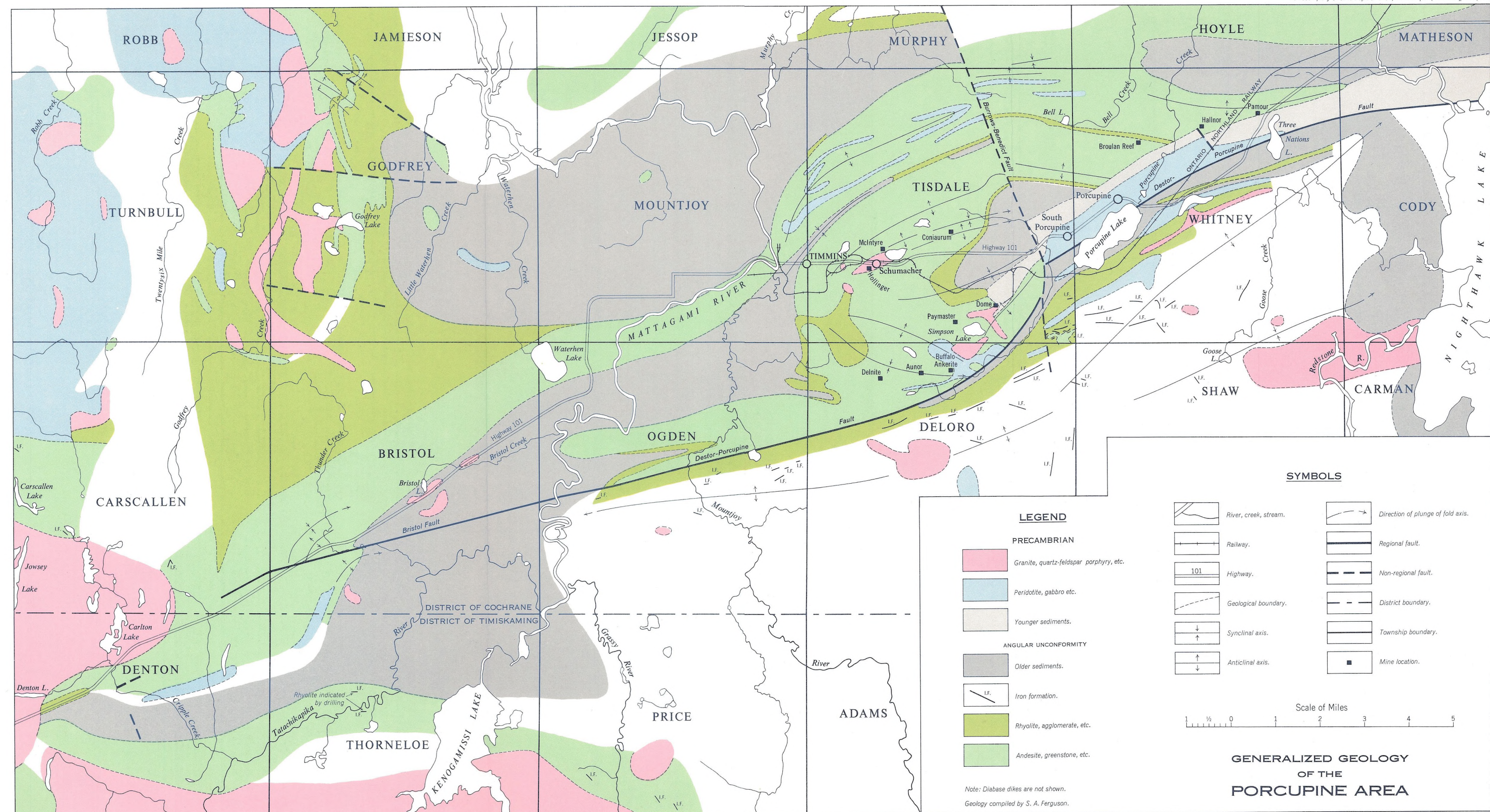
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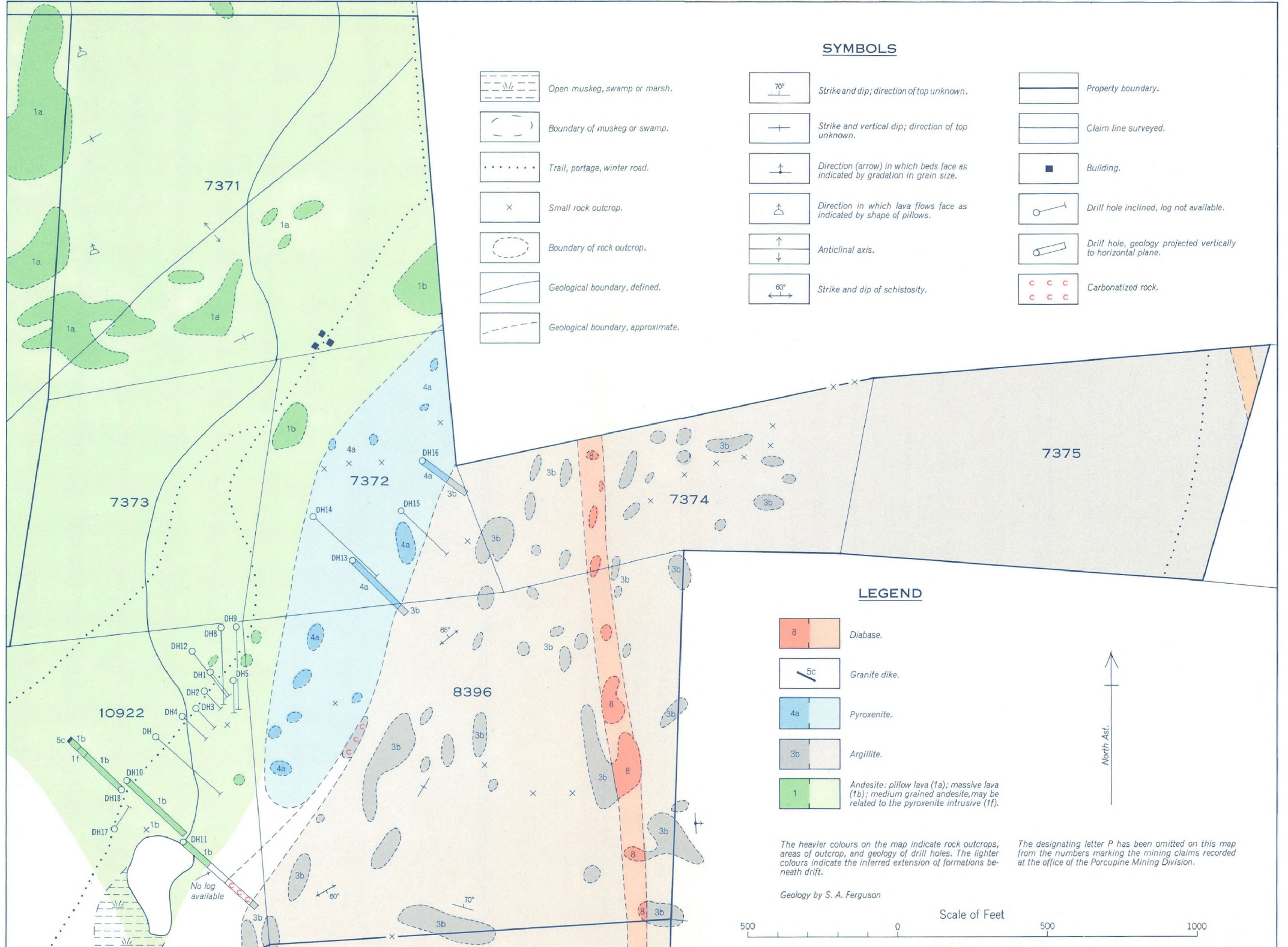
Frontispiece Vertical Air Photograph showing Sand Dunes and Pleistocene Sand Bar near the Southeast Corner of the Township



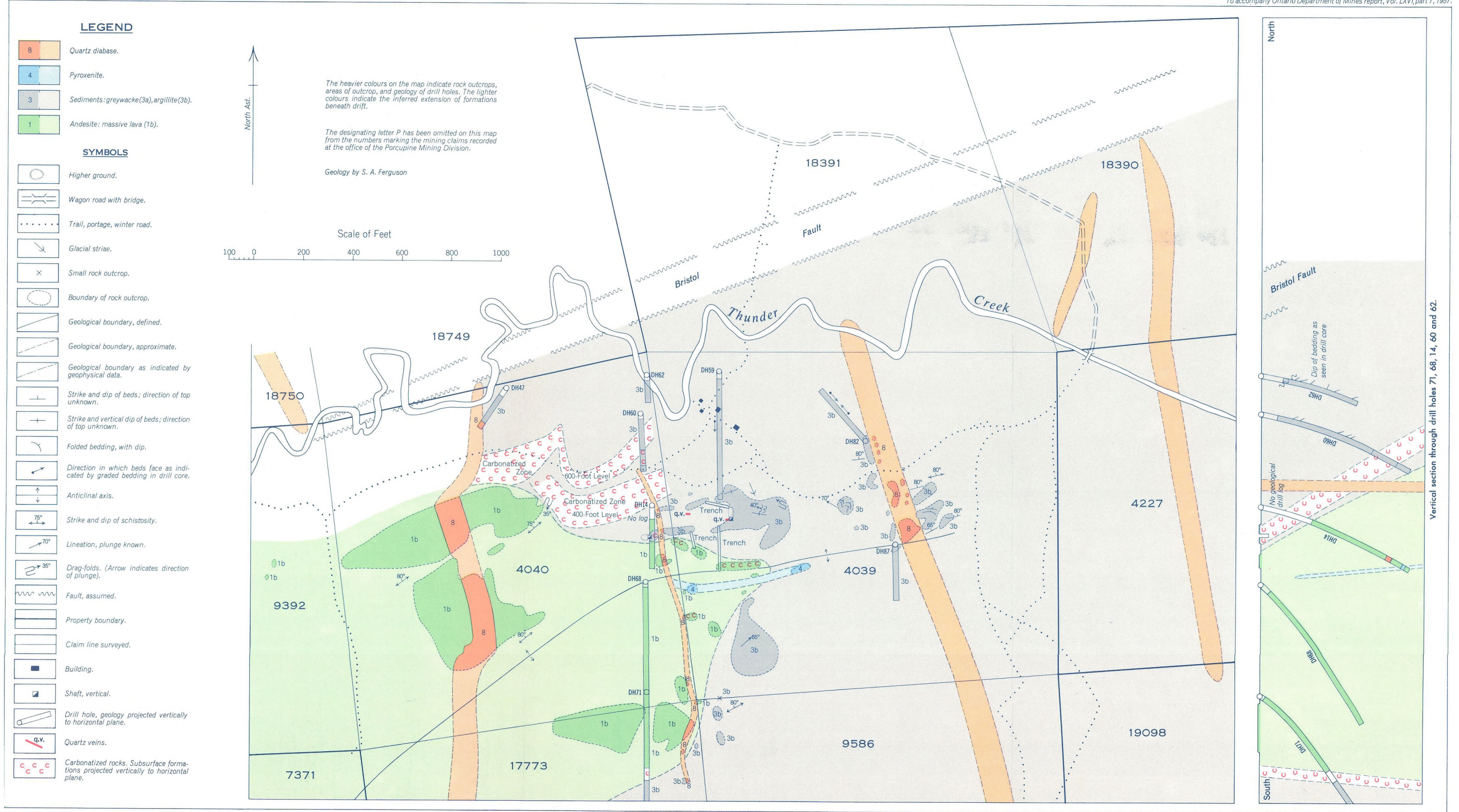
Aeromagnetic map of Bristol and part of Ogden townships, after Geological Survey of Canada geophysics papers 292G and 293G.



Generalized Geological map of the Porcupine Area



Geological plan of part of the Rusk Porcupine Mines property



Geological plan of part of the Stanwell Oil and Gas property together with a vertical section through drill holes 71, 68, 14, 60 and 62.