GENERAL CHARACTERISTICS OF THE DEPOSITS

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ABSTRACT

The ore deposits in the Cobalt-Gowganda region in Ontario occur in Huronian sedimentary rocks, Keewatin volcanic rocks and Nipissing diabase. Those in Huronian sediments are within 700 feet of the Nipissing diabase and are localized along the contact between the Huronian rocks and underlying Keewatin rocks. Those in Keewatin rocks occur within 500 feet of the Nipissing diabase and are localized along the contact between the Keewatin rocks and Nipissing diabase. The Nipissing diabase is in the form of local basin and dome structures and the ore deposits are located at specific positions with respect to these structures. Those above and in the upper part of the Nipissing diabase occur within the basin structures, and those below and in the lower part are under the dome structures. The deposits occur as veins in zones of intensely fractured rocks. Orebodies are localized in the veins by cross structures such as geological contacts, cross fissures and faults.

INTRODUCTION

The ore deposits in the Cobalt-Gowganda region in Ontario occur in various places around the periphery of a broad basin structure about 60 miles in diameter. They are located in South Lorrain township, Cobalt area, Casey township, Elk Lake area, Miller Lake area and Gowganda Lake area (Fig. 3). These deposits have been described by many authors, but the descriptions are detailed, and the general characteristics of the deposits are not readily apparent. In this paper the descriptions of the deposits are summarized from reports in the literature, and the characteristics are defined and reinterpreted. The descriptions are summarized from reports by Miller (1904, 1913), Bell (1906, 1907), Van Hise (1907), Barlow (1908), Hore (1908), Collins (1913), Reid (1918), Knight (1924), Burrows (1926), Campbell (1930), Boydell (1931), Moore (1956), Thomson (1957, 1960, 1961a-e, 1965 and 1967), Moore (1967), Ninacs (1967), Thorniley (1967), MacKean (1968), and Hester (1967).

GENERAL CHARACTERISTICS

The deposits occur as steeply dipping to vertical veins. The veins vary from several inches to 3,500 feet in length, several inches to 400 feet in vertical extent, and pinch and swell from hair-line thickness to 4 feet

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in width. Some are present as single veins and others as multiple ones that branch and join. They are generally grouped together into networks of parallel and inclined veins in confined areas, and are separated from other networks by zones of nearly barren rock. Each network contains one or more large veins and several smaller ones whose size decreases with distance from the large ones.

(The term "vein" as used in this report refers to the part of a fissure filled with mineral matter including calcite, quartz and ore minerals. The term "orebody" refers to the part of the vein that contains enough ore minerals to be mined at a profit. The term "vein group" refers to a cluster of veins in a confined area).

The veins occur in Nipissing diabase, or within about 700 feet of the diabase, in Huronian sedimentary rocks and Keewatin volcanic rocks. The diabase is present as one or more sheet-like bodies in the form of local basins and domes (or modified cone structures) several miles in diameter. In the vicinity of the ore-bearing areas, the diabase is about 1,000 feet thick.

Detailed Descriptions of Ore Deposits

South Lorrain township

About 1/30 of the silver produced in the Cobalt-Gowganda region was obtained from South Lorrain township. The deposits in South Lorrain township are located at the former townsite of Silver Centre about 3 miles west of Lake Timiskaming, and along Maidens Creek about 2 miles north of Silver Centre (Fig. 28). The Nipissing diabase in this area forms a

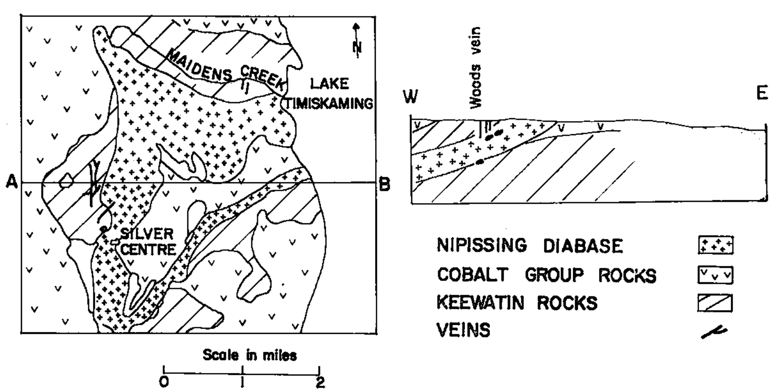


Fig. 28. Geological map and partial cross-section of the ore-bearing area along A-B, South Lorrain township.

dome structure, several miles across, and the deposits occur above the west flank and below the north flank of the dome. The deposits in the vicinity of the former townsite of Silver Centre are present as large and small veins in faults. Some parts of the veins are exactly within the faults, and other parts are up to several feet from the fault gouge. Most of these veins are in Keewatin rocks above diabase, but one highly productive vein, the Wettlaufer vein, was entirely in diabase. The orebodies in the veins are localized near the contact between the diabase and overlying Keewatin rocks, but some are 300 feet above the diabase and some extend for a short distance into the diabase. The largest vein in this area, the Wood's vein, contained several high-grade orebodies up to 100 feet in size, and a 25-foot-long high-grade orebody at the junction of the

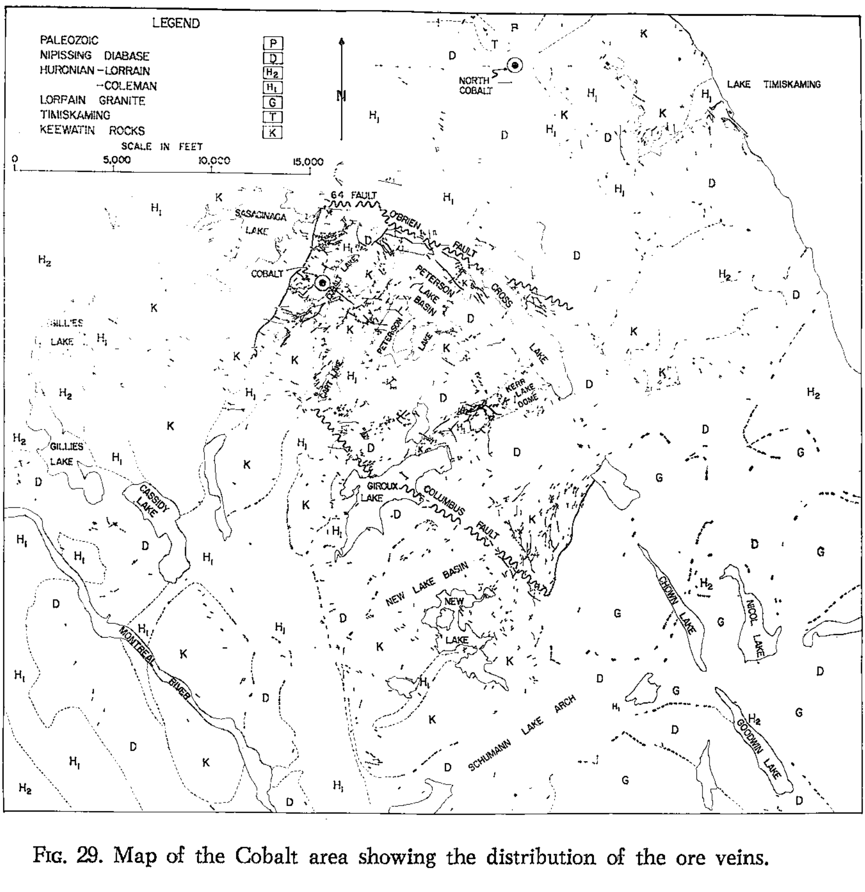


FIG. 29. Map of the Cobalt area showing the distribution of the ore veins.

Wood's and Watson veins. Some of the orebodies in the Wood's vein are intensely oxidized (Bell 1923). The parts of the vein between the orebodies consist of calcite, quartz, chlorite, and fault gouge. This vein has an average width of 3 to 12 inches, but in some places it pinches out completely and in other places it swells to about 4 feet. It is reported that in one place where the vein was 40 inches wide, it contained a width of 36 inches of high-grade silver ore (Knight 1924). Other veins in the Keewatin rocks contained orebodies up to 60 feet long, and ore pockets up to several feet long. Several small pockets of ore were also found in Keewatin rocks below the diabase (Boydell 1931).

The veins near Maidens Creek are small, and those found to date do not contain enough silver to be mined commercially. They occur in minor faults in Keewatin rocks below the Nipissing diabase, and contain small amounts of silver and of cobalt arsenides.

Cobalt area

The ore deposits in the Cobalt area are located in an area that is approximately bounded by the Columbus fault on the southwest, the No. 64 and O'Brien faults on the northeast, the body of Lorrain granite on the southeast, and the surface trace of the contact between Huronian sedimentary rocks and Keewatin volcanic rocks northwest of the townsite of Cobalt (Fig. 29). They can be grouped into those in and around the Peterson Lake basin, those along the crest of Kerr Lake dome, and those in the New Lake basin northeast of the Columbus fault. As shown in Figure 30, the ore deposits at the periphery of Peterson Lake basin and along the crest of Kerr Lake dome occur below the diabase, now eroded away, and within the lower part of the diabase. Those in the New Lake and Peterson Lake basins occur in Keewatin rocks above the diabase and in the upper portion of the diabase. For purposes of this report, the deposits in the Cobalt area will be geographically classified as those northwest of Cobalt Lake, those along the west side of Peterson Lake basin, those along the east side of Peterson Lake basin, those near Peterson Lake, along Kerr Lake dome, and those in the New Lake basin.

Northwest of Cobalt Lake. The deposits northwest of Cobalt Lake were so heavily mineralized that the largest amount of silver per cubic foot of rock in the Cobalt-Gowganda area was produced from this area. The deposits occur as veins in fissures, fractures, minor faults and major faults in sedimentary rocks of the Coleman Member, which is in the lower part of the Cobalt Group, Huronian system. The veins are present as

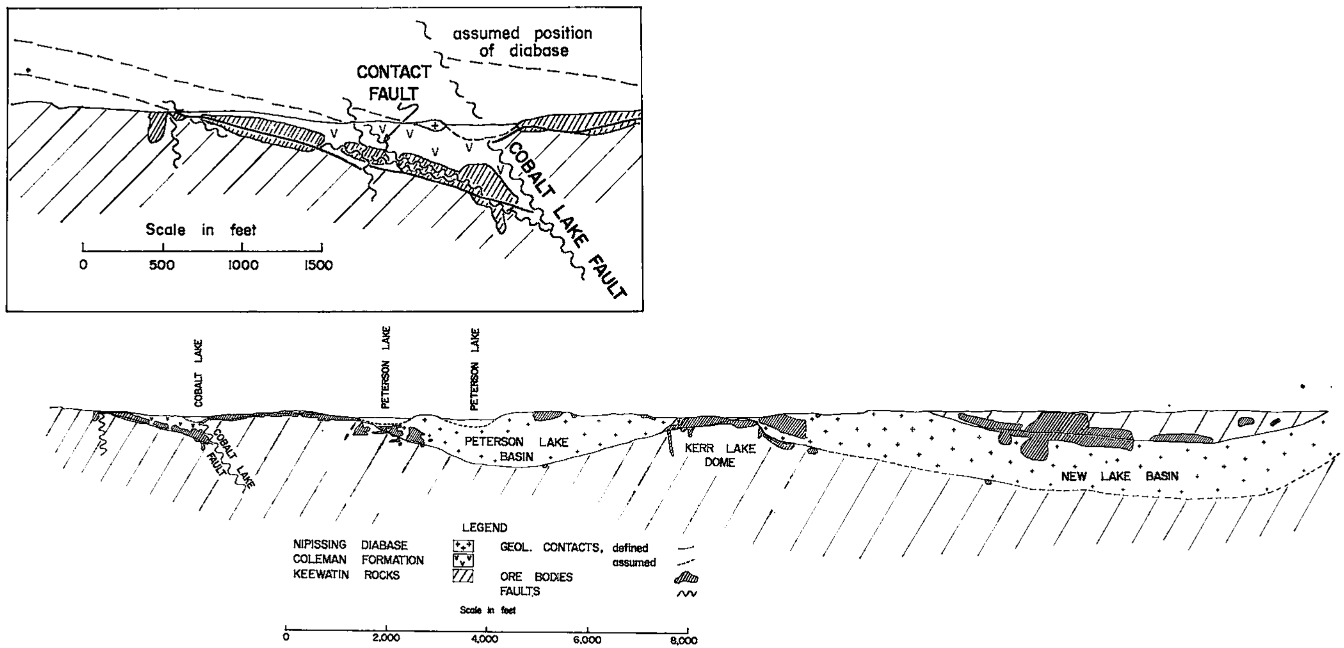


FIG. 30. Composite longitudinal section of the Cobalt area showing the positions of orebodies with respect to basins and domes formed by the Nipissing diabase. A large scale diagram of the northwest end of the section is included to show the characteristics of the deposits northwest of Cobalt Lake.

networks (Fig. 31), and occur in east-west trending troughs. These troughs occur at the ancient erosion surface of Keewatin rocks that are now filled with Coleman sediments (Fig. 32). They are generally considered as being pre-Huronian erosion valleys (Knight 1924). Many of the veins in these troughs are directly above horizons of mineralized sedimentary interflow Keewatin rocks, and some veins continue into these interflow rocks and follow them along strike and dip.

The orebodies in the veins are localized near the contact between the Coleman Member and underlying Keewatin rocks. They are generally

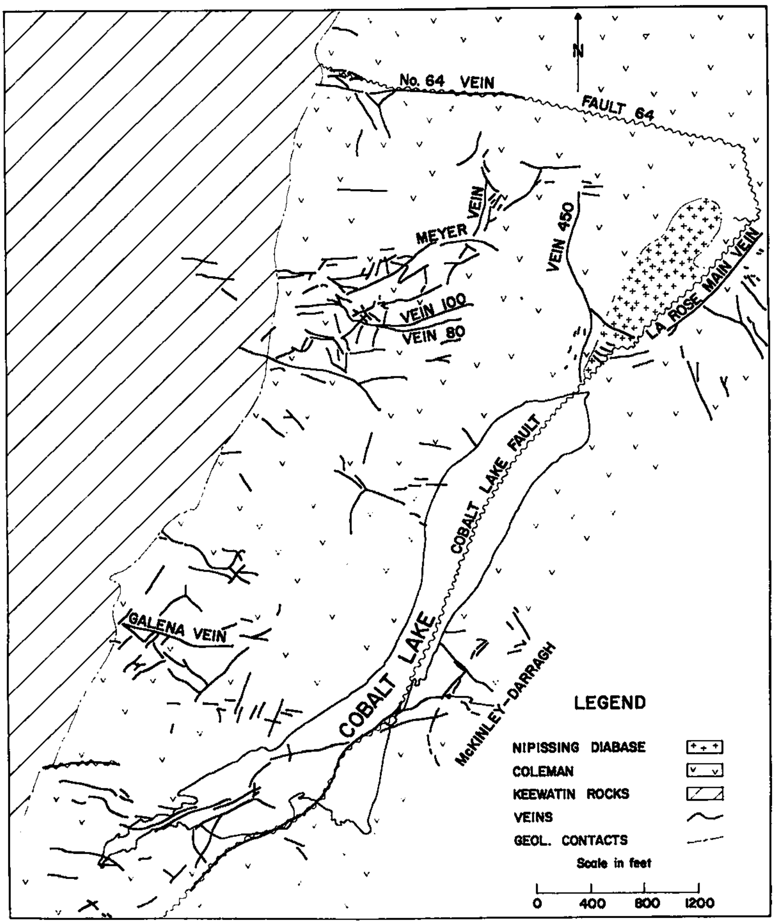


FIG. 31. Map showing surface geology and surface traces of the ore veins in the area northwest of Cobalt Lake.

within 150 feet of this contact but some are up to 275 feet above it. This contact is within 700 feet of the overlying Nipissing diabase, largely eroded away. Wherever orebodies intersect horizons of either greywacke or conglomerate composed of small boulders in a fine-grained matrix, the wall rock is fractured into blocks, and the blocks are coated and impregnated with veinlets and grains of native silver.

The tenor of the silver ore is highest near the tops of the orebodies, diminishes markedly at the contact between the Coleman Member and Keewatin rocks, and becomes very low several feet below the contact. The veins, however, generally continue into Keewatin rocks as either cobalt-iron-arsenide veins, or as carbonate veins with some sulphides. In some places the Contact fault, a gently dipping fault near the contact, has a similar effect on the tenor of the silver as the contact. In other places, however, the rock below the Contact fault is impregnated with more silver than above the fault, and in one place, at the southwest end of Cobalt Lake, the ore was confined to a 12-foot high vein between the Contact fault above and the Coleman-Keewatin boundary below (Knight 1924).

Some examples of veins northwest of Cobalt Lake are the Meyer, 80, 100 and 64 veins on the Nipissing property, the Galena vein on the Buffalo property, and the Cobalt Lake fault vein. The Meyer vein is an example of a vein with many branch veins. It is the northeast continuation of Trethewey vein, and is about 2,400 feet long. The orebodies in it had a combined length of about 1,600 feet. These orebodies contained about 1,000 ounces of silver per ton of vein material and about 20,000,000 ounces of silver was won from them. The ore was entirely in Coleman sediments

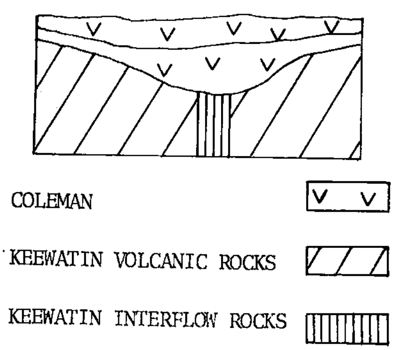


Fig. 32. Schematic section showing a pre-Huronian erosion valley at the surface of Keewatin rocks.

within 110 feet of the contact between the sediments and underlying Keewatin rocks. The vein is directly above a mineralized sedimentary interflow horizon in Keewatin rocks, and its attitude is the same as the strike and dip of this horizon. The part of the vein above the orebodies consists of barren carbonate, ¾ of an inch or less in width. An interesting feature of the Meyer vein is that it was offset 40 to 50 feet by a gently dipping fault. The tenor of silver below the fault is diminished; thus it is possible that the fault is a pre-ore fault.

Veins No. 80 and 100, the eastern extensions of veins on the Coniagas property originally found by Trethewey, are examples of veins that occur largely in conglomerate composed of small boulders in a fine-grained matrix. This conglomerate is intensely fractured and impregnated with native silver up to 45 feet on each side of the veins. Thus, the veins and adjacent wall rock were mined as large orebodies, up to 75 feet wide. It is to be noted, however, that wide orebodies are uncommon in the Cobalt-Gowganda region.

The Galena vein on the Buffalo property is another example of a vein that occurs in the Coleman Member in a pre-Huronian erosion valley above a mineralized sedimentary interflow horizon in Keewatin rocks. The mineralized interflow horizon is 300 feet wide at this point. The Galena vein contained high-grade silver ore, galena and chalcopyrite, and the wall rock adjacent to it was impregnated with silver. It had an orebody 960 feet long, and the impregnated wall rock gave rise to orebodies up to 75 feet wide. This vein is referred to as stop 5 by Thomson (1967) in his field excursion to the Cobalt camp.

Vein 64 on the Nipissing property occurs in a major fault, Fault 64, at the northwest end of the ore-bearing area at Cobalt. This vein is largely in the hanging wall of the fault, resting on the fault gouge in some places, and being 2 to 3 feet above it in other places. It is generally 2 to 3 inches wide, but in one place it was 42 inches wide. This vein had several branch veins, and in one place some were close enough together to be mined as one orebody, 40 feet wide. The vein follows a horizon of sedimentary interflow rocks, and the orebodies extended for very short distances into these Keewatin rocks. Nipissing Mines Limited sank a shaft 1,075 feet into the Keewatin rocks to explore the vein, but they found only sulphide mineralization. Several large ore-bearing veins are present at the west end of Fault 64, but no significant ore veins have been found to date north of Fault 64. Thomson (1967) refers to the veins in the vicinity of Fault 64 as stops 3 and 4 in his field excursion to the Cobalt camp.

The Cobalt Lake fault vein is present intermittently along the Cobalt Lake fault, either in the fault or several feet from it. It is largely a carbonate vein that is mineralized in some places. The mineralized parts contained several orebodies in the southern half of the Cobalt Lake fault. These orebodies occurred only where other orebodies intersected the fault, and where at least one side of the fault was in the Coleman Member. These orebodies pinched and swelled, forming lenses up to 4 feet wide and 65 feet long. At the south end of the Cobalt Lake fault, scores of rounded,

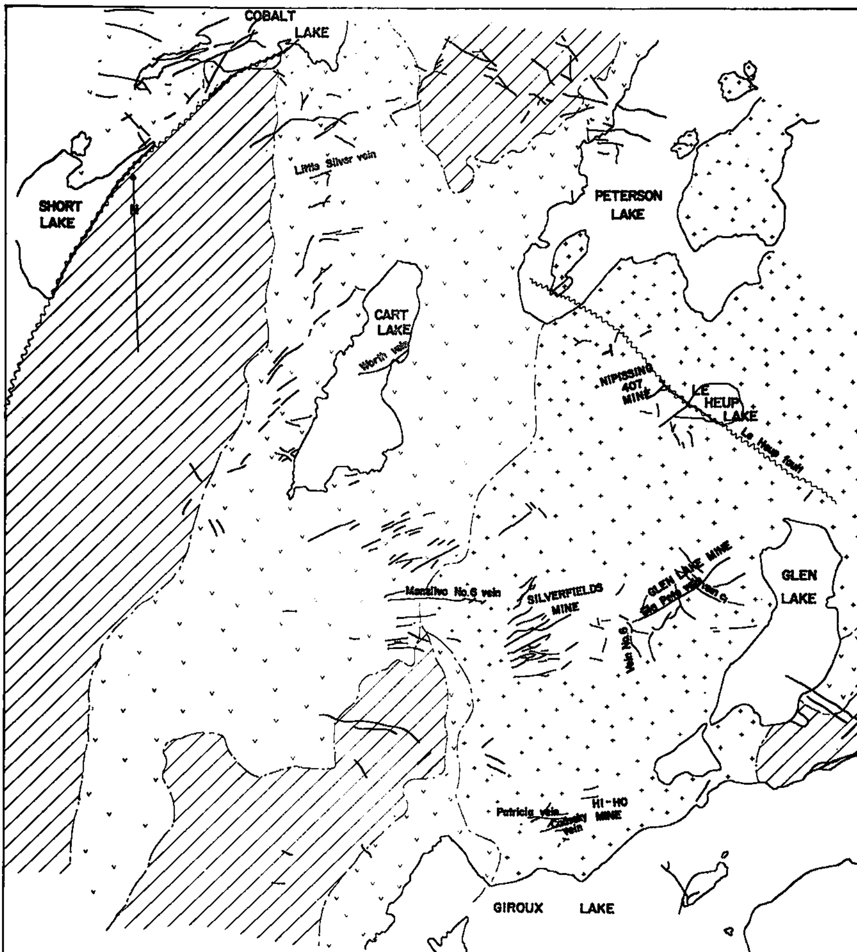


FIG. 33. Map showing surface geology and surface traces of ore veins in the area along the west side of the Peterson Lake basin.

polished, striated and slickensided masses of cobalt arsenides, about 18 inches long and 8 inches wide, are present in the fault. They occur over a length of about 30 feet, and erythrite is profusely developed in this part of the fault (Knight 1924).

Several branch, parallel, and subsidiary veins are present near the Cobalt Lake fault vein. These include the discovery veins, the Main La Rose vein and the McKinley-Darragh vein. The Main La Rose vein occurs in Coleman sediments on the southeast side of the Cobalt Lake fault and joins the fault in the vicinity of the contact between the Coleman Member and underlying Keewatin rocks. An assemblage of smaller veins is associated with the Main La Rose vein, and even veinlets of silver in granite boulders in conglomerate are present. The McKinley-Darragh vein also occurred in the Coleman Member south of the Cobalt Lake fault, but it was a small vein that was present only near the surface. Weathering of this vein gave rise to detrital ore on the shores of Cobalt Lake, and free silver was found in the gravel.

Along the west side of the Peterson Lake basin : The ore deposits along the west side of Peterson Lake basin are located between the southeast corner of Cobalt Lake and the north shore of Giroux Lake (Fig. 33). One group of veins is present in the area that extends southward from the southeast corner of Cobalt Lake to about 2,000 feet south of Cart Lake. These veins occur in the Coleman Member in a north-south-trending pre-Huronian erosion valley that widens south of Cart Lake. Most of the veins strike east-west and extend across the pre-Huronian erosion valley. Those north of Cart Lake occur in well-fractured sedimentary rocks of the Coleman Member. They feather out at the contact between the sedimentary rocks and underlying Keewatin rocks, and disappear entirely in the Keewatin rocks. Near Cart Lake a horizon of slate-like greywacke, about 70 feet above the contact between sedimentary rocks and underlying Keewatin rocks, offsets some ore veins by a series of step faults (Fig. 34). The tenor of silver ore below the slate-lake greywacke generally drops off markedly. South of Cart Lake the sedimentary rocks of the Coleman Member are only slightly fractured, but the Keewatin rocks below them are intensively fractured. The veins in the Coleman Member south of Cart Lake, therefore, do not have branch veinlets or leaf silver in the adjacent wall rock, and the ore in them occurred as pockets with chimney-like forms. Some of the veins continue into underlying Keewatin rocks, but the grade of silver in the Keewatin rocks was low.

Examples of ore veins in this area are the Little Silver vein, Worth vein and the Mensilvo No. 6 vein. The Little Silver vein, located about 800 feet south of Cobalt Lake, is an example of large veins that occur north of Cart Lake. It is referred to as Stop No. 7 by Thomson (1967) in his field excursion to the Cobalt camp. This vein occurs in a fracture in Coleman sediments, and contained an orebody about 400 feet long. The Worth vein, located under Cart Lake, is an example of vein whose orebody was offset 20 feet by a horizon of slate-like greywacke. The tenor of silver below this horizon was low. The orebody in this vein was 440 feet long and 350 feet high. The Mensilvo No. 6 vein is an example of a vein south of Cart Lake that contained orebodies in both the Coleman Member and underlying mineralized Keewatin rocks. The orebodies in the Coleman Member occurred as pockets of silver ore, and those in mineralized Keewatin sedimentary interflow rocks as cobalt ore with significant amounts of chalcopyrite, galena and sphalerite.

Other groups of veins on the west side of Peterson Lake basin are located in the vicinities of the Silverfields mine, the Hi-Ho mine, the Glen Lake mine, and the Nipissing 407 mine. Most of the current production of silver from the Cobalt area is from these mines. The veins in the vicinity of the Silverfields mine occur largely in the Coleman Member and continue into the underlying Keewatin rocks. The Coleman Member here is in a north-south trending pre-Huronian erosion valley (Moore 1967; Petruk 1968), and is covered by 200 to 300 feet of Nipissing diabase. The Keewatin rocks contain a horizon of mineralized sedimentary interflow rocks to the west of the veins. The veins are up to 900 feet long, 200 feet high, and are several inches wide. Two gently-dipping faults, about 1 foot wide, are also present in this mine. They contain fault gouge and breccia, calcite, sulphide minerals, and up to 100 ounces of silver per

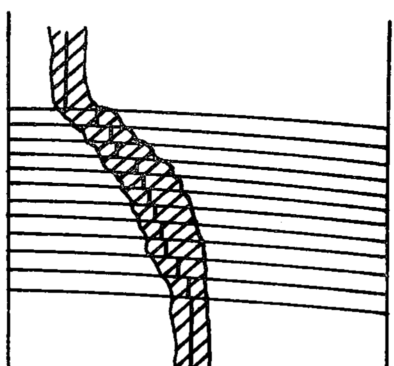


FIG. 34. Schematic diagram showing the manner in which a slate-like horizon offsets an ore vein.

ton of fault material. A geochemical soil survey conducted above this mine delineated the ore deposit (Boyle 1966), which suggests that minute fissures continue from the ore veins, through the overlying Nipissing diabase.

The ore deposits in the Hi-Ho mine, located about 1,500 feet south of the Silverfields mine, have features similar to those in the Silverfields mine. The veins occur in the Coleman Member in a pre-Huronian erosion valley, and extend for about 50 feet into the underlying Keewatin rocks that contain a horizon of mineralized sedimentary interflow rocks to the east of the veins. The Hi-Ho mine contains two large veins and several smaller ones. The orebody in one large vein, the Patricia vein, was about 300 feet long, 200 feet high, and had an average width of about 3 inches. This vein had very high-grade silver ore, and parallel veins 2 to 10 feet from it also contained very high-grade silver ore. The orebody in the other large vein, the Cadesky vein, had an average width of about 5 inches and was up to 18 inches wide in some places. The ore in this vein was not very high-grade, although it did contain a pocket of high-grade silver ore.

The veins in the vicinity of the Glen Lake mine are located about 1,000 feet east of the Silverfields mine, and are about 3,000 to 4,000 feet from the central part of the Peterson Lake basin. In this area the Coleman Member is only about 70 feet thick and occupies a shallow pre-Huronian erosion valley trending north-northeast. The veins in this area occur in Nipissing diabase, Coleman Member and Keewatin rocks. Some examples of the veins are the Big Pete vein, Vein C_1, and Vein No. 6. The Big Pete vein is in the lower portion of the diabase, in Coleman sediments, and in underlying Keewatin rocks. It is cut and displaced 90 feet by a gently-dipping fault about 25 feet above the bottom of the diabase. The orebodies in this vein occurred in diabase above the fault, and in the Coleman Member. The part of the vein between the gently-dipping fault and the bottom contact of the diabase is practically barren, and the part in underlying Keewatin rocks contains iron and cobalt arsenides, but no silver ore. The Keewatin rocks below the Big Pete vein contain a horizon of mineralized sedimentary interflow rocks. Vein C_1 strikes at right angles to the Big Pete vein. It contained silver ore in Nipissing diabase and the Coleman Member particularly near its intersection with the Big Pete vein. Vein No. 6 contained several small orebodies in the Coleman Member, and a lode of very high-grade silver ore in Keewatin rocks about 200 feet below the contact between the Coleman Member and Keewatin rocks, and the lode in Keewatin rocks may be in a different vein than the ore in the Coleman Member. This lode was about 160 feet long and 100 feet high, and was associated with a horizon of mineralized interflow sediments.

The orebodies in the vicinity of the Nipissing 407 mine are also near the central part of the Peterson Lake basin. They occur in zones of intensely-fractured sedimentary rocks within 100 feet of the Le Heup fault (Fig. 33), and are localized near the contact between the Coleman sediments and underlying Keewatin volcanics. The ore occurs largely in veins, but some is also present in the Le Heup fault, and some in fractured conglomerate. The ore in the veins occurs as pockets about 25 feet long and 25 feet high. The veins vary from ¼ to 1 inch in width and swell to 4 inches in some places. The ore in the Le Heup fault is present as small pockets adjacent to zones of intensely-fractured rock, and that in conglomerate as coatings of silver on small blocks of fractured rock near the ore veins and the Le Heup fault.

Along the northeast side of the Peterson Lake basin — The ore deposits in this portion of the Peterson Lake basin occur on the flanks and in the centre of the basin (Fig. 35). Those on the northwest flank of the basin occur in the lower part of the diabase, and in Coleman sediments and Keewatin basalt below the diabase. In this area the Coleman sediments pinch out under the diabase. Wherever the Coleman Member is present, the ore occurs largely in it with very little descending into the underlying Keewatin rocks ; on the other hand, wherever Coleman Member sediments are absent, the orebodies are in Keewatin rocks and diabase (Fig. 36).

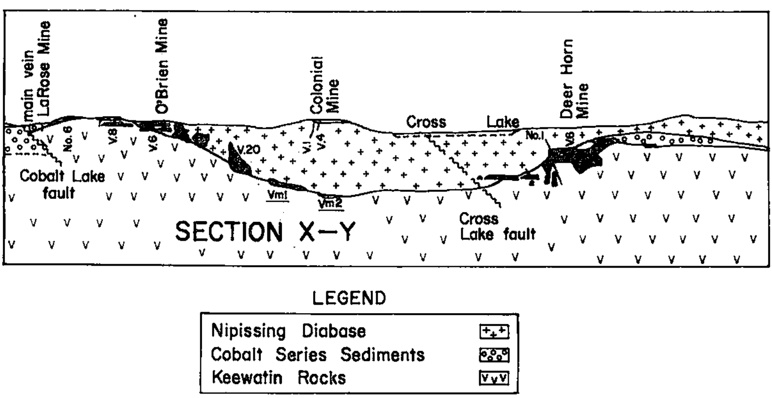
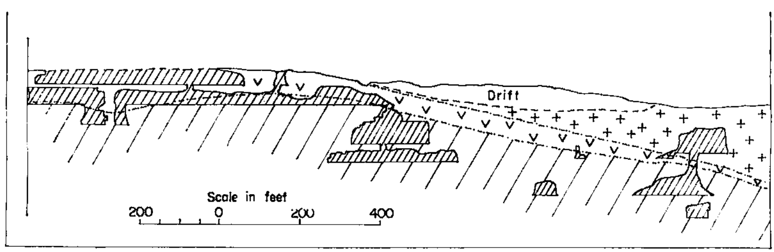


FIG. 35. Section across the northeast end of the Peterson Lake basin. The section extends from the La Rose mine on the northwest side of the basin to the Deer Horn mine on the southeast side.

The orebodies were found in two large veins parallel to the O'Brien fault, and in many others having different strikes (Fig. 37). The large veins contained high-grade orebodies, up to 1,350 feet long. At the south ends of the veins, however, on the Colonial and Violet properties, the orebodies were only 60 feet long and the distribution of silver in them was erratic. Further south, on the King Edward property, only a very small pocket containing 146 ounces of silver per ton was found (Thomson 1961c).

The ore veins on the southeast flank of the Peterson Lake basin are in the vicinity of the Deer Horn mine. This mine contains 3 large veins and several smaller ones. Two of the large veins, vein Nos. 2 and 6, contained orebodies largely in Keewatin rocks near their contact with the overlying diabase. The Keewatin rocks are bedded, and the veins appear to have the same strike and dip as the bedding in the Keewatin rocks. The other large vein, No. 1, transects the contact between Keewatin rocks and the bottom of the diabase, and the ore does not have a marked spatial relationship to the contact. In vein No. 1, high-grade orebodies were in diabase 300 feet above the bottom contact, and in Keewatin rocks 180 feet below the diabase. In addition, arsenide mineralization occurred at the surface 500 feet above the bottom of the diabase. The highest-grade ore was in diabase some distance above the contact, whereas the vein was barren at the contact and for 25 feet above and below. The part of the vein in diabase occurs in a series of irregular fractures and as small stringers following columnar joints.



LEGEND

NIPISSING DIABASE

COLEMAN

KEEWATIN ROCKS

FIG. 36. Section showing positions of orebodies in the O'Brien mine on the northwest flank of the Peterson Lake basin.

Vein No. 10 in the Deer Horn mine occurs along a fault that is on strike with the O'Brien fault. This vein is up to 9 inches wide and consists largely of carbonate. It has small amounts of arsenide mineralization near the contact between the Coleman Member and diabase.

Several veins containing pockets of very high-grade silver ore were found within 550 feet of the main ore-bearing veins. The ore pockets, which were up to 35 feet long and 10 inches wide, contained sulphides and several thousand ounces of silver per ton of vein material.

In other parts of the Deer Horn mine at some distance from the ore veins, small veins containing arsenides and traces of silver are present in

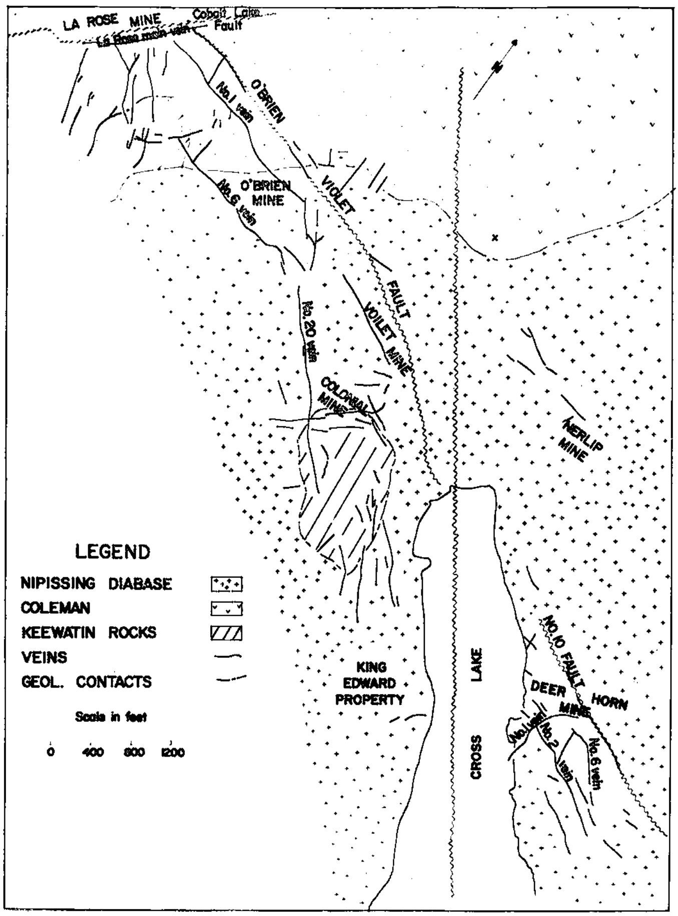


FIG. 37. Map showing surface geology and surface traces of the ore veins in the northeast portion of the Peterson Lake basin.

horizons of mineralized sedimentary interflow rocks in the Keewatin rocks. The sedimentary interflow rocks in the Deer Horn mine are intensely mineralized, and large bodies of massive pyrite and pyrrhotite are present.

Near Peterson Lake — The ore deposits near Peterson Lake occur below the diabase in the area between Peterson Lake and Cobalt Lake, and above the diabase east of Peterson Lake. In the area between Peterson Lake and Cobalt Lake, the Coleman Member is thin in some places, and absent in others. The ore veins in this area occur in faults in the Coleman Member and in Keewatin rocks. Some of those in the Coleman Member continue into the underlying Keewatin rocks, whereas others do not. The latter have similar features to the veins northwest of Cobalt Lake. Those that continue into Keewatin rocks are irregular, discontinuous, and are

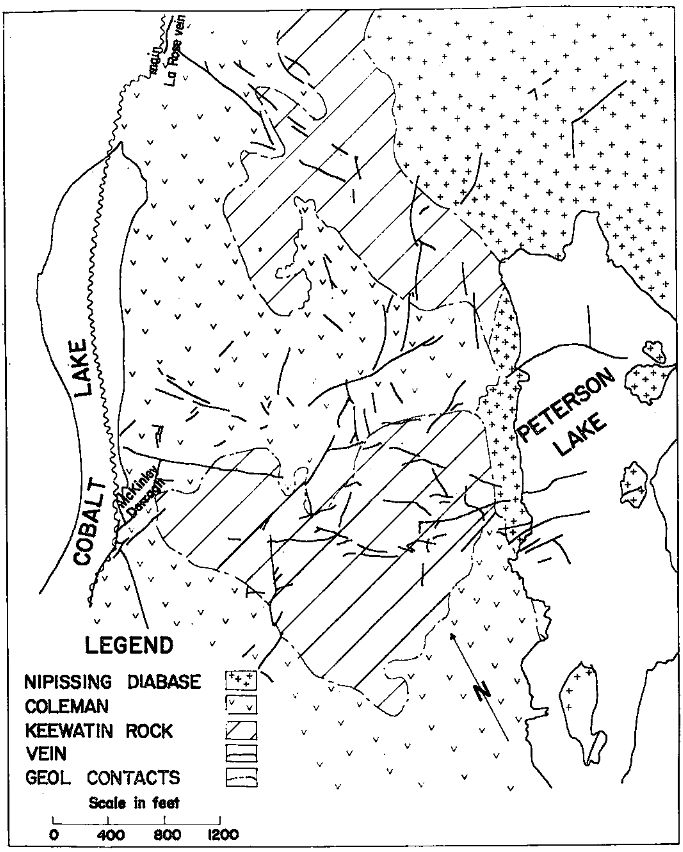


FIG. 38. Geological map of the area between Cobalt Lake and Peterson Lake showing surface traces of the ore veins.

not clustered together (Fig. 38). Some occur along mineralized sedimentary interflow horizons in Keewatin rocks, and some are parallel to the long axis of the Peterson Lake basin. Concentrations of silver are present in many parts of the veins, but they appear to be localized preferentially along lamprophyre dikes in Keewatin rocks.

Ore deposits above the diabase in the Peterson Lake basin occurred east of Peterson Lake and on the Colonial and Violet properties (Figs. 29, 35, and 37). In these areas the ore veins were in minor faults and the ore occurred primarily in diabase, within 250 feet of the top of the sill-like body. The ore was reported to be very high-grade in some places, and to be generally enriched in cobalt arsenides near the tops of the orebodies. Some veins continue into the overlying Keewatin rocks, and some follow horizons of sedimentary interflow rocks in Keewatin along strike and dip. A few contained significant amounts of sulphides, where in Keewatin rocks, and one vein had a very rich orebody in Keewatin rocks along a lamprophyre dike.

Along Kerr Lake dome — The Kerr Lake dome is in the area between the Peterson Lake basin and the New Lake basin where the diabase, now eroded away, presumably formed a dome-shaped structure. The long axis of the dome parallels the long axis of Giroux Lake, and the dome extends from the north shore of Giroux Lake to the southern part of Cross Lake (Fig. 39). The veins in this area contained large orebodies of high-grade silver ore. For example, the Carson vein on the Crown Reserve property yielded 9,100,000 ounces of silver from a vein length of 286 feet,

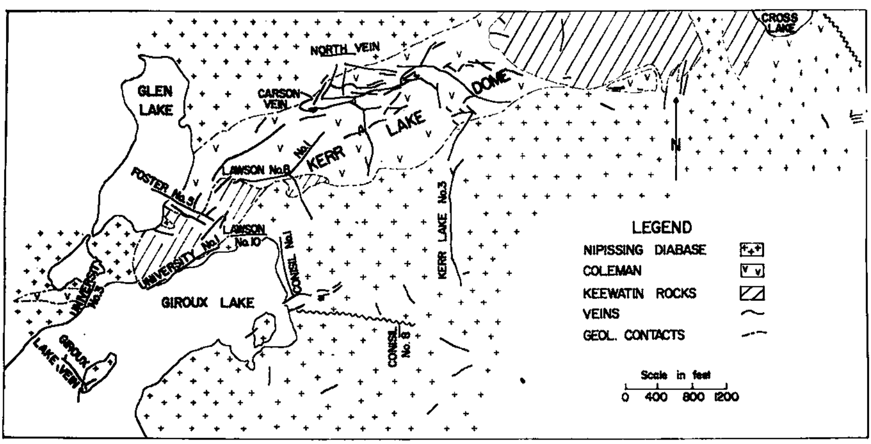


FIG. 39. Geological map of the area along Kerr Lake dome showing surface traces of the ore veins.

and a height of 150 feet. This is equivalent to 217 ounces of silver per square foot of vein area (Thomson 1961d). The ore in the eastern part of the ore zone on Kerr Lake dome occurred largely in Coleman sediments, and extended for short distances into the underlying Keewatin rocks. Some of the ore veins follow mineralized interflow horizons in Keewatin rocks, and some occur above pre-Huronian erosion valleys. In some places the veins were close enough together to be mined as one orebody, and in other places the rock between the veins is coated and impregnated with leaf silver. The large veins in this area are discontinuous and contained a series of orebodies. For example, the vein that contained the orebody referred to as the Carson vein extends intermittently eastward and contained orebodies on adjacent properties.

The North vein on the Silver Leaf property is on the north flank of the Kerr Lake dome, about 200 feet north of the other veins in the area. At this point the Coleman Formation is absent, and the vein occurs only in Keewatin rocks. It contained an orebody about 300 feet below the contact between Keewatin rocks and Nipissing diabase. About 100,000 ounces of silver were produced from the orebody in this vein.

In the western part of the Kerr Lake dome the Coleman Member is thin. The veins in this area still occur in the Coleman member, but most of them also continue into the underlying Keewatin rocks. Some veins, such as the Lawson No. 1 and 8 veins contained silver ore in Coleman rocks in the east end, and in Keewatin rocks at the west end. Most orebodies had high-grade silver ore in the Coleman Member and were enriched in cobalt and iron arsenides in Keewatin rocks below the Coleman Member.

Vein No. 5 on the Foster property is an example of a vein that occurs in the Coleman sediments and underlying Keewatin rocks. The highest-grade ore was in the Coleman sediments, although the largest part of the orebody was in Keewatin rocks ; thus most of the ore was in Keewatin rocks. The portion in Keewatin rocks was enriched in cobalt-iron arsenides and sulphides. The Keewatin rocks in the vicinity of this vein contain a 25-foot-wide horizon of cherty interflow rocks. The chert contains from negligible to large amounts of sphalerite, galena, chalcopyrite, pyrite and pyrrhotite, and is cut by veinlets of silver and cobalt arsenides. A selected sample assayed Zn 20.15%, Pb 8.5%, Cu 0.58%, Co 0.28%, Ag 1.53% per ton and traces of gold (Thomson 1961d). This mineralized interflow horizon was investigated as a base-metal orebody, but it was too small to be mined commercially.

Vein No. 3 on the University property is an example of a vein that occurs primarily in the Coleman Member on the western part of Kerr

Lake dome. It extends several feet into the overlying diabase, and small subsidiary arsenide- and base-metal veinlets are present below the Coleman Member in Keewatin rocks. High-grade silver ore occurred in the Coleman Member both in the vein, and as veinlets, coatings and impregnations in the adjacent bedded and fractured greywacke.

A few small veins on the Foster property occurred entirely in the Coleman Member where the member was only 10 feet thick. These veins were only 10 feet high and several hundred feet along (personal communication — H. H. MacLean).

There are some veins on the south side of the Kerr Lake dome where the Coleman Member has pinched out. These veins occur near the contact between the Nipissing diabase and the underlying Keewatin rocks, and include the Giroux Lake vein, University No. 1 vein, Lawson No. 10 vein,

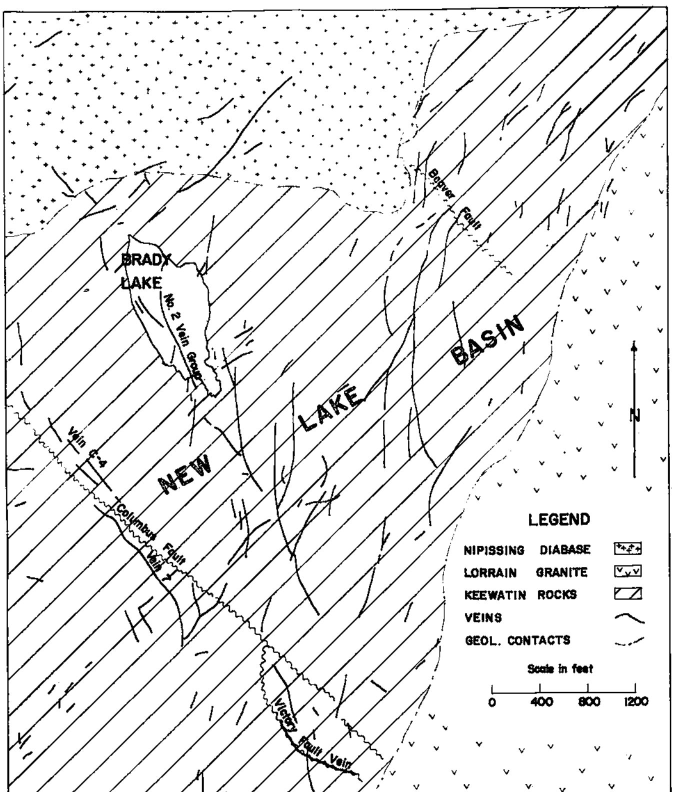


FIG. 40. Geological map of the New Lake basin area showing surface traces of the ore veins.

Conisil Nos. 1 and 8 veins, and Kerr Lake No. 3 vein. The Giroux Lake, University, Lawson and Conisil veins occur in Keewatin rocks and several extend for short distances into the overlying diabase. The highest-grade silver ore generally occurs near the diabase, although pockets of high-grade silver ore are present several hundred feet below it. The Giroux Lake vein varies from 3 to 10 inches in width, is at an acute angle to the Columbus fault, and is associated with a similar vein at right angles to it. The Conisil No. 8 vein is a 6-inch-wide vein that consisted largely of massive cobalt and iron arsenides, and had a pocket of high-grade silver ore. It is at right angles to a fault that contains small pockets of cobalt and iron arsenides, sulphides, and calcite in the fault gouge.

The Kerr Lake No. 3 vein occurs in the lower part of the Nipissing diabase, and the orebody in it extended from 125 feet above the lower contact to the middle of the diabase. It continues as a calcite vein into the underlying Keewatin rocks where it contains some galena, chalcopyrite, about 54 ounces of silver per ton, and up to ½ ounce of gold per ton. The orebodies from this vein produced about two to three million ounces of silver (Knight 1924).

Above diabase in the New Lake basin — The ore deposits in the New Lake basin (Fig. 40) occur near the contact between the top of the Nipissing diabase and overlying Keewatin rocks. Those in the centre of the basin are largely in Nipissing diabase, and those on the north and south flanks are largely in Keewatin rocks above the diabase. In addition, one orebody was in a 150-feet-long granite inclusion in Nipissing diabase. The veins commonly follow older pre-diabase structures and the parts in Keewatin rocks are somewhat arcuate and concave to the east. The parts in Nipissing diabase become mere fractures and dip at right angles to the top of the diabase. The parts of the veins in Keewatin rocks consist of carbonate, ore minerals and pre-ore quartz. The orebodies generally occurred within 150 feet of the contact between Nipissing diabase and overlying Keewatin rocks, but some were up to 500 feet above and 300 feet below this contact. The discovery vein in this area contained a small amount of cobalt arsenides at the surface, several hundred feet above the contact and 90 feet above an orebody. The lower parts of the orebodies and the parts adjacent to lamprophyre dikes were generally enriched in silver.

Two large veins, 2,400 feet long, and several smaller ones are present at the east side of the New Lake basin. They are at an acute angle to a chert interflow layer east of the veins. Orebodies occurred erratically throughout these veins and were separated from each other by great stretches of barren carbonate. Most orebodies occurred at intersections with cross-faults and had chimney-like forms. They appear to have occurred above an easterly-pitching trough at the surface of the diabase (Thomson 1961e). The orebodies at the north ends of the veins abutted against the Beaver fault and did not appear to continue beyond it. The Beaver fault contained high-grade orebodies at junctions with these veins. It is also to be noted that several veins were found in Keewatin rocks below the diabase. These veins were located directly below the large ore veins at the top of the Nipissing diabase, but they contained only small amounts of silver.

The middle part of the New Lake basin contains one large vein, about two-thirds of a mile long, and many smaller ones. The large vein, referred to as Vein No. 2 on the Silver-Miller property near Brady Lake had an orebody about 900 feet long. The ore in this vein occurred in the proximity of the contact between the Nipissing diabase and overlying Keewatin rocks, but the part at the north end of the vein was in Keewatin rocks, while that at its south end, in the middle of the New Lake basin, was in diabase. The southerly extension of this vein had orebodies in Keewatin rocks although some ore was also in diabase. This vein crosses a mineralized chert horizon in Keewatin rocks.

The veins in the vicinity of the Columbus fault are Vein C-4 on the Silver-Miller property, Vein No. 7 on the Christopher property, and Victory Fault vein on the Silver Banner property. Vein C-4, the most northerly vein, is on the northeast side of the Columbus fault. It follows a horizon of mineralized chert and is at angle to the Columbus fault. The ore in this vein occurred largely in the upper part of the Nipissing diabase, but extended into Keewatin rocks at the north end. That part of the vein in Keewatin rocks consists of quartz, calcite, and sulphides; the quartz attains a width of 10 feet at one place.

Vein No. 7 on the Christopher property also follows a horizon of Keewatin sedimentary interflow rocks, but it is on the southwest side of the Columbus fault. The vein appears to be in the Columbus fault at the north end, but is 400 feet southwest of the fault at its south end. The ore in the northern part of the vein was in diabase to 225 feet below the contact between Nipissing diabase and overlying Keewatin rocks, while that in the southern part was in Keewatin rocks up to 445 feet above the contact. The part of the vein in Keewatin rocks occurs in a 5-foot-wide zone of fractured rock, and contains 18 inches of fault gouge. The part in diabase is in tightly closed rock (Mason 1959). The fractured nature of the Keewatin rock leaves many vugs in the veins, and in many places in the upper levels the calcite has been dissolved away from the native silver and cobalt arsenides, and the insoluble minerals are coated with secondary sulphides. In one place, every piece of rock in a five-foot-wide fractured zone is coated with sulphides and graphite, and contains small amounts of copper, lead, zinc and about 15 ounces of silver per ton of rock. At one place at a small bend in the vein, sheets of native silver and masses of galena and freibergite projected into openings in the veins (personal communication, B. Thorniley). The galena contained 22.89 ounces of silver per ton (Thomson 1961e). At still another place some black earthy oxidized ore is present in the fractured rock. Several smaller veins, parallel and at right angles to vein No. 7, are present near the southern end of the vein. Most of these veins contain high-grade silver ore and one was accompanied by a ½ inch aplite vein.

The Victory Fault vein is located south of the Columbus fault and follows a pre-Nipissing fault in Keewatin rocks. It contained a small amount of silver ore about 170 feet above the diabase. The silver occurred in very small, but high-grade, pockets.

Veins outside the ore zone in the Cobalt area — Many mineralized veins are present outside the area delimited by the Columbus fault, No. 64 and O'Brien faults, the Lorrain granite, and the surface trace of the contact between the Coleman sedimentary rocks and Keewatin rocks northwest of Cobalt Lake (Fig. 29). Some of the veins contain pockets of ore minerals, and others contain red feldspar, epidote and fibrous amphibole. The pockets of silver ore are too small to be mined commercially, and their frequency and size appear to decrease with distance from the ore-bearing area at Cobalt. This type of occurrence is exemplified by veins southwest of the Columbus fault, and north of No. 64 and the O'Brien faults.

Some mineralized veins are also present 6,000 feet south of the New Lake basin in the vicinity of the Schumann Lake arch. These veins may represent occurrences related to the main ore-bearing area at Cobalt, or to an ore-bearing area still undiscovered. On the Schumann Lake arch, quartz and calcite veins with small amounts of chalcopyrite were found at the contact between diabase and the underlying Coleman sediments. North and south of the arch, quartz-carbonate veins in Keewatin rock above diabase contain small pockets of Cobalt mineralization, native silver and chalcopyrite, and one pocket south of the arch contained leaf silver in Lorrain granite.

The area west of the ore-bearing area at Cobalt is underlain by Keewatin volcanic rocks and Coleman sediments. Many veins in this area have been prospected but they were found to be quartz-calcite veins containing sulphides, axinite and epidote, but no minerals of commercial value.

Mineralized veins have been found near Montreal River two miles west of the New Lake basin, at Gillies Lake two miles west of Cobalt, in the area east of the townsite of North Cobalt, and in other areas beyond the ore-bearing area at Cobalt. The mineralized veins near Montreal River two miles west of the New Lake basin occur in Keewatin rocks below diabase, now eroded away. They contained pockets of cobalt arsenides, native silver and visible gold. The mineralized veins in the vicinity of Gillies Lake occur within diabase. The veins are calcite-quartz veins, and some are associated with aplite veinlets. They contain pockets of nickel arsenides, cobalt arsenides, native silver and sulphides.

The veins in the area east of the town of North Cobalt contained silver and cobalt ore in Coleman sediments and Keewatin volcanics under the diabase. Prior to 1922 one mine in this area produced 223,629 ounces of silver, largely from Keewatin rocks (Knight 1924). During the period of 1952 to 1957, several large cobalt-arsenide veins were mined for cobalt from the Aguanico mine, located on the shore of Lake Timiskaming. The cobalt ore was in the Coleman member and the orebodies were reported to contain a few pockets of high-grade silver ore (personal communication, H. H. McLean).

Casey township

The ore deposits in Casey township are all on the property of Langis Mines Limited. They occur primarily in Cobalt sediments below the Nipissing diabase. The Nipissing diabase in this area is in the form of a basin (Fig. 41), and the ore veins are at the edges of the basin structure. Some veins are in the vicinity of shaft No. 3 and some in the vicinity of

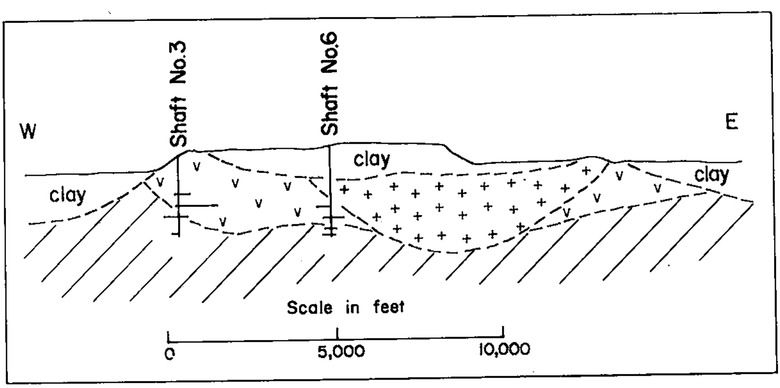


FIG. 41. Geological section of the ore-bearing area in Casey township (Legend is the same as for Figure 42).

shaft No. 6 (Figs. 42 and 43). The ones in the vicinity of shaft No. 3 occur as an assemblage of veins in fractures in a pre-Huronian erosion valley. The largest vein, vein No. 6, is in the middle of the valley directly above a mineralized carbonaceous sedimentary horizon in Keewatin rocks. Most of the ore in this vein was in Cobalt sediments, but the part in

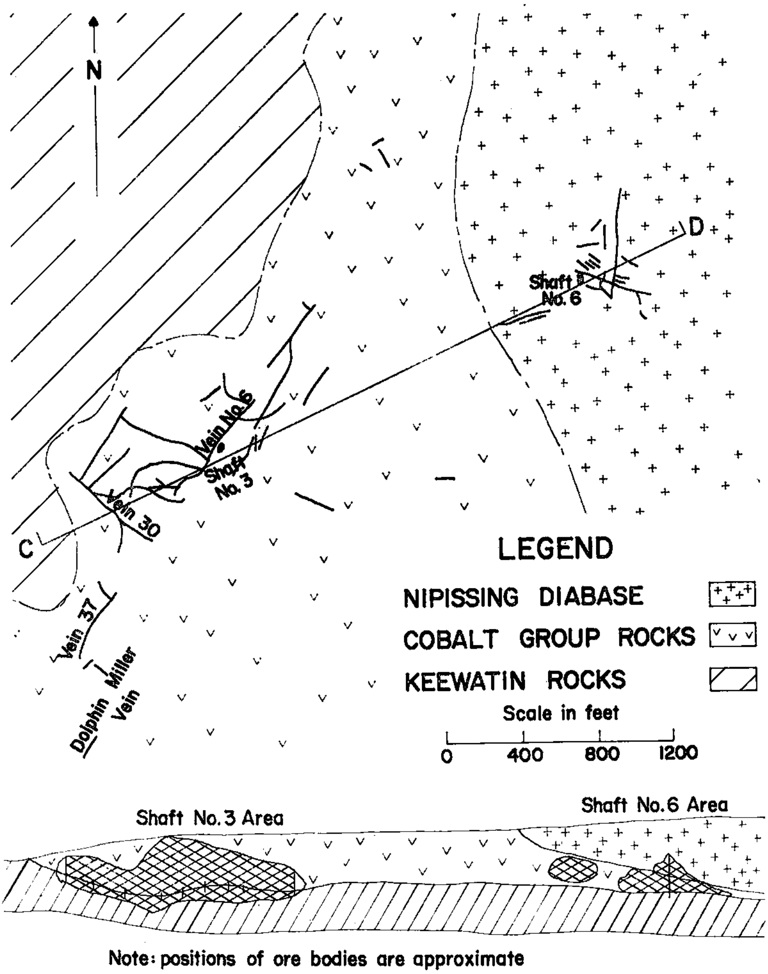


FIG. 42. (Top) Geological map of the ore-bearing area in Casey township showing surface traces of the ore veins.

FIG. 43. Schematic section C-D of the ore-bearing area in Casey township showing positions of orebodies.

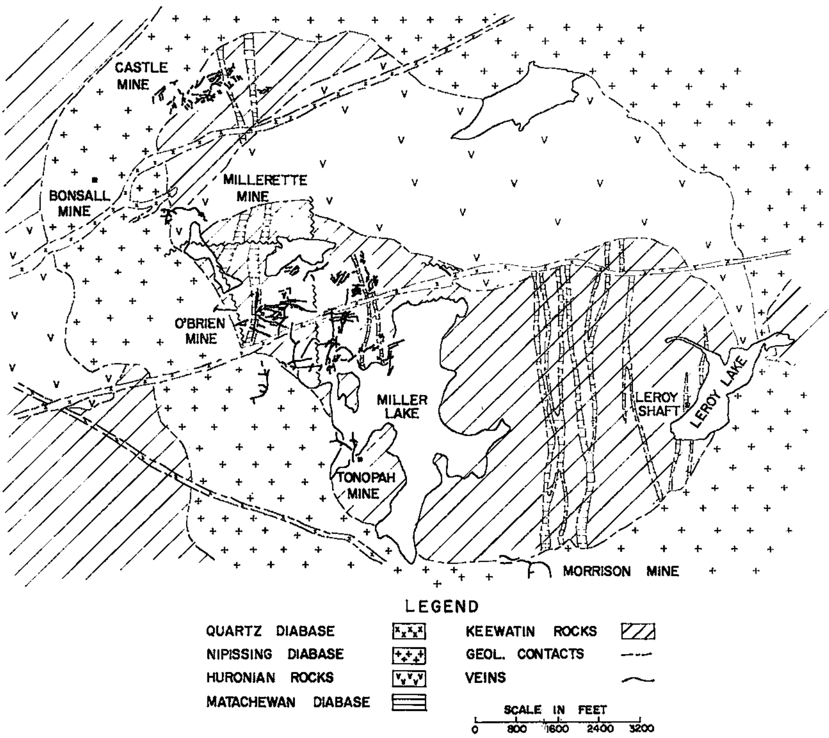


FIG. 44. Geological map of the Miller Lake area showing surface traces of the ore veins.

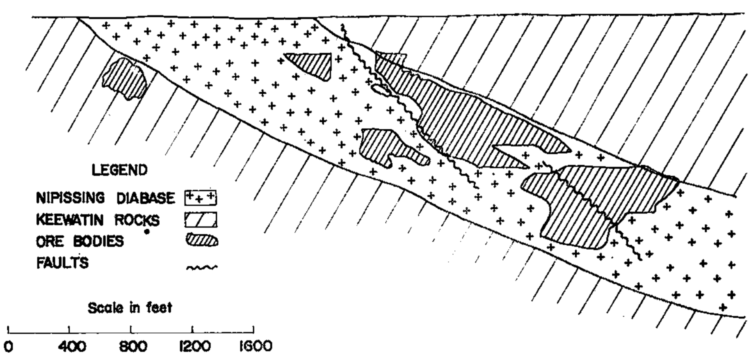


FIG. 45. Composite longitudinal section of the O'Brien mine in the Miller Lake area showing locations of the orebodies with respect to the Nipissing diabase.

Keewatin rocks also contained high-grade silver ore where it intersected a lamprophyre dike. Another vein, vein No. 30, in the southern part of the ore-bearing area, strikes at right angles to the pre-Huronian erosion valley. This vein occurs along a fault and contains cobalt arsenides, high-grade silver ore, and sulphides. It also has an unusual assemblage of minerals including langisite, parkerite and cobalt pentlandite (Petruk *et al.* 1969). No ore veins have yet been found southwest of Vein 30, but two wide veins composed largely of cobalt and iron arsenides are present to the southeast. One vein, the Dolphin-Miller vein, contained a pocket of native silver, but no silver has been found in the other one, Vein 37.

The veins in the vicinity of shaft No. 6 are also in Cobalt sediments, but the ore in the largest one extends upwards into the diabase for a distance of 70 feet. The veins in this area are present as an assemblage of narrow veins in minor farctures. They consist of arsenides and silver, and do not have abundant carbonate.

Elk Lake area

Many silver deposits are present throughout a large area near Elk Lake, which is about 35 miles northwest of Cobalt (Fig. 3). Some of the deposits contain high-grade silver ore in long continuous veins. However, no large orebodies have been reported to date. The deposits occur in Nipissing diabase that is in the form of a complex intrusion composed of dike-like and sill-like structures. No basin structure formed by the diabase is evident, but it is possible that such a structure exists southwest of Elk Lake. The deposits are characterized by being associated with aplite and containing large amounts of chalcopyrite and bornite. The ore veins occur along faults, joints and aplite dikes, and cut the aplite dikes.

Miller Lake area

The ore deposits in the Miller Lake area occur largely in the Nipissing diabase, although a few are in rocks above and below it (Figs. 44 and 45). Those in the diabase occur primarily in the top half on the west flank of a local diabase basin or modified cone structure (Hester 1967). The deposits are located in the vicinity of the O'Brien, Castle, Tonopah and Morrison mines. The diabase in these areas is intensely fractured and jointed, and has extremely well-developed cylindrical joints (Eakins 1961), most of which are normal to the diabase contact. The ore veins occur in the joints, and also in faults cutting across the cylindrical jointing. Most of the veins are perpendicular to the contact between diabase and Keewatin rocks, although there are many deviations. Generally, each vein contains only one orebody with the most common ore control being vein intersections. Frequently orebodies are present on both intersecting veins, but not always at the same elevation, although both may have similar dimensions and grades. The veins vary from a fraction of an inch to about 1 foot in width, and cracks in diabase contain sheets of silver no thicker than paper. A typical orebody consists of a vein 1 to 2 inches in width, and 100 to 200 feet in horizontal and vertical extent, although some are smaller and others are up to 400 feet in size. Whenever parallel veins are present, generally only one contains silver ore, but the value of the ore shifts from one vein to another at different horizons. The intervening rock between the veins may be impregnated with silver and occasionally constitute a wide ore zone. The widest such zone, mined as a glory hole, was 40 feet wide.

There are also a few veins in diabase on the east flank of the local diabase basin or cone-sheet structure, an area containing many aplite veins. These, however, do not contain enough silver to be mined commercially.

Veins above the diabase in the Miller Lake area occur on the Millerette and LeRoy Lake properties. Only those on the Millerette property contained enough silver to produce ore. The ore was in Coleman conglomerate near the contact between the conglomerate and underlying Keewatin rocks. It did not extend into the Keewatin rocks.

The veins on the LeRoy Lake property are in Keewatin rocks along a Matachewan diabase dike, above Nipissing diabase. They are quartz-calcite veins with sulphides, arsenides and small amounts of native silver.

Ore veins below the diabase were found in Keewatin rocks on the Bonsall property. Some silver was obtained from these veins.

Veins of aplite composition are present in many parts of the diabase, but are rare in the ore-bearing areas (Moore 1956). Frequently, the aplite grades into diabase along the walls. Some veins consist of aplite next to the diabase, calcite in the middle, and quartz crystals between the aplite and calcite. In some places the calcite contains nickeline, cobalt arsenides, and thin sheets of silver.

Gowganda Lake area

Ore deposits in the Gowganda Lake area occur in the upper and lower parts of the diabase. Those in the upper parts are on the Boyd, Mann and Rusty Lake properties. The diabase in the vicinity of the Boyd and Mann properties forms a small dome. This dome is interpreted by the writer as representing a local warping on the east flank of a larger basin west of Gowganda Lake. The ore in the lower part of the diabase, on the Bartlett property, is also on the east flank of the larger basin. The diabase near the ore deposits is well-fractured, and the veins are in faults and joints, and are associated with aplite.

Summary and Interpretation of the Characteristics

Significance of the host rocks

The ore veins occur in a variety of rocks including Huronian sedimentary rocks, Keewatin volcanic and sedimentary rocks, Nipissing diabase, lamprophyre, and granite. This shows that ore deposition was not dependent upon the lithology of the host rock. The tenor of silver in the veins, however, generally changes when the veins pass from one rock type to another and is highest in rock that has the highest mafic mineral content. Hence, the parts of the orebodies in chlorite-rich Huronian conglomerate and in biotite-rich lamprophyre dikes are frequently enriched in silver relative to other parts of the orebodies.

The physical characteristics of the veins appear to be related to the competence of the host rock. Veins in sedimentary rocks generally have more-or-less uniform width and composition over short distances. In addition, greywacke and conglomerate are frequently fractured into small blocks, and the blocks are coated and impregnated with native silver when they are near orebodies. Veins in volcanic rocks tend to pinch and swell and the mineralization is erratic. Veins in diabase and lamprophyre also have erratic mineralization, although they have more-or-less uniform widths.

Significance of mineralized Keewatin sedimentary interflow rocks

Many ore veins in the Cobalt area and Casey township occur near horizons of mineralized Keewatin sedimentary interflow rocks, but the parts of the veins near these rocks are themselves poorly mineralized. This suggests that the interflow rocks may have influenced the localization of the ore veins. This localization could be a structural one because the competence of the rocks is such that they fracture very easily (Thomson 1957) and consequently may have served as a locus for fracture zones that subsequently became sites for ore deposition. On the other hand the localization could be genetic as discussed on pages 414 to 417.

Significance of pre-Huronian erosion valleys

Many ore veins in the Cobalt area and Casey township occur in Huronian sedimentary rocks that were deposited in pre-Huronian erosion valleys. Some parts of the valleys are up to 150 feet deep and have steep slopes, while other parts are shallow and have gentle slopes. Many valleys, and particularly the deep ones, happen to be directly above horizons of mineralized Keewatin sedimentary interflow rocks. Orebodies occur along the valleys in some areas, and cross them in others. This suggests that the Huronian sedimentary rocks in the pre-Huronian erosion valleys fractured more readily than those elsewhere.

Significance of open structures and pervious zones

Ore veins occur in open structures such as faults, fissures and joints in zones of intense fracturing. The zones of intense fracturing in Huronian rocks are near major faults, in pre-Huronian erosion valleys, and above horizons of Keewatin sedimentary interflow rocks. In Keewatin rocks they are generally along faults that pre-date the Nipissing diabase, and in Nipissing diabase they are marked by an abundance of cylindrical joints and faults.

Orebodies within the ore veins are frequently localized near contacts between Nipissing diabase and Keewatin rocks, and between Huronian and Keewatin rocks. Some are further localized by cross fissures, other ore veins, and major faults. The orebodies that are localized solely by geological contacts, as those in the Silverfields and Hi-Ho mines, generally occur throughout the entire length of the vein. Orebodies that are further localized by cross fissures, as those in the New Lake basin in the Cobalt area, generally have chimney-like forms, and the parts of the ore veins between the orebodies consist of barren carbonate. Orebodies localized by other ore veins are most abundant in the Miller Lake area. An example of this feature on a small scale is shown by the intersection of two minute fissures in a sample of siliceous tuff from the Deer Horn mine in the Cobalt area (Fig. 46). Orebodies in major faults occur only at junctions with other veins, and most of them are very high-grade. Cobalt Lake and Beaver faults contained examples of such bodies.

Many orebodies are delimited by structural features. Some end abruptly at open structures such as cross faults and open geological contacts, and others continue for short distances across pervious geological contacts and slate-like greywacke, with a reduction in silver content. Superficially, structural features appear to delimit ore-bearing areas as well. The ore-bearing area at Cobalt appears to be delimited by the No. 64 and O'Brien faults on the northeast side, the Columbus fault on the southwest side, and the Beaver Lake fault northeast of the New Lake basin. These faults contain silver ore, but no significant orebodies have been found to date within 8,000 feet beyond them. The orebodies in the vicinity of North

Cobalt are about 8,000 feet northeast of the O'Brien fault, and are probably in a different ore-bearing zone.

The above relationships between the ore veins and open structures show that favourable conditions for ore deposition occurred where faults, fissures and joints were intersected by cross structures such as geological contacts, other ore veins, and cross fissures. The largest orebodies were presumably formed where the favourable conditions persisted for the longest period of time. It is reasonable to expect that these conditions persisted longest near geological contacts in zones of intensely fractured rock, and changed more quickly in major faults and at cross fissures.

Significance of size and distribution of the ore veins

The ore veins are generally grouped together as networks, and each network contains several large veins and many smaller ones. The distribution of the networks in the ore-bearing areas is dependent upon the fracture patterns, and hence upon the competence of the rocks and the stresses that were applied to the rocks. Thus, wherever the host rock is uniform, as on the west side of Peterson Lake basin and northwest of Cobalt Lake, the orebodies are uniformly distributed. A systematic drilling program based on this regular distribution met with some success (personal communication, G. Ninacs).

The orebodies generally appear to decrease in size with distance from large orebodies or groups of orebodies, and those farthest away are present

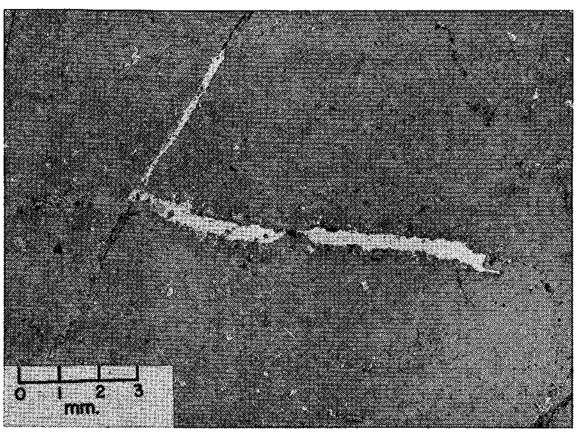


FIG. 46. Photomicrograph of a polished section typifying the occurrence of many of the veins in the Cobalt-Gowganda area. The ore minerals are localized near the intersection of the two veinlets.

only as small pockets, some of which, however, contain very high-grade silver ore. Some veins in the Deer Horn mine in the Cobalt area, for example, contained several pockets of very high-grade silver ore about 550 feet from veins that contained large orebodies. A similar feature appears to be present south of the Columbus fault where small high-grade silver deposits were found several thousand feet from the orebodies in the Cobalt area, and smaller, lower-grade ones were found even farther away. The possibility that these small deposits represent the edges of other undiscovered deposits cannot, however, be disregarded.

Significance of Nipissing diabase

The main relationships between the ore deposits and Nipissing diabase are shown on the composite cross-sections of the ore-bearing areas prepared by projecting the orebodies into one plane (Figs. 30, 43 and 45). These relationships can be summarized as follows :

(1) The ore deposits in Huronian sedimentary rocks occur within 700 feet of the Nipissing diabase and are localized along the contact between the sedimentary rocks and underlying Keewatin rocks.

(2) Ore deposits in Keewatin rocks occur within 500 feet of the contact between Keewatin rocks and Nipissing diabase and are localized along this contact.

(3) Orebodies in Nipissing diabase generally occur either in the upper or lower parts of the diabase, although there are some exceptions to this.

(4) Orebodies on one side of the Nipissing diabase are sometimes vertically in line with concentrations of ore minerals on the other side of it, and with minute fissures and veinlets of ore minerals within the diabase.

(5) Ore deposits that occur in the upper parts of the Nipissing diabase and above it are located in basin structures formed by the Nipissing diabase. Those in the centre of the basin extend furthest into the diabase, while those on the flanks are generally above the diabase.

(6) Ore deposits that occur in the lower parts of the Nipissing diabase and below it are located at the peripheries of basin structures, i.e. under the domes, formed by the Nipissing diabase.

(7) Deposits not associated with basin structures formed by the Nipissing diabase appear to be too small to be mined commercially. Such deposits occur in the Gillies Lake area west of Cobalt, and those in the Elk Lake area may also be of this type.

The above relationships show that there is a definite correlation between the occurrence of ore and Nipissing diabase, and that orebodies occur in definite positions with respect to the basin structures formed by the diabase. Since this report was prepared Lovell & Caine (1970) have suggested that the basin structures formed by the diabase are cone sheet structures. This factor, however, does not alter the relationship between the diabase and ore deposits.

Significance of aplite

Aplite dikes have been found in Nipissing diabase and adjacent rocks in the Elk Lake, Miller Lake, Gowganda Lake and Cobalt areas, in Casey township, and near Bass Lake about 2 miles west-southwest of Cobalt (Collins 1910, Hore 1910 and 1911, Bastin 1935, MacKean 1967, Bowen 1910, Moore 1956, Sampson & Hriskevich 1957, and Thomson 1965). These dikes are generally a few inches wide, but a few are up to 4 feet wide. They have sharp-to-gradational contacts with diabase and many contain quartz and carbonate veins ; some also contain ore minerals. The sequence from diabase to the middle of an idealized aplite vein, *i.e.* aplite-quartz-calcite-ore minerals, indicates that the ore minerals are a late phase of the aplite crystallization. Aplites are generally absent from the ore-bearing areas, but are abundant where silver mineralization is less prominent. The wall rock adjacent to aplite veins is generally altered, and this alteration is similar to that along ore veins in South Lorrain township and the New Lake basin (Moore 1934, Bourne 1951). This suggests that the orebodies and aplites were deposited from solutions that had similar volatile constituents, and it has been suggested that the aplites and ore minerals were derived from a common source (Moore 1934, Bourne 1951, and Sampson & Hriskevich 1957).