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PRELIMINARY REPORT

COPPER-NICKEL MINERAL  
OCCURRENCES IN PIGEON  
RIVER AREA, ONTARIO

BY

T. L. Tanton

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COOPER-NICKEL MINERAL OCCURRENCES IN PIGEON RIVER AREA, ONTARIO.

BY

T. L. TANTON

## COPPER-NICKEL MINERAL OCCURRENCES IN PIGEON RIVER AREA, ONTARIO.

By T. L. Tanton

Copper and nickel-bearing sulphides occur, as primary magmatic segregations in diabase and related rocks that intrude Animikie sediments, in an area extending 6 miles north from Pigeon river and from the west end of Pardee township easterly for 24 miles to Thompson island in lake Superior, Thunder Bay district, Ontario.

(1). The first discovery, so far as known, of this type of mineralization, was made on Mining Claim T.B. 3340 which is in the NE  $\frac{1}{4}$  of the SW  $\frac{1}{4}$ , lot 13, con. VIII, Pardee tp.

The property may be reached by a wagon road 2 miles long that branches north from the Scott highway,  $1\frac{1}{2}$  miles north-east from the International bridge over Pigeon river.

The property was staked about 1913 by the discoverer, the late John McCuaig of Port Arthur; it is now owned by his heirs, for whom Miss M.E. McCuaig of Port Arthur is agent.

The claim is for the most part drift-covered. The only exposures of rock in place, that are known, are those revealed at the two mineralized localities subsequently described. Prominent exposures of diabasic intrusives occur within a mile northeast, northwest, and south of the claim. A dyke of diabase nearly  $\frac{1}{4}$  mile wide occurs about 2 miles south 70 degrees west from the claim, and the strike of this dyke as traced westerly for 3 miles is south 70 degrees west.

It is inferred that the claim is underlain by diabase and related rock in the form of one or more huge dykes.

The principal mineral showing on the property is at pit No. 1 near the middle of the claim. Here, adjacent to a natural outcrop a few feet in diameter, the rock has been exposed by stripping for about 200 square feet and a pit has been sunk to a depth of 10 feet.

The rock is massive, diabasic material of variable texture and composition, fresh-looking and unaltered, except for a film of surface weathering products that is rust-stained in blotchy, irregular-shaped areas over about a quarter of the total area. Approximately half of the exposed rock is medium- to

coarse-grained diabase that occurs in oval and irregular-shaped masses commonly from 6 inches to 2 feet in diameter. These masses merge, in some places gradually and in other places rather abruptly, into a finer grained phase of the rock richer in pyroxene, tentatively identified as norite, that fills in the spaces between and around the coarser grained diabase.

All phases of the rock, as exposed, are in places mineralized with sulphides. In the diabase grains of pyrite, pyrrhotite, pentlandite, and chalcopyrite, are commonly intergrown with each other, disseminated in the rock in the form of a primary crystallization, filling in the spaces between the rock-forming silicates. In the norite, the same sulphides occur in a similar manner, but also in places intergrowths of massive, fine-grained chalcopyrite, pyrrhotite and pentlandite in nodules or globules, up to 2 inches in maximum diameter, are distributed in seams having widths of a few inches and lengths of a few feet.

The mineralized parts of the rock occur as streaks or blotches and in general these mineralized parts may be traced gradationally into the unmineralized part of the rock. At some places, however, concentrations of sulphides with sharply defined boundaries and having areas a few inches or feet in maximum diameter were observed in the norite. It is estimated that about 10 per cent of the volume of rock on the pit dump is well mineralized.

A representative sample taken across 15 feet in the pit was assayed at the Mines Branch with the following result:

Silver	--	none
Gold	--	none
Nickel	--	0.34 per cent
Copper	--	0.62 per cent
Platinum	--	0.15 ounce Troy, per ton of 2000 pounds

Occurrence No. 2 is 80 feet north of pit No. 1. Here, in a partly caved trench, 20 feet by 6 feet, the rock surface is exposed over an area 6 feet by 6 feet. The surface is blotched with rust stains. The rock is a sulphide-bearing diabase apparently very similar to the rock in pit No. 1.

About 125 feet west of the above occurrences there is an escarpment, about 30 feet high, that faces west over a swampy lowland. At four places, within a distance of 600 feet along the crest of this escarpment, pits have been dug on showings of sulphide-bearing diabase similar to material exposed in pit No. 1. Now that the pits have been dug it is obvious that these showings were in

boulders up to several feet in diameter, that occur in the drift.

(2). In the northeast quarter of lot 11, con. VII, Pardee tp., a sill of diabase is exposed on a cliff. In the course of a traverse along this cliff an assistant collected a specimen of diabase containing sparsely disseminated grains of pyrrhotite and chalcopyrite. While returning to camp on this traverse he met Mr. Aho, a settler whose residence is about  $1\frac{3}{4}$  miles southwest of the above-mentioned occurrence, and from him obtained a specimen of sulphide-bearing diabase, said to have been collected from the same cliff (precise locality not known). The latter specimen consisted of fresh-looking massive diabase, and contained disseminated grains of chalcopyrite and pyrrhotite in about equal amounts making up about 5 per cent of the volume of the rock. When tested chemically the specimen yielded a positive reaction for nickel. No mineral development work has been done at the locality. So far as known the property is not privately owned.

(3). In 1935 Mr. M. Green of Hovland, Minnesota, reported an occurrence of sulphide-bearing diabase on Pigeon river west of the International bridge. In the bed of Pigeon river three-fifths mile upstream, northwesterly from the bridge, an assistant reported the occurrence of boulders of diabase carrying disseminated chalcopyrite and pyrrhotite. A specimen of the material gave a positive reaction for nickel. At this locality it is inferred that a dyke of diabase, 500 feet wide striking northeast, crosses Pigeon river. The dyke is exposed on the west or Minnesota side of the river for 200 feet in a cliff about 10 feet high, but the bedrock is concealed by drift on the Ontario side. There is no reference in literature so far as known to sulphide-bearing diabase in Minnesota in this vicinity. No mineral development work has been done on either side of the river. It is not known whether or not the land in Ontario adjacent to the occurrence is privately owned. The area is forested and with no habitation nearer than the International bridge.

(4). In 1935, Mr. Alf Cooper of Fort William stated that about 1914 he and his associates prospected for copper in Pardee township and that by trenching through drift finds were made of material similar in appearance to the McCuaig discovery. One or more mining claims were staked, but had been allowed to lapse. The precise locations of the occurrences were not reported and Mr. Cooper is of the opinion that due to soil slumping and forest growth over a period of years the showings uncovered would probably not be visible now.

(5). A blueprint of Pardee township that the writer obtained in 1923 shows mining claim T.B.3430 in lot 11, con. V, Pardee tp. This is marked Lalonde. From information supplied by Mr. Cooper

the writer infers that this claim was staked on account of an occurrence of sulphide-bearing diabase being found on or adjacent to it.

(6). Mr. B. Renshaw of Cloud Bay reports an occurrence on his property, lot 4B, Crooks township, of sulphides in diabase.

The occurrence is said to extend along the northern side of a dyke mapped by the Geological Survey as being about 400 feet wide and striking north 65 degrees east. The mineralized zone is said to be from 5 to 10 feet wide and discontinuously traceable for half a mile. The sulphide minerals identified in the rock are chalcopyrite, pyrrhotite, and pentlandite.

(7). Mr. B. Renshaw reports the occurrence of a sulphide-bearing zone in diabase on Naomi island which is near the west headland of Pine bay. This island is mapped as being underlain by a dyke of diabase and related rock about 400 feet wide and striking north 75 degrees east.

(8). Sulphide-bearing diabase occurs on the south side of the peninsula that forms the west headland of the entrance to Cloud bay. The property is owned by Mr. B. Renshaw of Cloud Bay. The peninsula is underlain by a dyke of diabase and related rocks that is about 500 feet wide and strikes north 65 degrees east. About 600 feet southwest from the extremity of the peninsula, on a cliff that rises from the lake vertically for about 5 feet, the rock is heavily rust-stained for 5 feet by 5 feet on the vertical surface and for 1 foot back from the edge of the cliff. Specimens taken from this rust-coated material consist chiefly of massive, coarsely crystalline pyrrhotite with which chalcopyrite is associated in small amount. Parts of specimens react for nickel; presumably pentlandite is intergrown with the pyrrhotite locally.

(9). Sulphide-bearing diabase occurs about 600 feet north-east of Tripp point, which is the east headland of Cloud bay. The property is owned by Captain Tripp.

The sulphides occur in a dyke of diabase and related rocks that is about 500 feet wide and strikes north 65 degrees east.

At a place about 20 feet northerly from the southern wall of the dyke there is on the rock surface a rust-coated area 3 feet wide and at least 6 feet long in a direction north 65 degrees east. Drift conceals the easterly extension of this area. Specimens taken from the rusty weathering material consist of fresh-looking diabase containing disseminated grains of pyrrhotite, and

in places intergrowths of pyrrhotite and chalcopyrite in grains ranging from  $1/20$  inch to  $1/2$  inch in diameter. A specimen gave a positive reaction for nickel. It is estimated that the sulphides make up about 5 per cent of the volume of the sulphide-bearing rock examined; pyrrhotite preponderates and the copper and nickel-bearing minerals, which are irregularly distributed, are in small amount.

Along the dyke easterly from the above-mentioned occurrence there are outcrops at 200 and 300 feet, respectively, from it where the rock surface is in places rust-coated. The westerly of these areas is 2 feet wide and 20 feet long in a direction north 65 degrees east and the easterly area is 6 inches by 6 inches. Pyrrhotite was the only metallic mineral identified in the small amount of rock that could be dislodged for examination at these places.

(10). On the shore of the southeast end of Victoria island an assistant reports the occurrence in diabase of a vein-like mass of sulphides 1 foot wide and traceable for 20 feet. The material consists of an intimate association of chalcopyrite, pyrrhotite, pentlandite, and pyrite. The rock for a few inches on either side of this mass is rust stained.

(11). Jarvis location is a block of land about 2 miles by 5 miles that lies adjacent to the shore of lake Superior. The property is traversed by a road that leads east from the Scott highway to the mouth of Jarvis river at lake Superior.

The property was taken up as a mineral location in 1846. It is now owned by Mr. E.A. Bell.

Prior to 1935 mineral development work had been done on veins of the silver-bearing type.

In August 1935 Mr. Bell's son, Earl, found sulphide-bearing diabase on the property. This occurrence was examined by an assistant. The owner subsequently prospected along dykes on the property and mineral occurrences were found in two of them.

Along the middle of the peninsula, south of Prince bay, which terminates in Jarvis point, there is a dyke traceable for  $1\frac{1}{2}$  miles, which is about 100 feet wide and strikes north 75 degrees east and dips vertically. The greater part of this dyke consists of "poicilitic diabase" (a variety of diabase that has mottled lustre) and relatively small masses within the dyke consist of related rocks of different textures and compositions, tentatively identified as diabase and norite.

Mineralized masses within the dyke occur as follows:

On the south side of the peninsula and about 125 feet west of the extremity of Jarvis point. Here, in September, 1935, a pit about 8 feet by 8 feet by 4 feet deep was opened up. The rock in the pit is diabase of various textures and is mottled and seamed with norite; this assemblage appears to form a platy mass, with gradational boundaries, within the main dyke of poicilitic diabase, striking north 65 degrees east and dipping vertically.

The middle zone, about 3 feet wide, of the 8-foot mass, is well mineralized; in it there is a preponderance of dark grey, medium-to fine-grained norite. Through the norite, seams from 1 inch to 4 inches wide occur at intervals of a foot and, for distances of at least a few feet, strike north 65 degrees east and dip vertically and with horizontal offshoots. These seams consist almost entirely of intergrown sulphides. Chalcopyrite makes up about half of the sulphide association; the other sulphides being pyrrhotite, pentlandite, and pyrite. A similar association of sulphides occurs in an irregular manner sparsely disseminated throughout some of the diabase and norite distributed over a width of at least 6 feet in the platy mass.

A representative sample taken across 8 feet is reported by Mr. Bell to have yielded, upon analysis, copper 3 per cent, nickel 1.5 per cent.

An extension of this platy mass of mineralized rock is traceable, by its rusty weathered surface, for 35 feet easterly to the shore of lake Superior. The westerly extension is concealed by drift.

About 700 feet, south 65 degrees west from the above-mentioned occurrence, about 40 feet in from the shore and 40 feet above the lake, in a pit 3 feet long, 2 feet wide, and 1 foot deep sunk through drift, rusty weathering, poicilitic diabase was exposed. Specimens show the rock to be sparsely mineralized with disseminated pyrrhotite and chalcopyrite. A specimen when tested gave a positive reaction for nickel.

About 200 feet, south 65 degrees west from the above occurrence, across a drift-covered area, there is an exposure 1 foot square of rusty weathering, porphyritic norite. Specimens show intergrowths of pyrrhotite and chalcopyrite disseminated as small grains through the rock and making up about 1 per cent of its volume. Nickel was not present in the material tested at this locality.



One mile south 65 degrees west from the last-mentioned occurrence is the westerly end of a dyke that rises as a bridge about 40 feet above the adjacent drift-covered lowland. Rusty weathering sulphide-bearing diabase was observed along the northerly facing slope of the dyke that strikes about north 65 degrees east, as follows: at the western termination an area 1 foot by 6 feet; 150 feet northeasterly from this, is an area 1 foot by 1 foot; 175 feet northeasterly from this is an area 8 feet by 2 feet; and 75 feet northeast of this is an area 1 foot by 2 feet. At each of these localities specimens were obtained showing pyrrhotite and chalcopyrite disseminated as a primary crystallization in the diabase. The proportion of the sulphides to the silicates in the rock varies within short distances at each locality. The amount of sulphides in specimens is about 1 per cent to about 10 per cent of the volume. Pyrrhotite was estimated to make up two-thirds or more of the sulphide association as observed. No positive reaction for nickel was obtained by the writer in the material tested at these several occurrences. Subsequently in September Mr. Bell reported that he had found nickel-bearing sulphides in the vicinity of the above-mentioned occurrences.

(12). In September Mr. E. A. Bell reported the discovery of segregations of copper and nickel sulphides at a locality  $2\frac{1}{2}$  miles east of the west extremity of the Jarvis location. The sulphides are in a dyke of poicilitic diabase, known to be at least 30 feet wide, that strikes north 45 degrees east and dips vertically.

(13). A geological map of part of Spar island, supplied in October, 1935, to the writer by R. Schurman of Montreal, who is the agent for the present owners, shows occurrences marked "charged with copper pyrites" in a diabase dyke at two localities:

A. is 320 feet northeast of the west end of the island. The area is 10 feet wide and extends northeasterly for 160 feet.

B. is 240 feet easterly from the west end of the island. The area is 8 feet wide and extends northeasterly for 60 feet.

In 1935 the writer noted occurrences of small grains of chalcopyrite sparsely disseminated through diabase in a chip specimen collected 160 feet east of the west end of the island. This is from the dyke in which the other occurrences were recorded.

(14). An assistant reports occurrences of sulphide-bearing diabase at three localities on Thompson island. It is not known to the writer if the island is privately owned.

On the south shore of the island about  $1\frac{1}{2}$  miles northeast from its western extremity a coarsely crystalline diabase dyke hundreds of feet wide is fractured in a zone 5 to 10 feet wide striking north 55 degrees east. The rock in this fractured zone is sparsely mineralized with disseminated pyrrhotite, chalcopyrite, and pentlandite.

On the south shore of the island about half a mile from its northeast extremity there is a mineralized area similar to that in the above-mentioned occurrence. The fracture planes at this locality, however, strike in a variety of different directions.

On the north shore of Thompson island about  $\frac{1}{2}$  mile northeast of its western extremity, is a small peninsula, on the tip of which an assistant reports the occurrence of diabase mineralized with pyrrhotite and chalcopyrite.

About 600 feet southeasterly from the above occurrence an assistant reports that on the side of a north-facing cliff of diabase the rock is mineralized with pyrrhotite and chalcopyrite.

At the foregoing localities, where dimensions have not been recorded, the information available indicates that the mineralized parts of the rock are within an area 60 feet square.

December 1935.

T.L.T.

