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PROVINCE OF ONTARIO
DEPARTMENT OF MINES

HON. CHARLES MCCREA, *Minister of Mines* THOS. W. GIBSON, *Deputy Minister*

Bulletin No. 48

The South Lorrain Silver Area

By
CYRIL W. KNIGHT

To accompany Report by Cyril W. Knight on Underground Workings in Cobalt and South Lorrain in the Thirty-first Report of the Ontario Department of Mines, Part II.

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PREFACE

This report on South Lorrain is an advance part of a larger report on the Cobalt and South Lorrain silver areas shortly to be published by the Ontario Department of Mines in Volume Thirty-one, Part Two. The full report deals more particularly with the geology of the mine workings, and will constitute a supplementary report to Dr. Willet G. Miller's well-known memoir on Cobalt, published in 1913 in Volume Nineteen, Part Two, of the Ontario Bureau of Mines.

Toronto, August, 1923. C.W.K.

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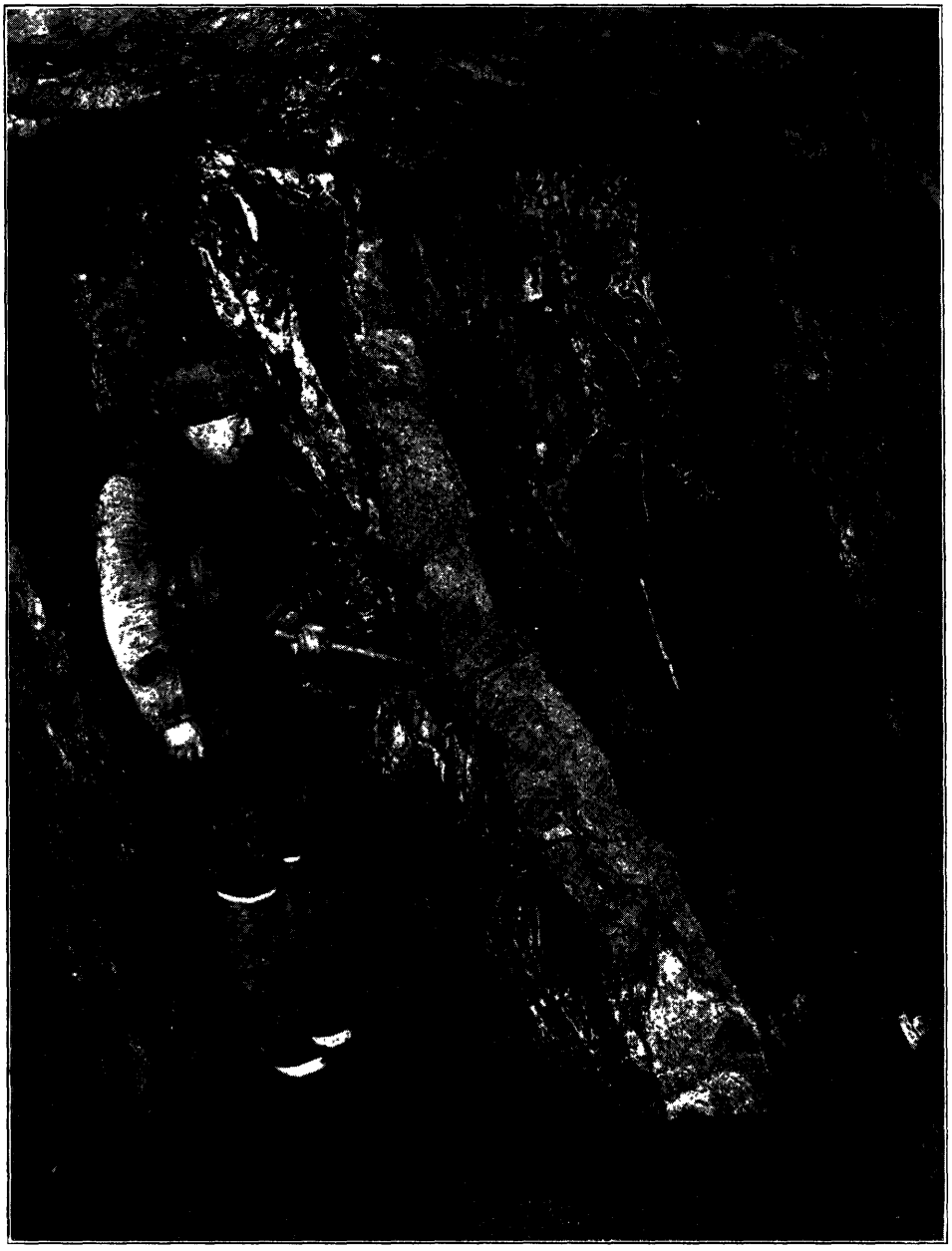


Fig. 1.—Wood's vein, north face, Keeley mine, 480-ft. level, October 12th, 1922. The vein averages 10 inches in width and assays 8,000 to 14,800 ounces of silver per ton. This ore is in the Nipissing diabase sill, about 50 or 60 feet below the top of the sill. Major Leonard G. Smith in the photograph.

SOUTH LORRAIN

By CYRIL W. KNIGHT

Introduction.

The productive part of the South Lorrain silver field occupies a comparatively small area, probably less than one hundred acres. It is sixteen miles southeast of the town of Cobalt. The field may be reached by a road from Cobalt, or by a pleasant twenty-mile trip on a steamboat from the town of Haileybury down Lake Timiskaming. From the wharf at South Lorrain it is about three miles westward over a rough road to the Keeley, Frontier and Wettlaufer mines.

South Lorrain at the present time is attracting much attention owing to rich silver ore-shoots which have been discovered at the Keeley and Frontier

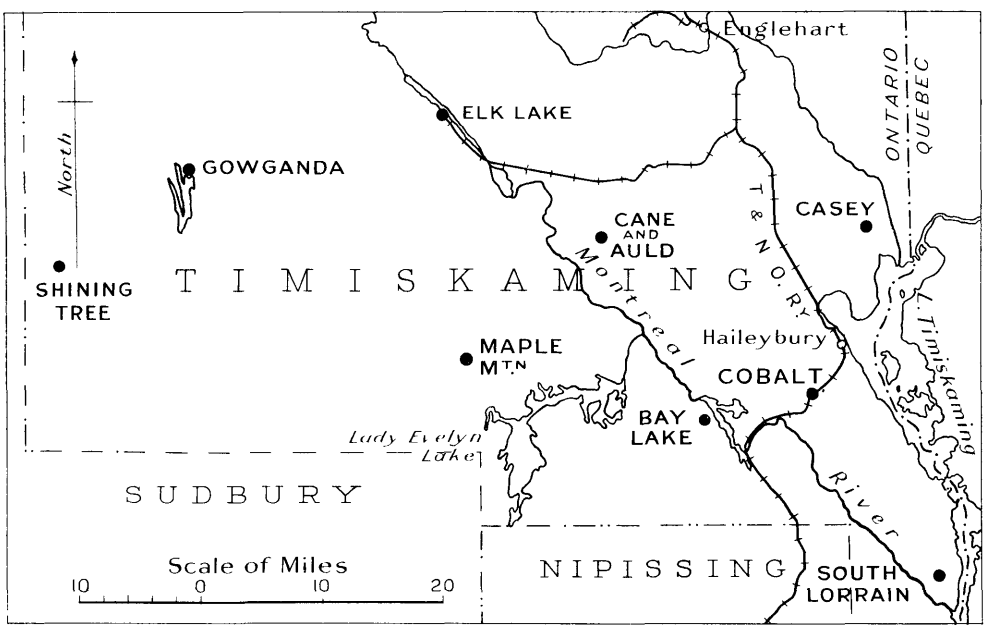


Fig. 2.—Plan showing relative position of South Lorrain.

mines during the last two years. As a result it is certain that much new exploration will be carried on, with the object of ascertaining whether the present small productive area can be enlarged.

The field was examined in the fall of 1921 and 1922, and brief visits were also made in January and May, 1923. In the year 1922 there were only two operating companies, namely, The Mining Corporation of Canada, Limited, working the Frontier, and the Keeley Silver Mines, Limited, operating the Keeley.

The history of South Lorrain has had its tragic and romantic aspects, its ups and downs. Silver was discovered in 1907 at the Keeley mine, and there followed a period of widespread staking of claims, and of active work lasting until the latter part of the year 1913. During this time, which may be called the first period in the history of the camp, there were produced about 2,446,235 ounces of silver, practically all of which came from the Wettlaufer mine. The Keeley yielded 24,337 ounces, according to the official records of the Ontario Department of Mines.

The camp then became almost inactive for eight years, and was looked upon with little interest by most mining men during that time. To all intents and purposes it was a dead camp.

The credit for the rejuvenation of South Lorrain is due to Dr. J. Mackintosh Bell. He obtained an option on the Keeley mine in 1913, and after efforts lasting for eight years finally succeeded in 1921 in finding rich ore-shoots. South Lorrain thereupon entered the second period of its history, and now gives promise of developing, for the time being at any rate, into the most important of the outlying areas of the entire Cobalt silver camp.

In the rejuvenation of the area Horace F. Strong also played a prominent part. He discovered the first important high-grade ore at the Frontier mine in August, 1921, and through his agency the Mining Corporation of Canada, Limited, acquired this property. J. G. Harkness, who had spent much time in South Lorrain, was associated with Strong in the early development of the Frontier. On following pages are described conditions that militated against the earlier development of the Frontier.

Most people in northeastern Ontario are familiar with the role which the Farmers Bank played in the early history of the Keeley mine. The bank was indirectly and vitally interested in the property, and became insolvent partly as a result of the failure of the mine to produce the anticipated quantity of silver for which the promoters of the mining venture hoped. Let this be said for the Farmers Bank. Had the operators known the relation of ore-shoots to the diabase contact, it is probable that the rich ore-shoots along the top of the Nipissing diabase sill would have been found by the early promoters. In view of the high-grade ore which has been discovered recently at the mine along the top of the diabase sill at a depth of 400 to 500 feet it would appear that the early promoters were justified in their venture. They failed through what would popularly be called hard luck.

The silver veins of the productive area of South Lorrain outcrop on the height-of-land between the Montreal river and Lake Timiskaming, 500 to 600 feet above the lake. The deposits are just over the crest, on the west side of the divide facing the valley of the Montreal river. The country is rugged and generally barren of soil, except in the valley of the river and in isolated spots elsewhere. Along the river valley there are picturesque stretches of agricultural land, fringed by rocky hills, which some day will be turned into as beautiful a bit of farm land as is to be found anywhere in northeastern Ontario. It is desirable that this land be settled now as a market for farm produce is available at the nearby mines.

A. G. Burrows reported on the South Lorrain area in 1909, his report being based on work carried out in 1908.[1] The surface geology of South Lorrain and also of part of Lorrain township was mapped by A. G. Burrows, James Bartlett, and R. B. Stewart. The accuracy of their work has been acknowledged and appreciated by mine operators and prospectors alike. Burrows

[1]Ont. Bur. Mines, Vol. XVIII, Pt. II, 1909.

found that the formations conformed to the scheme of classification worked out by Willet G. Miller for the Cobalt area proper. When Burrows reported on the area little actual mining had been done, and hence his report did not deal with the geological structures of the rocks and veins at depth. More recently, in 1922, Dr. J. Mackintosh Bell[1] has written a report on South Lorrain, dealing particularly with the Keeley mine.

The writer is greatly indebted to Dr. J. Mackintosh Bell, and to his associates Messrs. H. Whittingham and Leonard G. Smith, for much information regarding the Keeley and Maidens mines. Dr. Bell gave to the Department extracts from his report on the Maidens mine, and his plan accompanying the report. To Mr. Warren Emens of the Mining Corporation of Canada, Limited, and to the officials connected therewith, the writer is also much indebted for many details concerning the Frontier and Crompton mines. The generous and kindly manner in which the Keeley Silver Mines, Limited, and the Mining Corporation of Canada, Limited, gave to the Department of Mines all the information which was asked for may be put on record here. Mr. Horace F. Strong furnished the Department with plans of the mine levels of the Wettlaufer, and with a stope section of the Wettlaufer vein; he has also very kindly written an account of the history of the Frontier mine, and a description of the Wettlaufer mine. To Mr. Walter J. D. Penley the writer begs to express his thanks for information regarding the location of certain claims.

Production.

To the end of the year 1922 South Lorrain had produced 4,339,984 ounces of silver, contributed by the several properties according to the table on page 10.

Vein Minerals.

The silver occurs largely in the native state and is the most important mineral in the veins. Associated with the native silver are the following compounds of the metal—argentite, or silver sulphide; pyrargyrite, or ruby silver ore, the sulphantimonite of silver. Smaltite, the diarsenide of cobalt, and niccolite, the arsenide of nickel, are commonly found, together with their decomposition products "cobalt bloom" and nickel bloom. Other minerals also are found.

It may be added that the veins are composed largely of calcite or dolomite, white or pink in colour.

A complete list of the minerals which occur in the Cobalt silver area will be found in Miller's report.[2]

---

[1]Bulletin of the Institution of Mining and Metallurgy, February, 1922.

[2]The Cobalt-Nickel Arsenides and Silver Deposits of Timiskaming, by Willet G. Miller; Annual Report Ontario Bureau of Mines, Vol. XIX, 1913, Part II, p. 9.

SILVER PRODUCTION, TROY OUNCES, IN SOUTH LORRAIN TO END OF DECEMBER, 1922.

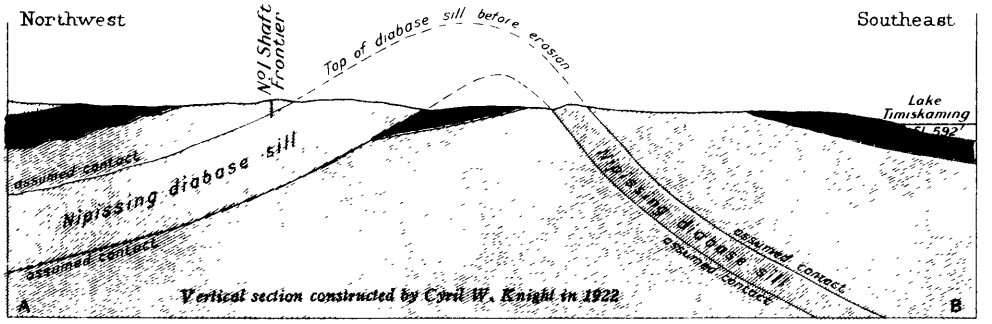
Total oz. to end 1922	Mine	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922
*1,136,917	*Keeley	13,124	11,213					3,534				39,199	4,586	8,253	281,659	775,349
2,564,584	Wettlaufer		183,742	199,920	925,017	834,119	248,992	104,665		68,129						
42,629	**Pittsburgh-Lorrain Syndicate									7,629	10,000	25,009				
31,630	Bellellen			21,213	8,895					1,522						
556,235	†Frontier & Crompton														47,277	508,958
7,989	#Silver Eagle											7,989				
4,339,984	Total	13,124	194,955	221,133	933,912	834,119	248,992	108,199	nil	77,280	10,000	72,188	4,586	8,253	328,936	1,284,307

*Keeley produced 826,814 ounces in first half of year 1923.

**Curry and Wettlaufer.

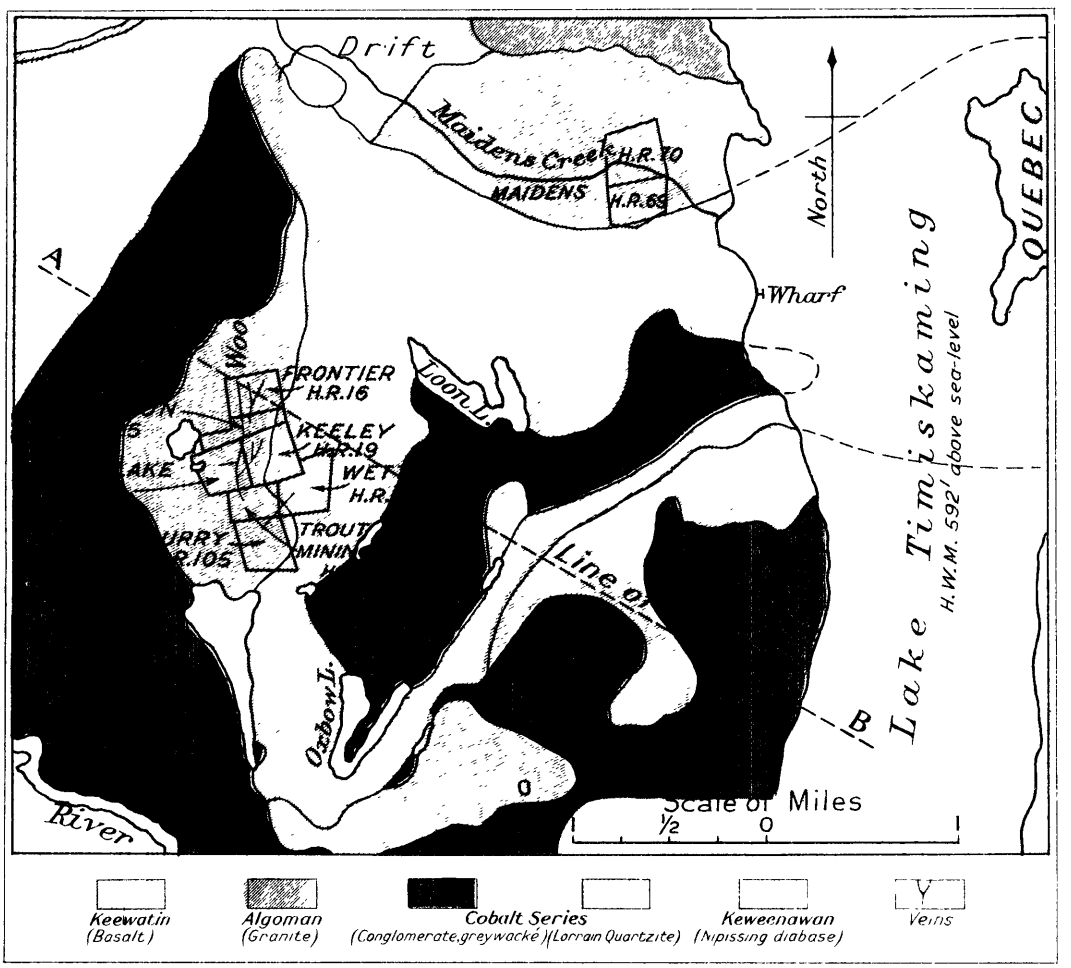
†Frontier and Crompton produced 456,212 ounces in first half of year 1923.

#Operated early part of 1918 by John Redington.



SECTION ALONG LINE A—B, SHOWING DOME STRUCTURE OF NIPISSING DIABASE SILL

Horizontal and Vertical Scale, 1 mile to 1 inch.



Veins mapped by the mining companies in 1923; at depth the veins extend into the Nipissing diabase. Surface geology mapped by A. G. Burrows in 1908.

GEOLOGICAL MAP OF SOUTH LORRAIN

DISTRICT OF TIMISKAMING, ONTARIO

To accompany Ontario Department of Mines Report, Volume XXXI, Part 2, 1922, by Cyril W. Knight *on the Cobalt Silver Area.*

Where Veins Occur.

The productive veins occur along the top of the Nipissing diabase sill, both in the diabase and in the overlying Keewatin (vertical sections facing pages 11 and 25). In this respect the occurrence is similar to that at the Timiskaming and Beaver mines in Cobalt. The diabase occurs in the form of a great elongated dome, known as the South Lorrain dome, and the productive veins discovered up to the present time have been found on the northwest slope of the dome.

No ore has yet been found in the conglomerate and greywacké of the Cobalt series below the South Lorrain diabase dome. In Cobalt, on the other hand, the rocks below a similar dome, in the Kerr lake-Giroux lake section, have been highly productive, and such mines as the University, Lawson, Crown Reserve, Kerr Lake, and Drummond all occur below the diabase dome in rocks of the Cobalt series.

Pre-Glacial Weathering.

In Wood's vein, at the Keeley mine, pre-glacial weathering exists to a depth of at least 480 feet. The weathering has escaped glaciation, and is the only known occurrence of the kind in the entire Cobalt field. The upper part of Wood's vein has been leached and oxidized, and the wall rock has been changed to red and grey clay for a width of an inch or two to as much as seven or eight feet. This weathering and oxidation is more fully discussed in dealing with the Keeley mine.

The economic significance of pre-glacial weathering in Wood's vein may be important if it is proved that large quantities of secondary silver have been deposited at or near the bottom of the weathered and oxidized zone.

While pre-glacial weathering at the Keeley mine is unique in the Cobalt silver field, it is known, nevertheless, in a few other localities in Ontario. Two notable instances may be cited. At the Helen iron mine, north of Sault Ste. Marie, weathering of a diabase dike and Keewatin schist has taken place to a depth of 540 feet, according to A. L. Parsons. These rocks are altered to grey kaolin.[1] In Hastings county, at the Eldorado copper mine, weathering of iron and copper sulphides has taken place to a depth of 60 to 80 feet, the sulphide having been changed to iron oxide, which yielded a good grade of iron ore. Below the weathered zone primary sulphides were met with. E. L. Fraleck has described this occurrence.[2] In certain other hematite deposits in southeastern Ontario similar conditions occur, the iron ore passing into sulphide in depth.

Length of Ore-Shoots.

The ore-shoots at the Keeley and Frontier mines are shorter than are those at Cobalt. The most consistent high-grade shoot in the Keeley is 74 feet long in vein No. 26; "N" shoot in Wood's vein on the seventh level is 198 feet long. On the 300-ft. level of the Crompton there is a shoot of high-grade 102 feet long in Wood's vein. If we compare the South Lorrain shoots with certain shoots at Cobalt, we shall obtain a just idea of their relative lengths. The stope on the Meyer shoot, with its westward extension on the Trethewey, is about 1,600 feet long. The stope on the O'Brien No. 1 vein on the second level is 900 feet long at the west end of the property. The stope on the No. 3 vein of Kerr Lake is 400 feet long. Other examples might be given.

It may be, of course, that longer shoots will be found in South Lorrain as development and exploration proceed. The writer has not seen the stopes in the Wettlaufer mine. He was, however, given the stope-section of the

[1]Annual Report, Ontario Bureau of Mines, Vol. XXIV, Pt. I, 1915, pp. 192-194.
[2]Ontario Bureau of Mines, Vol. XVI, Pt. I, 1907, p. 182.

Wettlaufer vein through the kindness of Horace F. Strong; the section shows one of the stopes to have a length of 210 feet on the second level, and 260 feet on the third level.

While the South Lorrain ore-shoots have not yet proved to be as long as those at Cobalt, some of them are very rich. At the Keeley mine, J. Mackintosh Bell reported that in drifting 74 feet along vein No. 26 on the 480-ft. level not less than 250,000 ounces of silver had been mined; no stoping was done in recovering this huge amount. On the 300-ft. level of the Crompton a shoot on Wood's vein 102 feet long and an average height of 35 feet had produced 900,000 ounces of silver to the end of April, 1923.

The "Mother Lode."

The vein-system in the productive part of South Lorrain is an interesting one. The main vein is known as the Wood's vein. It has been named by Dr. J. Mackintosh Bell the "mother lode" of the productive section. It is in a reverse fault the displacement of which is about 30 feet, and most of the productive veins are probably branches. The relation of the Wettlaufer vein to Wood's vein is not known. The Wettlaufer vein strikes towards Wood's vein at an angle of about 45°, but, in so far as the writer can ascertain, it has not yet been followed to its intersection with the Wood's. According to Horace F. Strong, it "feathers" out about 50 feet southwest of the northeast corner of the Curry, H.R. 105.

Faults.[1]

The faulting system in South Lorain is believed to be a complex one. The two main faults are the Lake Timiskaming fault on the east, following the course of the lake. and the Montreal river fault on the west, following the general course of the river. The former strikes north and south, the latter southeastward, so that the two faults join about five miles south of the Keeley mine about at the point where the Montreal river enters Lake Timiskaming.

Between these two major faults it is believed that there are many minor faults, although the only one which has been positively proven to exist is Wood's fault with its small branch faults. The evidence for stating that many other faults exist is the presence of sharply defined valleys. It if is assumed, for the moment, that these valleys are fault valleys, then the number of faults between Lake Timiskaming and the Montreal river is great.

At the north end there is Maidens creek valley striking westward, a few degrees north of west. Running about at right angles to the Maidens creek valley are a number of valleys entering it from the south; one of these begins at the northeast corner of Trout lake, and, striking about north-northeast, passes through the Wettlaufer claim, and then continues to the Maidens valley, a total distance of two and a half miles. This fault may be called the Wettlaufer valley fault. East of this there is probably another fault along the east arm of Loon lake, which continues north-northeast to Maidens valley. The Loon lake fault appears to be exposed to view a few hundred yards south of the lake, where the conglomerate is crushed into a rock similar to the fault breccia found in faults. This breccia is cemented by calcite, dolomite, or other carbonate.

Wood's fault has been proven to strike southward through the Frontier, Crompton, Keeley, and claim No. H.R. 103. It may join the Wettlaufer valley fault at some point near the northeast corner of Trout lake. Another fault, enter-

[1]The Cobalt-Nickel Arsenides and Silver Deposits of Timiskaming, by Willet G. Miller. Annual Report Ontario Bureau of Mines, Vol. XIX, 1913, Part II, pp. 116-121.

ing from the eastward from a little lake on H.R. 98, also seems to join Wood's fault at or near the point that the Wettlaufer valley fault joins it. Another valley enters Trout lake at the northwest corner. Thus there appear to be several faults entering the north end of Trout lake. If these faults, or veins connected with them, contain commercial quantities of silver, they present an interesting problem.

Some of the valleys referred to above are indicated on the map of South Lorrain by A. G. Burrows.

There are several other prominent valleys not mentioned above, notably that about half a mile west of the Frontier mine; and there are also a number of sharp cliffs suggestive of faulting.

A word may be added as to the character of the faults. The Lake Timiskaming fault was first pointed out by Willet G. Miller.[1] Later, G. S. Hume[2] showed that the fault has a displacement of 800 to 1,000 feet the east side being the down throw side The character of the Montreal river fault, whether reverse or normal, is not known; nor is the character of any of the other faults known, except Wood's fault at the Frontier and Keeley, which appears to be a reverse fault with a displacement of about 30 feet.

A word of caution must be added about assuming that all the valleys in South Lorrain represent faults. A valley in Cobalt may be cited which proved to have no fault. This is the valley along which runs the branch line of the Timiskaming and Northern Ontario railway from Cobalt to Kerr lake, opposite the cliff at the "Little Silver" vein on the Nipissing property. The underground workings penetrated below this valley, and no evidence of a fault was found. This may be the case in more than one valley in South Lorrain.

Discovery of Ore Bodies.

To those, and there are many, who want to know the likely places in which to explore in South Lorrain, the writer can do no better than to point out how success was achieved during the last two years at the Keeley and Frontier properties. The operators began working at the surface on strong calcite veins, an inch to a foot or more in diameter; these veins contained small shoots of smaltite; the silver was negligible. The veins outcropped in Keewatin rocks three to four hundred feet above the top of the Nipissing diabase sill. The operators sank on the veins to the contact of the Nipissing diabase and Keewatin basalt. Exploration of the veins along and near the contact revealed the rich ore-shoots which have brought the camp into such prominence. Another factor, however, besides the diabase contact played its part at the Keeley mine. J. Mackintosh Bell believed that, at or near the bottom of the pre-glacial weathered zone in Wood's vein, he would find rich masses of secondary silver ore which had been leached out of the top part of the vein. While the bottom of the weathered zone has not yet been reached at a depth of 480 feet, there is evidence nevertheless that the workings are approaching it. At any rate, most of the high-grade ore in the mine has been encountered at this depth.

Those seeking new ore bodies in South Lorrain should also keep in mind the conglomerate and greywacké of the Cobalt series below the South Lorrain dome, in the vicinity of Loon and Oxbow lakes. Up to the present time no calcite veins of importance are known in these rocks under the dome. Should

[1]Annual Report, Ontario Bureau of Mines, Vol. XIX, Pt. II, 1913, Willet G. Miller.

[2]The Ordovician Rocks of Lake Timiskaming, Museum Bulletin No. 17, Geological Survey of Canada.

American Journal of Science, Fourth Series, Vol. 50, 1920, pp. 293-309, by G. S. Hume.

strong calcite veins, with smaltite, be discovered by trenching or diamond drilling such veins might be explored along the base of the Cobalt series. In Cobalt much of the silver ore occurs along the base of that series; similar conditions may exist in South Lorrain under the diabase dome.

Maps and Plans.

In the pocket at the back of the report will be found a detailed surface geological map of the productive area of South Lorrain, on a scale of 400 feet to an inch. The map shows the kinds of rocks, the location of the veins, contour lines, buildings, and so on. This map was prepared by the Mining Corporation of Canada, Limited, in co-operation with the Keeley Silver Mines, Limited. The work is wholly theirs, and the geology is based on A. G. Burrows' map, scale one mile to an inch, published in 1909 by the Ontario Department of Mines. The writer herewith expresses the thanks of the Ontario Department of Mines for the generous manner in which the companies concerned handed over the entire map for publication in this report. The map was made by the companies on a scale of 100 feet to an inch; the Department has published it on a scale of 400 feet to an inch.

In the pocket will also be found a sheet showing the plans of all the levels of the Keeley and Frontier mines. The geology, veins, faults, and so forth, are shown.

General Geology.

The following classification of the rocks in South Lorrain is largely based on that given in the report of A. G. Burrows,[1] to which the reader is referred. The rocks have been fully described in Burrows' report, and it is not necessary to add much, beyond referring to the presence of lamprophyre dikes of Haileyburian age which have since been found. The Nipissing diabase has, since the early work, been proved to occur in the form of a sill with a great dome-like structure. In view of the importance of this dome structure the writer has described it in somewhat great detail in following pages.

TABLE SHOWING ROCK CLASSIFICATION OF SOUTH LORRAIN.

PRE-CAMBRIAN	KEWEENAWAN	Silver veins. Nipissing diabase sill.
		INTRUSIVE CONTACT.
	ANIMIKEAN (Cobalt Series)	Lorrain quartzite, arkose and conglomerate. Conglomerate, greywacké, slate-like greywacké, quartzite.
		GREAT UNCONFORMITY.
	ALGOMAN	Granite and syenite, feldspar-porphyry.
		INTRUSIVE CONTACT.
	HAILEYBURIAN	Lamprophyre dikes.
	KEEWATIN	Basalt and similar basic lavas, much altered in places.

The South Lorrain Diabase Dome.

The Nipissing diabase in South Lorrain occurs, as in Cobalt, in the form of an irregular sill, hundreds of feet thick. Its exact thickness in South Lorrain is not known, and will not be until the diamond drill or shafts have penetrated it.

The sill has the shape of a great elongated dome, the longer axis of which strikes northeastward. The dome structure is illustrated in the drawing facing

[1]Annual Report, Ontario Bureau of Mines, Vol. XIX, Pt. II, 1913, pp. 134-144.

page 11, which shows a vertical section at right angles to the longer axis. A study of this vertical section, and the plan accompanying it, will explain the structure much better than a page or two of text.

It is believed that the dome-like structure of the diabase sill was not caused by folding, but that the diabase was intruded in that form during its molten state. Of course there may have been a little subsequent folding, but the gentle dips of the slate-like greywacké and conglomerate of the Cobalt series show that there has been comparatively little disturbance.

The top of this diabase dome, during a great period of time, has been slowly eroded and worn down until, finally, all that now remains of the dome is the lower part with its encircling arms dipping away from the centre.

Contacts of the bottom of the diabase sill with the underlying rocks around the inside of the dome are exposed in a score of places, showing the diabase dipping away from the centre at angles varying from 5° or 10° to as high as 65°. Similarly, the top of the diabase sill around the outside of the dome is exposed in many places, and the top of the sill may be seen plunging under the older rocks at angles of 15° to as high as 80° or 90°. The almost vertical dips along the top of the sill were noted in the valley of Maidens creek along the north part of the dome.

Details of the South Lorrain Diabase Dome.

As the dome-like structure of the Nipissing diabase sill is one of the most important structures in South Lorrain it is described rather fully.

The evidence proving that the diabase forms a dome may readily be obtained by following the contacts around the inside and outside of the dome. The contacts around the inside of the dome show the bottom of the diabase sill; while the contacts around the outside of the dome show the top of the diabase sill. The contacts which were found may now be described in detail, beginning with the outside of the dome on the shores of Lake Timiskaming, at Maidens creek, half a mile north of the government wharf.

The Outside of the Diabase Dome (Top of the Sill).

The actual contact of the top of the dome is heavily covered with drift for a mile and a half westward from the shore of Lake Timiskaming. The contact appears to follow the south side of Maidens creek valley. The first contact observed was found on or near claims Nos. R.L. 461 and H.S. 11, where it is excellently exposed, particularly at one place. At this place a hill rises about 25 feet high, and the contact goes up one side and down the other, and is seen to be vertical. The actual contact is exposed for about 60 feet. Elsewhere on the two claims mentioned above there are half a dozen contacts exposed, but the dip of the diabase is obscure and could not be positively determined; at one place, indeed, the diabase seemed to be resting on top of the Keewatin. This may, however, be a local irregularity.

Half a mile northwest the contact is again excellently exposed in a valley, through which the main road runs, on claim No. B.C. 105. The valley cuts across the contact at right angles. Standing at the bottom of the valley and looking southeast up the hill the contact of the diabase is seen to extend up the hill. It is vertical. Similarly, standing in the valley and looking northwest, the contact is seen to extend up the other side of the valley and to be also vertical. The rock with which the diabase is in contact is a pink quartzite. The colour of the quartzite makes a sharp contrast with the dark colour of the diabase. The contact is vertical for at least 50 to 75 feet.

The vertical contacts described in the preceding paragraphs are along the north side of the diabase dome, where the only known vertical contacts have been found. There is no way of determining to what depth this vertical contact extends except by diamond-drilling or shaft-sinking. A knowledge of the dip of the diabase at the Maidens claim, H.R. 69, is of practical importance on account of the veins which occur there.

The northwest end of the diabase dome terminates in a spur about 300 yards wide. At the north end of this spur a shaft has been sunk in the diabase near the quartzite. The shaft dips about 55° or 60° to the southwest. The rock on the dump is diabase. There are on the dump pieces of a pink calcite vein about three or four inches wide carrying a little cobalt bloom. The latter mineral may be seen in place in a joint in the rock about six feet southeast of the shaft. Evidently the inclined shaft was sunk on this joint. West of here about 450 feet another shaft has been sunk, apparently at the contact between the diabase and quartzite. This shaft is in a valley, the contact here following the valley as it curves around to the west, southwest and south. The rock on the dump from this shaft is coarse- and fine-grained diabase.

Fig. 3.—Mr. J. M. Wood, pioneer in South Lorrain. He and his partner Mr. R. J. Jowsey were joint discoverers of the Keeley mine. The "Wood's" vein was named after Mr. Wood. The Keeley mine was named after Mr. Charles Keeley who was associated with Jowsey and Wood.

Fig. 4.—Mr. R. J. Jowsey, pioneer in South Lorrain.

From the north end of the spur the contact runs about due south for nearly four miles to the south end of Trout lake. This part of the contact, up to the present time, is the most important part in the whole South Lorrain area because the productive properties, Wettlaufer, Keeley, and Frontier, occur here.

Commencing at the north end of this important part of the sill the contacts may be described in detail.

About 300 yards south of the north end fine-grained diabase occurs along the side of a hill. The slope of the hill appears to indicate the dip of the diabase, namely, about 30° or 35° to the westward. The diabase here is dipping under conglomerate and greywacké of the Cobalt series.

The first satisfactory place to examine the contact along this four-mile stretch is about three-quarters of a mile south of the north end of the dome, on claim No. R.L. 467, known as the Alice Lorrain. A shaft has been sunk on this claim. About 125 yards southwest of the shaft the contact is excellently exposed for about 40 feet; the contact dips steeply westward under the Keewatin.

South of here three claims, on the Lorrain Consolidated property, No. H.R. 24, the contact is excellently exposed along the side of a hill. It dips to the westward at 15° to 22°, but is much steeper in places. South of this exposure the contact goes below swampy or low ground, and is not exposed until the Keeley property is reached, where at the roadside, about 75 yards from the old Keeley shaft, it dips westward. Between this last-mentioned exposure and the Wettlaufer mine there are several excellent exposures of the contact, all dipping westward under the Keewatin.

At the Frontier the diabase dips about 25° to the westward in the vicinity of No. 1 shaft; this dip is shown by the mine workings.

At the Keeley, to the south of the Frontier, the dip of the diabase is about 34° westward; this dip is also shown by the Keeley workings. The drawings facing pages 25 and 37 show the dip of the diabase contact at the Keeley and Frontier.

The Wettlaufer mine was flooded at the time of examination of the area in October, 1922, so that it could not be inspected. But it was learned from those who had examined this mine that the diabase dips below the Keewatin at steep angles. On the surface the contact is exposed at more than one place, and is particularly well shown near the east side of the valley where the diabase dips under the Keewatin at an angle of about 15°. From this exposure southward to Trout lake the contact is covered with soil.

At the south end of Trout lake, on the east side, the contact between the conglomerate of the Cobalt series and the top of the Nipissing diabase is well exposed. At two places the contact dips 45° to the westward. Southeastward from here about two claims, on No. H.S. 497, the diabase contact is exposed on the side of a bare hill and dips 44° to the south. This contact is located at about the most southward part of the Nipissing diabase dome.

Northeast of here, on the next claim, No. H.S. 500, the contact is well exposed in three places, dipping from 36° to 51° to the southeastward. Two of these contacts are on the side of a hill. It may be noted here that many of the contacts observed in South Lorrain are on the side of valleys as frequently as they are in the bottom of valleys. On H.S. 500 little acid dikes from one-half to two inches wide intersect the diabase: these dikes were noted elsewhere in the area.

Northeast of the last-mentioned contacts about a mile the contact is exposed on H.R. 113, but the dip could not be ascertained.

Two claims to the northeast, on H.R. 54, at the northwest corner, the

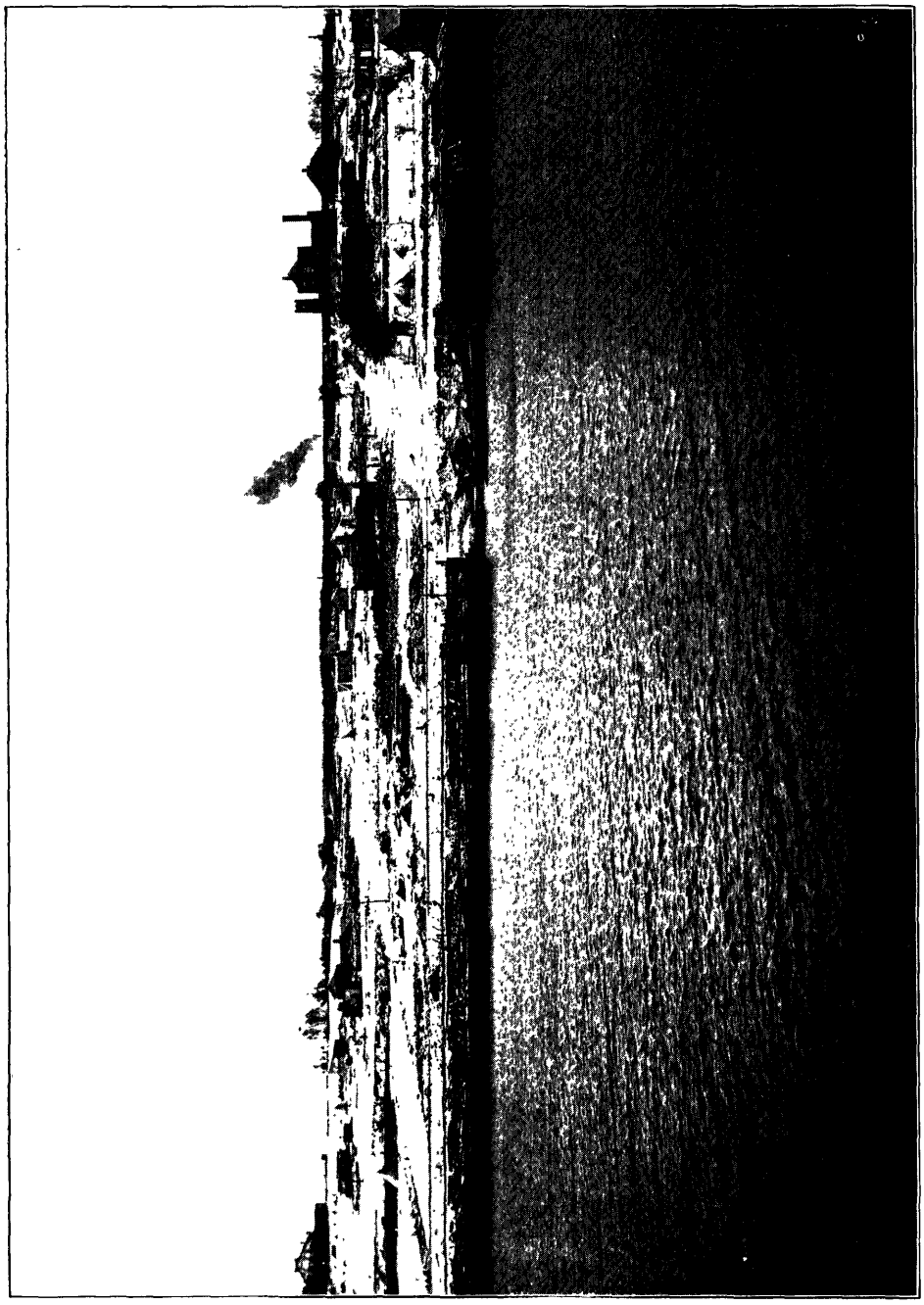


Fig. 5.—Haileybury, five miles north of Cobalt, Oct. 27th, 1922, after the great fire of Oct. 4th, 1922. Lake Timiskaming in the foreground.

contact is exposed in two places dipping 41° and 55° respectively to the southeast. The Keewatin basalt is here altered to a banded, slightly schistose rock; the diabase has cut about at right angles across the banding, making the contact sharp and clear-cut.

Northeast of the last exposure the contact is again exposed on H.R. 27 at the northeast corner. Judging by the jointing in the diabase, the contact dips 25° to the southeast.

From this point eastward to the shore of Lake Timiskaming the contact is drift-covered, except at the hill on the side of the lake. Here, near the north end of claim No. H.S. 308, the contact is exposed in two places about 40 feet apart, one exposure being just north of the boundary and the other just south of it

The contact dips 25° to 30° to the southeastward. The Keewatin basalt is altered to a banded rock with streaks of epidote paralleling the banding; the diabase cuts about at right angles across the banded basalt, and the contact is sharply defined in consequence. At the foot of the hill the coarse-grained Nipissing diabase is exposed, and a shaft has been sunk in it.

In the preceding paragraphs we have followed almost completely around the outside of the Nipissing diabase dome. The east part of the dome is partly covered by the water of Lake Timiskaming, but outcrops on the Quebec side of the lake along the shore. According to the geological map-sheet No. 1066, of the Geological Survey of Canada, the diabase contact near the shore is drift-covered.

The contact along the inside of the diabase dome may now be followed, commencing at the shore of lake Timiskaming at the south end of claim No. H.R. 61.

The Inside of the Diabase Dome (Bottom of the Sill).

The bottom of the Nipissing diabase is well exposed a little over half a mile west of Lake Timiskaming on or near claim No. H.R. 30. Forest fires have destroyed the trees, and lines are difficult to find. At the foot of a low cliff the diabase contact is exposed in two places, resting on finely bedded slate-like greywacké of the Cobalt series. The contact follows the bedding; contact and bedding dip 9° to the northwestward at one point and, at another 200 feet north, 13° to the northwestward. The jointing in the diabase is well defined along the contact, the most prominent jointing being at right angles to the contact.

From claim H.R. 30 westward to the northwest shore on Loon lake, a distance of a mile, the contact is either heavily drift-covered or hidden under the water of Loon lake.

Southward from the northwest corner of Loon lake for half a mile the contact of the bottom of the diabase sill is exposed in half a dozen places. Prospectors have trenched it here and there. The contact has a semicircular outline along this part, so that the dips strike from southwest, to west, to northwest, at angles of 10° to 35°. This semicircular outline of the contact is due to a local arching of the bottom of the sill, the arch striking apparently about northwestward along the west arm of Loon lake. At the top of the arch the diabase is resting on pink arkose and quartzite, while at the bottom of the arch, on the southwest side, the diabase rests on finely bedded slate-like greywacké. Where it lies on the slate-like greywacké it follows the bedding for a distance, then it leaves the bedding and rips upwards across the bedding, resting on the sediments at a higher and higher horizon until it finally rests on the pink arkose and greywacké at the top. The succession of the sediments of the Cobalt series

in this place is as follows, the older rocks being shown at the bottom of the column:

Arkose and quartzite.
Greywacké and slate-like greywacké.
Coarse boulder conglomerate.

The bedding of the slate-like greywacké dips at 10° to 14° to the northwest. The greywacké and slate-like greywacké have a thickness of 50 to 60 feet, and the total thickness of the whole section is from 150 to 200 feet. The coarse boulder conglomerate is at the bottom of the section; its thickness is not known. The arkose and quartzite are similar to the Lorrain arkose and quartzite, while the greywacké, slate-like greywacké and conglomerate are typical of the Cobalt series. The sediments are all conformable.

In places faulting has occurred parallel to the contact in the area southwest of Loon lake described in the two preceding paragraphs. The faulting is indicated by the presence of a fault breccia 15 inches or less in width; the direction and displacement of the faulting were not determined.

Southwest of the area described in preceding paragraphs the diabase contact is covered for three-quarters of a mile, when it is again well exposed on the south shore of a small lake on claim H.R. 98. The contact is exposed for 50 feet dipping at 40° and more to the westward.

About 250 yards south of the little lake the diabase contact is again exposed for about 40 feet; judging from the joint planes in the diabase, the bottom of the diabase sill here dips southwestward 30° to 40°. The slate-like greywacké nearby dips at 10° to the southwest.

South of the exposure referred to in the preceding paragraph another contact is exposed, but the direction of the dip is obscure. The slate-like greywacké dips 10° under the diabase.

About 200 yards north of the west arm of Oxbow lake another contact is exposed for 50 feet. The dip is obscured by a fusion between the diabase and the sediments; the jointing in the diabase dips 38° westward.

Oxbow lake constitutes the south end of the inside of the Nipissing diabase dome, and the contact of the bottom of the sill follows the bed of the lake in a rough semicircle, the contact being covered by water for more than a mile.

The southeast side of the dome dips at steeper angles than the northwest side, and the diabase sill along the southeast side appears to be thinner than elsewhere.

For a mile northeast of the east arm of Oxbow lake the bottom of the diabase sill is drift-covered. Then, 200 feet southwest from the northeast corner of claim H.R. 34, the contact has been exposed in a trench. Here the diabase is resting on altered Keewatin basalt which has a banded structure. The contact dips at 62° to the southeast.

From the last-mentioned exposure northeast for a mile and a half to Lake Timiskaming the contact is drift-covered, and it then passes below the waters of the lake.

Description of Properties.

Keeley.

The Keeley Silver Mines, Limited, has a capital of 2,000,000 shares having a par value of one dollar a share. All the shares have been issued. The company bought the original Keeley claim, H.R. 19, and the claim immediately to the west, H.R. 21, known as the Beaver lake claim.

The property was examined in the fall of 1921 and 1922, and brief visits were also paid during the latter part of January and early in May, 1923.

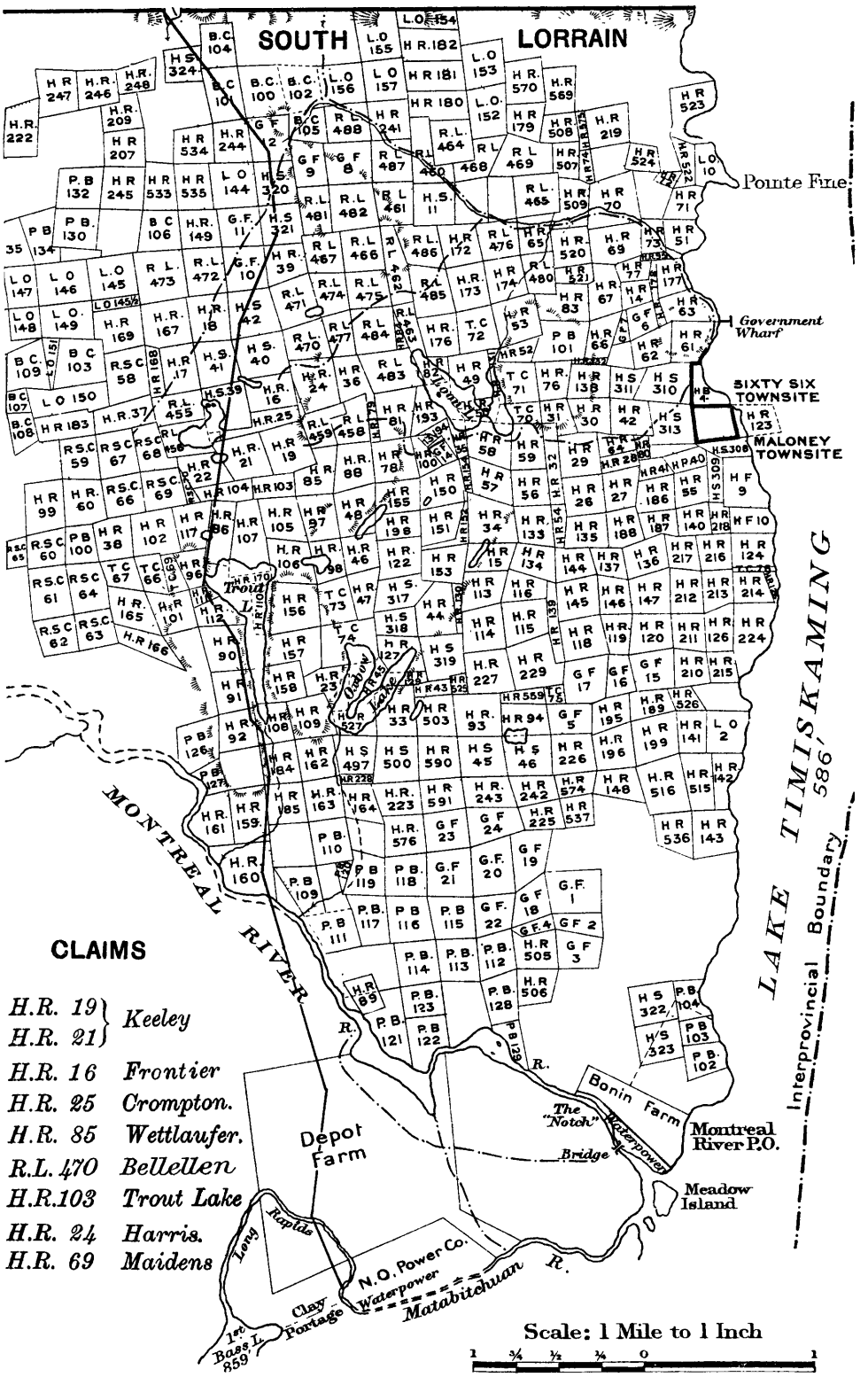


Fig. 6.—Plan showing claims in South Lorrain.

The first discovery was made by J. M. Wood and R. J. Jowsey on the original Keeley claim, H.R. 19, in the fall of 1907, and the first shipment of ore from the discovery was made by the owners of the claim, Charles Keeley, R. J. Jowsey and J. M. Wood, in the spring of 1908, and was received by the Deloro Mining and Reduction Company, Limited, Deloro, Ont., on the twenty-second of June of that year. The shipment consisted of twelve tons, dry weight, assaying 1,061 ounces of silver per ton. The value of the shipment was $6,068.52, of which amount $170.32 was credited to the cobalt and arsenic content. In the latter part of March, 1908, Mr. James Bartlett and the writer examined the open pit from which this shipment was made.[1] The pit was about 40 feet long and 14 feet deep, and the vein had a width of two to six inches showing some pure smaltite and wire silver.

The following account of the discovery of the Keeley mine has been kindly furnished by R. J. Jowsey:

> The find on the Keeley was made in the fall of 1907. J. M. Wood had been digging while I had gone to Haileybury for some provisions. I went to Haileybury on the last trip of the boat, and the lake froze, so I had to pack the supplies down on my back. When I returned Wood had found a chunk of smaltite, and had it in the camp when I arrived. I went out and helped him dig that evening, and next day, about three o'clock, he uncovered the vein when I was a little farther ahead in the trench. We left it on the window sill a couple of days, as it looked to be just smaltite. On Sunday we were looking at it when it had dried out, and noticed all those fine hairs in it. We were not sure of its value, so we had it assayed. If I remember right it was around 11,000 ounces of silver per ton.

Messrs Keeley, Jowsey and Wood then sold the property to interests connected with the now defunct Farmers Bank. The bank was only interested in the property on account of having made advances on a million dollars worth of bonds issued by Keeley Mine, Limited; and the bank was never owner of the mine. Keeley, Jowsey and Wood received $300,000 for the property. The total amount advanced by the bank, including the purchase price, wages, cost of plant, etc., was much greater than the above mentioned sum.

The property, under the name of Keeley Mine, Limited, was worked by interests associated with the bank until 1911, and about 24,337 ounces of silver were produced, mainly from the original discovery, No. 1 shaft. Wood's vein was not worked during this period in the history of the mine.

The affairs of the Farmers Bank then became involved, and the bank failed. The liquidators of the bank found themselves in possession of the Keeley mine, H.R. 19, but they did not allow the operating company, Keeley Mine, Limited, to fail. It was kept in good standing.

In 1913 J. Mackintosh Bell acquired an option on the property for the Associated Gold Mines of Western Australia, Limited. An option had been granted on the 26th March, 1913, by Keeley Mine, Limited, and the Farmers Bank to one, E. G. Aman, which option was assigned to the Associated Gold Mines of Western Australia, Limited, on the 12th June, 1913 The Associated Gold Mines of Western Australia, Limited, obtained several renewals of that option, and on the 23rd April, 1918, they obtained the last option. These were given by the Keeley Mine, Limited, and the Farmers Bank. The final payment on the property was made on August 1st, 1919; the total price paid was $110,000. Upon the Associated Gold Mines of Western Australia, Limited, making the final payment they received a transfer from Keeley Mine, Limited, and the Farmers Bank of the property, and they also received the majority of the stock in Keeley Mine, Limited, and the bond issue of a million dollars made by Keeley Mine, Limited, which was held by the Farmers Bank. Eventually these bonds were burned by J. Mackintosh Bell and the solicitor of the present

[1]Annual Report Ontario Bureau of Mines, 1907, Vol. XVI, Part II, p. 147.

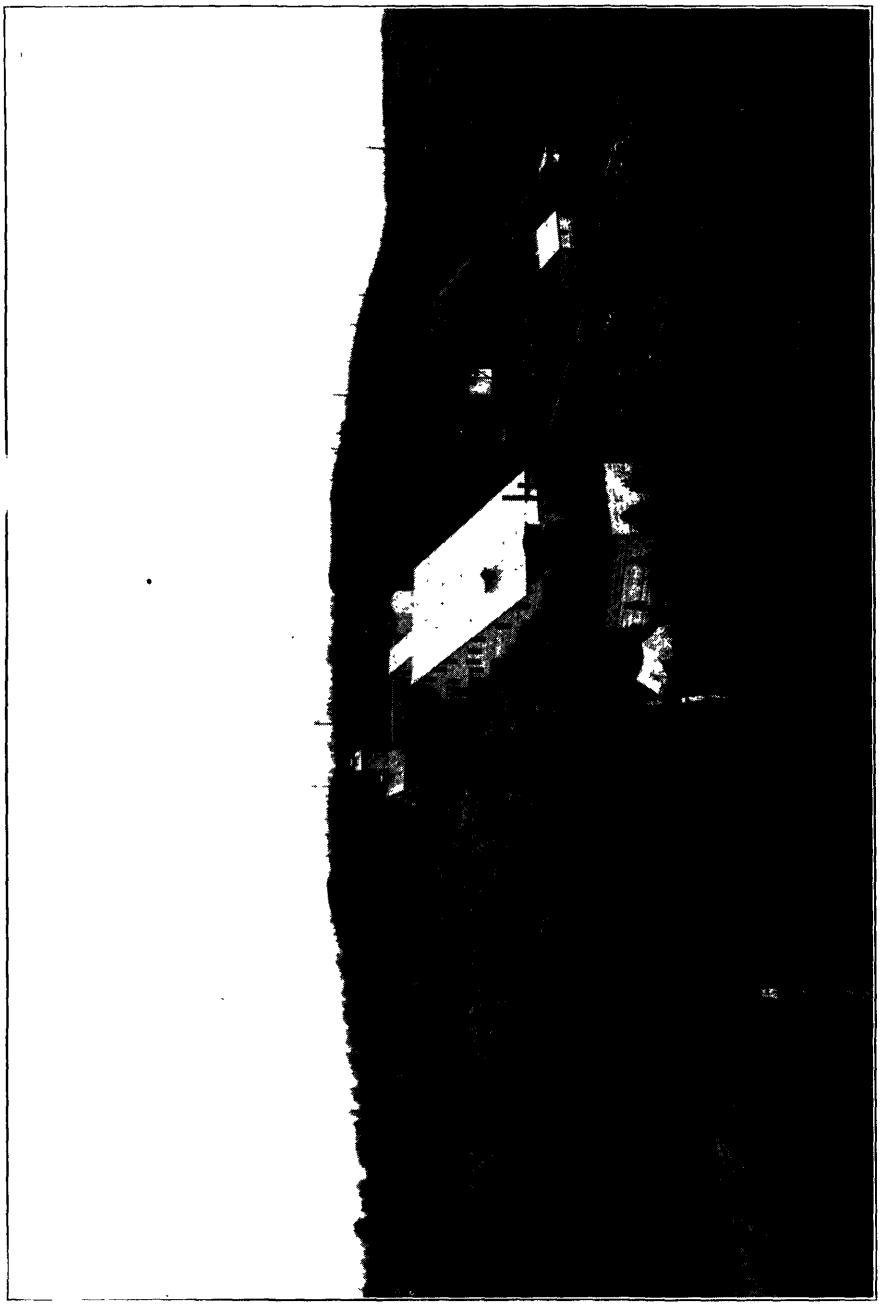


Fig. 7.—Keeley mine and mill, October, 1922.

company, W. H. Stafford. The writer is greatly indebted to these two gentlemen for much of the information regarding the history of the property.

The Associated Gold Mines of Western Australia, Limited, did not operate the original discovery at the Keeley mine, No. 1 shaft, nor have these old workings been connected with the main, present-day workings on Wood's and other veins at No. 3 shaft.

Between the years 1913 and 1919, work at the property was retarded and carried on intermittently on account of the Great War which lasted from 1914 to 1918. In 1914 the mine was worked with a force of 85 men, but, following the outbreak of war, the force was reduced in August from 85 to 20 men, and in September to 6 men, who were sinking by hand in No. 2 shaft. The mine ceased operations about the middle of October, 1914.

In 1915 the mine was worked from May to October 1st. In 1918 a shipment of ore, in stock from previous operations, was made; and the property was in operation between July and September. In 1919 work was carried on during the summer months with a force of 15 men.

Subsequent operations have been highly successful, and the mine has been operated without cessation up to the time this report went to press.

On account of the fact that Wood's vein, the "mother lode" of the productiv section, was first discovered on the Beaver lake claim, a few words may be add about its history. The claim, as already noted, is now owned by the Ke Silver Mines, Limited, and is contiguous to the original Keeley, H.R. 1 the west.

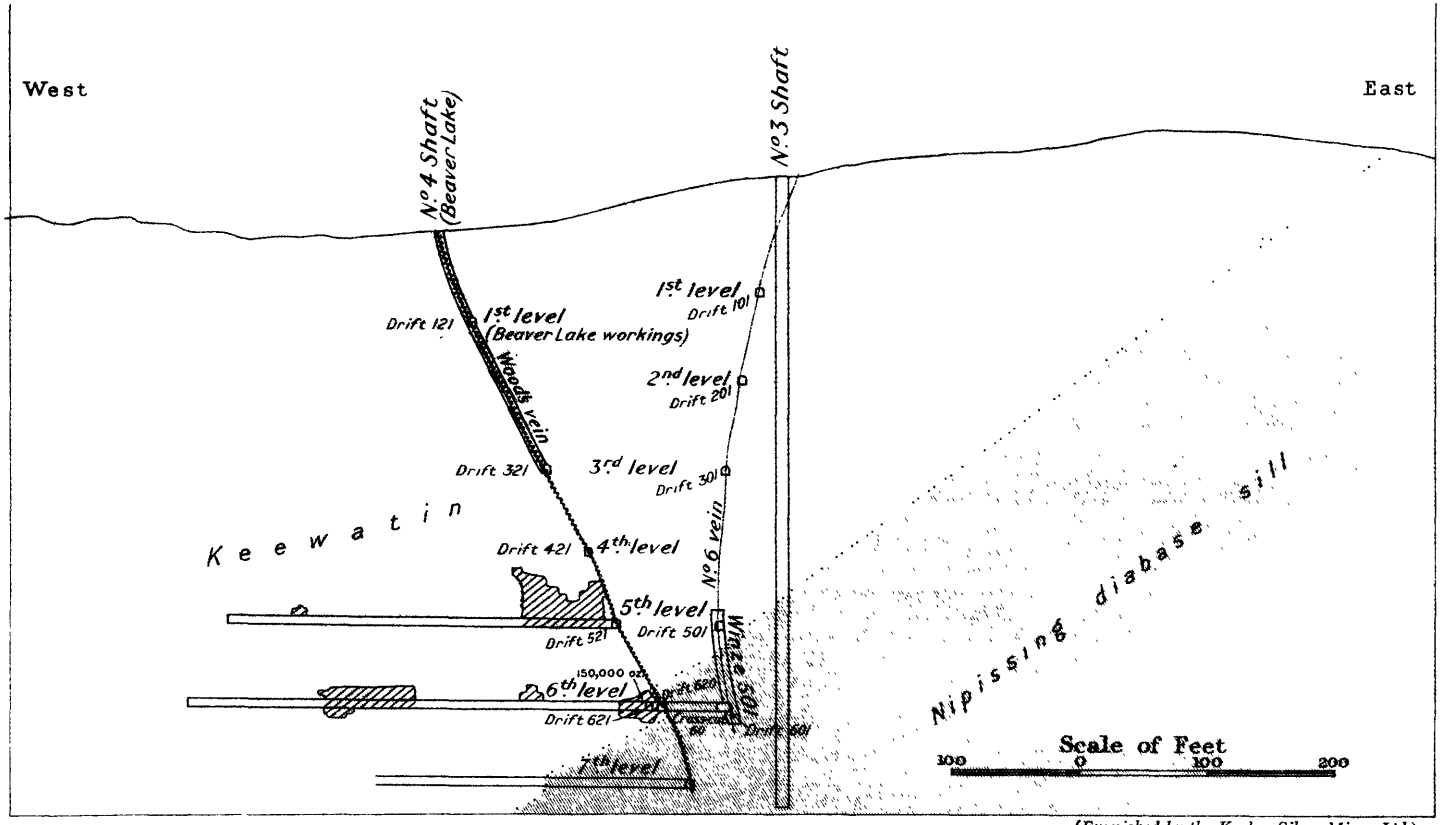
Wood's vein was discovered in 1908 by J. M. Wood on the Beaver lake cla H.R. 21. The southern two-thirds of the vein outcrops on the Beaver lake cl the northern third of the vein passes into the original Keeley claim In and 1909 Jowsey and Wood sank a shaft on Wood's vein, on the Beaver claim, near the west boundary of the Keeley. The shaft was sunk to a of 110 feet, and on the 75-ft. level a drift 75 feet long was run. Had Jo y and Wood drifted a short distance farther north they would have encounte ed a very rich ore-shoot known as D 3, Fig. facing page 34, although only a small part of the shoot is in the Beaver lake claim, most of it passing into the Keeley. But had Jowsey and Wood found this shoot the Keeley would undoubtedly have heard about it, and would have worked that part of the shoot which is in the Keeley, and which constitutes the largest part. The shoot has proved to be an important producer, and, if it had been discovered in those days, the discovery certainly would have led to an exploration of Wood's vein. Perhaps the rich ore-shoots four or five hundred feet below the surface might have been encountered by Farmers Bank interests, and the bank might have thus been saved from failure. But these are idle speculations. It remained the good fortune of the present company to discover at depth the fabulously rich silver ore of Wood's vein. Such are the vicissitudes, such the tragedy and romance of mining!

The credit for the discovery of Wood's vein must be given to Wood; and although this pioneer and his partners Jowsey and Keeley did not find any ore, they did find flakes of native silver in the vein.

Some of the early history of the Beaver lake claim is recorded by the inspectors of mines for Ontario and by A. G. Burrows, and their remarks are quoted below.

In 1908, the inspector of mines reported that the following work was done on Beaver lake claim:

The claims H.R. 21 and H.R. 22 are owned by the original owners of the Keeley mine, Messrs Keeley, Jowsey and Wood, and lie immediately to the west of it. Considerable trenching



(*Furnished by the Keeley Silver Mines Ltd.*)

VERTICAL SECTION ALONG VEIN 16 AND THROUGH NO. 3 SHAFT, KEELEY MINE

SOUTH LORRAIN, DISTRICT OF TIMISKAMING, ONTARIO

To accompany Ontario Department of Mines Report, Volume XXXI, Part 2, 1922, by Cyril W. Knight *on the Cobalt Silver Area.*

was done on the two claims during 1908, and veins carrying silver discovered. A shaft has been sunk on it 25 feet, and sinking was to be continued. This vein [Wood's] had a strike of about north and south, and was only a short distance from the west boundary of the Keeley claim.[1]

In 1909 the work reported on the Beaver lake claim, H.R. 21, by the inspector of mines was as follows:

Messrs Jowsey and Wood have been operating on claims H.R. 21 and H.R. 22, lying west of and adjoining the Keeley mine. A shaft has been sunk to a depth of 110 feet, and, on the 75-ft level, 75 feet of drifting done.[2]

A. G. Burrows in 1913 has the following remark to make concerning the Beaver lake claim, H.R. 21:

On H.R. 21 there are several calcite veins and one of these has shown on development native silver. This vein is near the east side line and strikes about north-northeast. A shaft has been sunk to a depth of 110 feet, and on the 75-ft. level 75 feet of drifting has been done. The gangue is calcite, which has a very fine crypto-crystalline texture, associated in bands with quartz and decomposed material. Leaf silver, in small flakes, has been found in the vein, associated with smaltite, copper pyrites and native bismuth. Minute crystals of chloanthite are scattered through the gangue.[3]

Veins and Rock Structures.

The structure of the rocks and the relation of the veins to the rocks are shown in the drawing facing page 25. The veins occur at the top of the Nipissing diabase sill, both in the sill and in the overlying Keewatin. The top of the sill at No. 3 shaft dips westward at an angle of 34°. Most of the ore has been found along this contact at a depth of 400 to 500 feet below the surface. An important shoot of ore was, however, met with only 55 feet below the surface; this shoot is known as D 3 in Wood's vein. There are also other ore-shoots 200 or 300 feet above the contact which are, on the whole, much lower in grade than those along the contact.

There are five main veins on the Keeley which are worked from the main, or No. 3 shaft. The veins at No. 1 shaft, the original discovery, are described elsewhere in this report; they have not been worked by the present company.

The five veins referred to are Wood's, and Nos. 26, 16, 6, and 20. The most important vein is Wood's. The others are branches of this vein. There are several other minor veins.

Wood's, Nos. 26, 16, and 6 are fault veins with displacements up to 30 feet. The writer has not had an opportunity of examining No. 20 vein. The displacement along vein 26 is not yet known.

Wood's vein occurs in a reverse fault, having an apparent displacement along the dip of about 30 feet, as nearly as could be ascertained in the present state of development of the mine workings. The horizontal displacement is not known, but the presence of more or less horizontal scratches on the walls of the fault show that some horizontal movement took place. The vein strikes about north and south, and dips eastward at an angle of 65°. The breccia of the fault is not wide, perhaps averaging one to six inches, in places being almost absent. The gouge, too, is narrow, showing only small fractions of an inch in width; in the weathered and oxidized zone the gouge is an inch wide. In places the walls of the fault are schistose. The vein in Wood's fault is, in places, exactly in the fault; that is to say, it abuts against the gouge. In other places the vein is in the hanging-wall a foot or two above the gouge; and, in other places, it is in the footwall a foot or two below the gouge. In the same face of the drift, from time to time, veins have been noted in the hanging-wall, in the footwall

[1] Annual Report Ontario Bureau of Mines, Vol. XVIII, Part I, 1909, p. 125.
[2] " " " " " Vol. XIX, Part I, 1910, p. 114.
[3] " " " " " Vol. XIX, Part II, 1913, p. 143.

and in the gouge. In places several irregular veins occur across a width of four or five feet. The breccia of the fault is in places cemented together by vein material, and the veins thus form an irregular network intersecting the fault breccia.

It is difficult to say what is the average width of Wood's vein. In places vein matter is almost absent, while in one place on the fourth level the vein has a width of three to four feet. It may average between three inches and a foot in width.

Some replacement of the wall rock by vein matter has taken place.

Pre-Glacial Weathering.

An interesting and unique condition occurs on the south part of the Wood's vein. Pre-glacial weathering has been preserved in this part of the vein, Fig. facing page 34. It has reached a depth of at least 480 feet below the surface. In no other mine in the entire Cobalt area has pre-glacial weathering been preserved, although, as stated elsewhere in this report, good examples are found in connection with ore bodies in other parts of Ontario. There is no absolute proof that the weathering is pre-glacial. It is simply assumed that sufficient time has not elapsed since the retreat of the glaciers to have allowed such deep weathering to form. J Mackintosh Bell was the first geologist to observe these conditions and he has given the first description of them.[1] For convenience, the term "weathering" may include disintegration, solution, leaching, oxidation and hydration. The mine workings have penetrated this weathered zone on the third, fourth, fifth, sixth and seventh levels. The third level penetrated the weathered zone for 600 feet; no indication was there noted that it was becoming less intense at the south end of the drift. The weathering has altered the country rock to a more or less soft clay. In places the clay has a reddish-brown and yellow colour. Elsewhere it has a pale greenish-grey colour. Towards the bottom of the weathered zone the pale greenish-grey clay is more common than the red clay. That is to say, the red variety of oxidation occurs, for the most part, at and near the surface, and the grey variety occurs, for the most part, at depth.

Judging from chemical analyses and tests made by W. K. McNeill, the red colour of the clay is due to ferric oxide, while the pale greenish-grey colour is due to ferrous oxide.

In places there is a sharp line of demarcation between the red clay and the grey clay; in other places there is a more or less gradual transition between the two. In the case of the sharp line of demarcation the fault sometimes separates the grey clay from the red.

The alteration of the country rock to clay was noted in one place across a width of six or seven feet. It is, on the average, much less than that.

The zone of contact, which is a very gradual one, between the weathered rock on the south and fresh solid rock on the north, is about vertical.

The question has been asked the writer whether the weathered zone will extend south to Trout lake, a distance of about half a mile, and whether it will follow along the bottom of Trout lake a farther distance south of a mile. This can be answered only by exploration of the ground. It is very doubtful, however, if the weathering will persist unless the Wood's or some other fault extends south to Trout lake. The reason that pre-glacial weathering has been preserved is that it followed down Wood's fault along a narrow zone on each side of the

[1]Bulletin, Institution of Mining and Metallurgy, February, 1922, "The Occurrence of Silver Ores in South Lorrain, Ont., Canada."

fault. Glaciation was not intense enough to remove the solid fresh rock on each side of the fault. Hence the preservation of the weathered zone in Wood's fault.

J. Mackintosh Bell forwarded two samples of ore from the weathered zone of Wood's vein to Ledoux and Company, New York. One of these samples was the red, ferric variety of weathered ore, and the other was the ferrous variety. Ledoux and Company found that the ferrous ore contained a large proportion of metallics which were principally silver. The sample of ferric ore contained, on the other hand, no metallics.

Ledoux and Company's letter, addressed to the Keeley Silver Mines, Limited, regarding these samples, is given below.

Practically complete analyses have been made on two samples of ore referred to in your letter of December 28, 1922.

The first sample, designated as "ferrous ore" contained a large proportion of metallics which were principally silver. On fine grinding we obtained: Pulp, 91.68 per cent.; Metallics, 8.32 per cent. Since in the ordinary practice of treating this ore the metallics would be separated in the preliminary stages by ball-mill crushing or otherwise, particular attention has been paid to analysis of the fine pulp, and only the principal elements in the metallics have been determined. Our analysis of the ferrous ore is as follows:

	Pulp per cent.	Metallics per cent.	Composite per cent.
Silica (SiO_2)	43.24	.....	39.6
Iron (Fe)	10.33	4.69	9.9
Alumina (Al_2O_3)	12.06	.....	11.1
Lime (CaO)	2.42	.....	2.2
Magnesia (MgO)	6.92	.....	6.3
Manganese Oxide (MnO)	0.68	.....	0.6
Arsenic (As)	10.36	10.42	10.4
Antimony (Sb)	0.53	.....	0.5
Copper	0.07	.....	0.1
Cobalt	0.33	.....	0.3
Silver	4.59	73.36	10.3
Sulphur	0.26	.....	0.2
Phosphoric Anhydride (P_2O_5)	0.30	.....	0.3
Gold	trace	0.06	.....
Bismuth, Lead, Zinc, Nickel, Selenium, Tellurium	None		

Silver.....3008.5 oz. per ton of 2,000 lbs.
Gold..... 0.88 oz. per ton " " "

It will be noticed that the elements determined in the pulp account for only 92 per cent. The balance is made up of oxygen combined with some of the iron and with other elements, combined with water as an essential part of the gangue and the alkali metals, potash and soda. The calculation of the composite is on the assumption that the metallics do not contain the constituents of the gangue matter, but of course some gangue constituents are included in the metallics. The metallics consist essentially of native silver, silver arsenides and iron.

The ferric ore developed no metallics on crushing and grinding. Our analysis shows:

	Per Cent.
Manganese Oxide (MnO)	1.33
Silica (SiO_2)	45.46
Iron (Fe) (Fe_2O_3 15.24)	10.67
Alumina (Al_2O_3)	19.92
Lime (CaO)	1.69
Magnesia (MgO)	3.92
Arsenic (As)	0.38
Antimony (Sb)	Trace
Copper (Cu)	0.06
Cobalt (Co)	0.28
Silver (Ag) (3.00 oz. per ton of 2,000 lb.)	0 01
Sulphur (S)	0.10
Phosphoric Anhydride (P_2O_5)	0.20
Combined Water	10.47
Gold	Trace

In this sample the iron is present principally as ferric oxide, (Fe_2O_3) but an exact determination of the state of oxidation is impossible on account of the presence of arsenic, sulphur and perhaps other oxidizable elements. So far as we can see from the results of our analysis, there is nothing in the ferrous ore that should interfere with ordinary milling operations. While the ferric ore likewise contains nothing deleterious, it contains nothing valuable except a small proportion of cobalt and three ounces of silver per ton. If this is a characteristic sample, we venture to say that the ferric ore should not be included with the ferrous in milling operations.

Secondary Silver.

It is generally accepted that most of the native silver at Cobalt is primary.[1]

The primary character of all the silver at the Keeley mine, however, is to be doubted. Some of the silver which occurs in the weathered zone, described in preceding pages, is in all probability secondary, as was first pointed out by J. Mackintosh Bell. It would be difficult, nevertheless, to reach a definite conclusion as to what proportion of the silver in the Keeley mine is primary and what proportion is secondary.

This much may be said: In the oxidized zone native silver in thin leaves has been found deposited on top of red iron oxides. These red iron oxides are secondary; and hence the leaf silver deposited on top of the oxides is also secondary. Very little native silver, however, occurring under this condition has been noted.

Again, soft spongy layers of native silver were noted resting loosely on top of smaltite. The sponge silver could be removed with the nail. This silver is doubtless secondary, having been leached out of the upper greatly oxidized zone and precipitated when the silver solutions came in contact with the unaltered smaltite at depth. Little of such silver was noted.

Probably the ruby silver occurring in geodes and vugs is also secondary. The wire silver, so common at the Keeley mine, is also doubtless secondary.

Beyond these statements the writer is not prepared to go at the present time. An examination of many polished surfaces of the ore might lead to a more definite idea as to how much silver at the Keeley is primary and how much is secondary

More light may, perhaps, be thrown on this subject when mining operations have reached the bottom of the weathered zone.

W. K. McNeill tested some of the native silver in vein No. 26 on the 480-ft. level for mercury and found it to contain a trace.

Description of Keeley Mine Workings.

The workings of the Keeley mine may now be described in detail, and if reference be made by the reader to the level plans accompanying this report the descriptions will be more readily followed.

The workings from the main shaft, No. 3, will first be described, beginning with the bottom level.

Workings from No. 3 Shaft, Keeley Mine.

Seventh level, 480 feet below collar of No. 3 shaft.—There are on the seventh level four productive veins, namely, Wood's, No. 26, which is sometimes called the "Birthday," No. 16, and No. 20. This level is the richest in the mine.

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[1]The Cobalt Nickel Arsenides and Silver Deposits of Timiskaming, by Willet G. Miller, Annual Report Ontario Bureau of Mines, Vol. XIX, 1913, Part II, and Guide Book No. 7, pp. 90-95, International Geological Congress, 1913.

Wood's is a fault vein, the displacement of which has been worked out on the level above. It dips to the east at 55° to 69° and strikes about north and south. The fault shows very little gouge or fault breccia; the gouge is for the most part but a small fraction of an inch in width, and the fault breccia some two or three inches. In the oxidized zone at the south part of the level the gouge and fault breccia are wider; in places the gouge is an inch and a half in width and the fault breccia six inches in width. Here and there in the gouge horizontal scratches were observed; other scratches were noted dipping at 10° to 15° to the north. Evidently there was some horizontal movement along Wood's vein. In places the fault contains little vein matter. North of the shaft about 80 feet Wood's vein became wider, and early in October, 1922, a high-grade shoot was discovered. Part of this shoot, for a length of 40 feet, assayed from 500 to 14,800 ounces of silver to the ton; one part of the shoot 12 feet in length had a width of six to fifteen inches and assayed, according to the returns of the company, 8,000 to 14,800 ounces of silver per ton. This rich shoot was in the hanging-wall of the fault about two feet east of the gouge. The writer was fortunate enough to have been at the Keeley mine in October, 1922, when this shoot was discovered, and was therefore able to photograph it, Fig. 1.

At the south part of Wood's vein a shoot of silver ore was discovered, having a length of 198 feet, which gave an average assay return of 370 ounces of silver per ton across an average width of 19 inches, according to the sampling of the company. This shoot is known as "N" shoot.

In the Keeley mine on the seventh level there are thus two ore-shoots in the Wood's vein.

In December, 1922, vein No. 26 was discovered. In this vein was found the most consistent shoot of high-grade ore encountered in the mine up to March, 1923. It had a length of 74 feet and, according to the company reports, gave an average assay return of 2,600 ounces across an average width of 15 inches. It is reported by the management that in drifting 74 feet along this shoot the company mined 250,000 ounces of silver; no stoping was done to recover this output. At one place this wonderful shoot had a width of about five feet, but this width was only local and appeared to be due to a sudden swell in the vein, combined with a sharp bend, Fig. 8.

Vein No. 26 is at the south part of the level. It is a branch of Wood's vein and very gradually leaves this vein almost paralleling it for about 60 feet, at a distance of 2 to 5 feet. Vein 26 then turns to the northwestward, just about the point at which the ore-shoot began to develop. The writer examined the vein on January 24th and 25th, 1923. At that time it showed very little calcite, but was characterized by a high percentage of smaltite, some of which occurred in vuggy, kidney-like or grape-like rusty masses. The native silver, in places, was noted to occur in thin leaf-like forms in vugs, and on top of the kidney-like or grape-like masses of smaltite. Vein No. 26 appears to occur in a fault of small though unknown displacement.

At the south end of the level vein No. 20 was discovered early in the year 1923. It is a branch of Wood's vein on the east side and strikes eastward. The writer has not seen this vein, but it is reported to contain high-grade ore, the native silver occurring in "matted" forms.

Vein No. 16 is a branch of Wood's vein. It leaves the latter in a gentle curve and finally strikes westward, about at right angles to Wood's vein. In October 1922 the vein had been followed westward for 225 feet. It is in Nipissing diabase for some distance west of Wood's vein. Where the vein occurs in the

diabase it is vertical, but where it enters the Keewatin it dips at an angle of about 60 to the south. This southerly dip is due to the fact that where the vein enters the Keewatin it follows the footwall of a mica-lamprophyre dike and, as the dike dips to the southward at 60°, so the vein also has this dip. It is another instance, so common in the Cobalt area, of a vein following the strike and dip of a lamprophyre dike. In every case, of course, the lamprophyre dikes

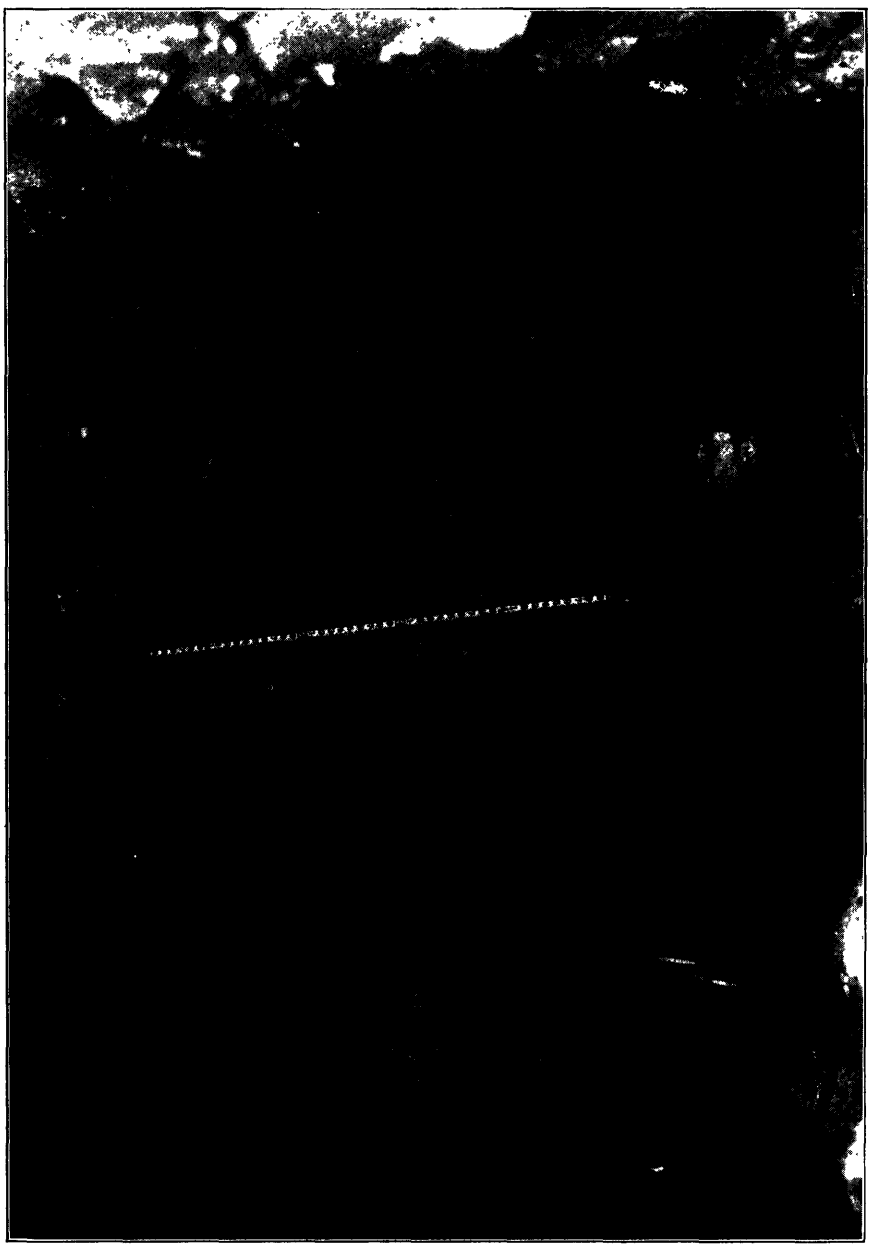


Fig. 8.—Keeley mine, vein No. 26, 480-ft. level, January 24th, 1923. The vein is four to five feet wide on this face, but pinches out rapidly to normal size. The ore averages 7,000 ounces of silver per ton. Major Leonard G. Smith in the photograph.

are younger than the Keewatin, but older than the Nipissing diabase. At the time of our examination in October 1922, vein No. 16 had been traced for 100 feet along the footwall of the lamprophyre dike. Vein No. 16 is a fault vein; it has faulted the contact of the Keewatin and Nipissing diabase about two feet horizontally, the vertical movement not having been ascertained. The fault breccia is six inches wide in places. A stope section along vein No. 16 is shown in the drawing facing page 25.

Weathering and oxidation of Wood's vein and wall rock first develops about 75 feet south of vein No. 16 where there is a zone, about 15 feet in length, of red oxidized material. The back of the drift along this 15-ft. zone had soft and dangerous rock, necessitating some timbering. South of this small oxidixed portion weathering almost ceases for about 50 feet, when it again develops, and in places the Nipissing diabase is altered to a more or less soft green clay for a width of at least 4 or 5 feet in places. Most of the oxidized material has a pale greenish-grey colour, although some is coloured reddish-brown due to ferric oxide.

An analysis of the weathered Nipissing diabase at the south part of Wood's vein was made by W. K. McNeill, Provincial Assayer, and T. E. Rothwell. The specimen analyzed was a clayey material having a pale greenish-grey colour; and although the rock minerals were apparently almost entirely altered to kaolin the specimen still preserved its diabase texture.

ANALYSIS OF GREENISH-GREY CLAYEY MATERIAL (ALTERED NIPISSING DIABASE), KEELEY MINE, 480-FT. LEVEL, WOOD'S VEIN, IN OXIDIZED ZONE.

	Per Cent.
Silica	44.76
Alumina	25.06
Ferrous oxide	5.23
Ferric oxide	5.54
Lime	5.76
Magnesia	3.12
Potash	1.64
Soda	1.44
Carbon dioxide	0.28
Water	7.42
	100.25

Vein No. 26 is stained here and there with red oxides, but the weathering of the wall rock is not marked.

On levels above, the red oxides of iron are more common in the weathered zone than they are on the seventh, 480-ft. level.

Much water was encountered in certain parts of the oxidized portion of Wood's vein; on October 23rd, 1922, the flow taxed the capacity of the pumps. More water was encountered in the weathered part of Wood's vein on the various levels than was met with in the unweathered portions of the vein at the north part of the workings.

The workings on the seventh level are almost entirely in the Nipissing diabase sill. All of Wood's vein is in the diabase. The Keewatin was met with in the drift along vein No. 16, about 100 feet west of Wood's vein; the Keewatin was also met with in the drift on vein No. 28 west of Wood's vein. The dip of the diabase contact where it occurs in the drift along vein No. 16 is about vertical, but this vertical contact is, persumably, a local irregularity

Sixth level, 418 feet below collar of No. 3 shaft.—The productive veins on the sixth level are Wood's, No. 16, and No. 6.

Wood's vein marks the contact between the Nipissing diabase and the Keewatin. In October, 1922, the vein had been drifted on for nearly 700 feet,

disclosing Nipissing diabase on the hanging-wall, east side, and Keewatin basalt on the footwall, west side, except at the north and where the diabase forms both hanging-wall and footwall. The contact of the top of the diabase on the footwall dips, at the north end, at an angle of 10° to the south, drawing facing page 34.

Wood's vein is in a fault. As far as could then be determined, the fault is a reverse one, with a displacement of about 30 feet, more or less, along the plane of the fault, drawing facing page 25. But horizontal scratches on the walls of the fault on the level below show that some horizontal movement has taken place. Sufficient work had not, however, been done to definitely determine the exact displacement, either along the dip or along the strike of the fault.

Wood's vein on this level is, in places, a strong one, showing at one point 12 to 15 inches of smaltite; in other places there is little or no vein matter. At the north part of the drift the vein apparently leaves the fault for about 50 feet and enters the hanging-wall, finally, however, entering the fault again farther north, as shown by the plan of this level. North of this there are vugs in the fault, and some beautiful crystals of argentite and ruby silver were found in these vugs.

The fault breccia varies in width from two to fifteen inches; it will average probably less than three or four inches. The gouge is but small fractions of an inch in width, showing in one place, however, a width of an inch.

Weathering and oxidation along Wood's vein and wall rock on the sixth level begins about 20 feet south of the crosscut which runs from No. 6 vein to Wood's vein. The oxidation increases in intensity towards the south until on the face there are three feet or more of soft, brownish-red decomposed rock. In places the hanging-wall of Nipissing diabase is completely altered to the soft, clay-like material with a pale, greenish-grey colour, already mentioned, which still retains the diabase texture of the original rock. At the south end of this oxidized zone some very rich lenses of silver ore, a few feet long and one to three or four inches wide, were met with. In this part of the fault there were found lenses of smaltite; and in cracks in the smaltite there occurred plates of soft, spongy silver. This silver could readily be removed from the smaltite with the finger. Such occurrences of silver, in cracks in the smaltite, are apparently of secondary origin. The silver was probably dissolved out of the upper part of the vein in the oxidized zone and carried down and re-deposited on the smaltite. In this part of the vein there is much wire-silver, growing in geodes in the smaltite.

Vein No. 16 is an important one on this level although it has not yet been so productive on other levels. It leaves Wood's fault in a gentle curve and is evidently a branch of Wood's fault, running at about right angles to it. Immediately west of the fault a rich shoot was encountered in No. 16 vein. The stope in this shoot is only 30 feet long and 25 feet high, yet it produced about 150,000 ounces of silver. The vein in this stope was in places 12 inches wide of smaltite. The shoot did not extend quite up to Wood's vein, but a small calcite stringer did enter the latter. The vein had been followed west for some distance, and two more shoots of less importance were found, drawing face page 25. The vein in the drift, west of the rich shoot, is a strong calcite vein showing in places a width of 15 inches. It follows a mica-lamprophyre dike, as on the seventh level. The vein is sometimes on one wall of the dike and sometimes on the other.

Vein No. 16 is evidently a fault vein, as there is about half an inch of fault breccia and gouge in the fissure. On the seventh level the fault has a horizontal displacement of about two feet.

Vein No. 6 is a strong, white calcite vein up to a foot in width, dipping 70° to the east. In places the vein is almost frozen to the walls, while elsewhere there are from one to perhaps three inches of fault breccia and gouge. On the fifth level, 35 feet south of the shaft, a winze was put down on No. 6 vein. In this winze, 17 feet below the fifth level, on the east side of the vein, the top of the Nipissing diabase sill was met with; while on the west side of the vein the Nipissing diabase was encountered 19 feet below the fifth level. Thus, vein No. 6 is in a reverse fault which has displaced the diabase contact two feet (drawing facing page 25).

Fifth level, 355 feet below collar of No. 3 shaft.—Nearly all of the level is in Keewatin, cut by lamprophyre dikes. A little Nipissing diabase occurs at the shaft and in two nearby drifts. Opposite the shaft the contact between the Nipissing diabase and Keewatin is vertical, but this is a local irregularity.

Wood's vein varies in width from an inch or two to about a foot. The fault in which it occurs shows about one to three or four inches of fault breccia and gouge. In places the vein consists of a number of small, irregular stringers which evidently, in part at any rate, replace the wall rock, which is somewhat schistose. Here and there a lamprophyre dike was noted along the walls of the vein on this level. In places a little pink feldspar occurs in the vein. The south end of the vein and wall rock is oxidized, the intensity of oxidation increasing towards the south.

Vein No. 16 is a strong vein, up to 18 inches wide, of white calcite, and at one place 30 feet west of Wood's fault, 12 inches of pure smaltite was exposed; some high-grade silver ore also occurred here. The vein follows a mica-lamprophyre dike, as it also does on the two levels below. On the west face there was half an inch of gouge in the fault in which this vein occurs.

No. 6 vein is a strong one, four to six inches in width, in places as wide as 12 to 18 inches of calcite. In places it splits into six parallel stringers. A stope has been worked on this vein.

Fourth level, 296 feet below the collar of No. 2 shaft.—This level is not connected directly with No. 3 shaft. It is reached by a winze from the third level. The rock consists of Keewatin basalt cut by lamprophvre dikes.

The fourth level had, up to November, 1922, proved to be barren. The work had been done wholly on Wood's vein, the drift on the vein being 550 feet in length. The vein is a strong one, at one point showing four feet of white calcite. In places a finely banded texture occurs, due to the interbanding of pink and white calcite, as many as 50 bands or more having been counted across six inches. There is a pink, fine-grained variety of calcite in the vein in places, a sample of which was submitted to W. K. McNeill for analysis, the result of which was as follows:

ANALYSIS OF FINE-GRAINED, PINK CALCITE, KEELEY MINE, 296-FT. LEVEL.

	Per Cent.
SiO_2	0.20
MgO	0.16
CaO	53.91
MnO	0.10

The vein is not always in the fault. It leaves the fault at times, and parallels it at a distance of three feet or so in the hanging-wall.

The gouge and fault breccia have a combined width of two or three inches.

The south end of the drift is oxidized for 200 feet, the intensity of the oxidation increasing towards the south. On the south face of the drift there is one foot of soft clay, stained brown or yellow; on each side of this clay the walls are stlll hard but are stained with iron oxides.

Third level, 235 feet below the collar of No. 3 shaft.—This level is all in the Keewatin basalt, cut by lamprophyre dikes of Haileyburian age. It is one of the most extensive workings in the mine, the Wood's vein having been drifted on for about 1,200 feet. The Wood's vein, as on lower levels, pinches and swells, and is as wide as 15 inches in places.

The south part of Wood's vein and adjacent country rock is oxidized and weathered for 600 feet. Oxidation begins about 125 feet south of the crosscut which goes to the main shaft. The oxidation is at first not marked. It first becomes evident by the appearance, in cracks and joints of wall rock and vein, of reddish-brown limonite together with the earthy variety of limonite which has a brownish-yellow and ochre-yellow colour. Proceeding south along the drift this oxidation becomes more intense. The wall rock gradually turns soft until finally in places the rock is almost completely decomposed to a soft clay. In some places the rock is altered to this soft material across a width of four feet. The decomposed and oxidized rock, fault breccia, and vein material have for the most part a reddish-brown colour. In places the material has a pale grey colour tinted with pale green. The lamprophyre dike, which here and there forms the wall rock of Wood's vein, appears to have weathered more readily than the hard, tough basalt. At one place a sample of this altered lamprophyre was taken and submitted for analysis to W. K. McNeill, Provincial Assayer, and T. E. Rothwell, who found it to have the following composition. It will be noted that the iron occurs almost wholly in the ferric state, Fe_2O_3, probably accounting for the red colour.

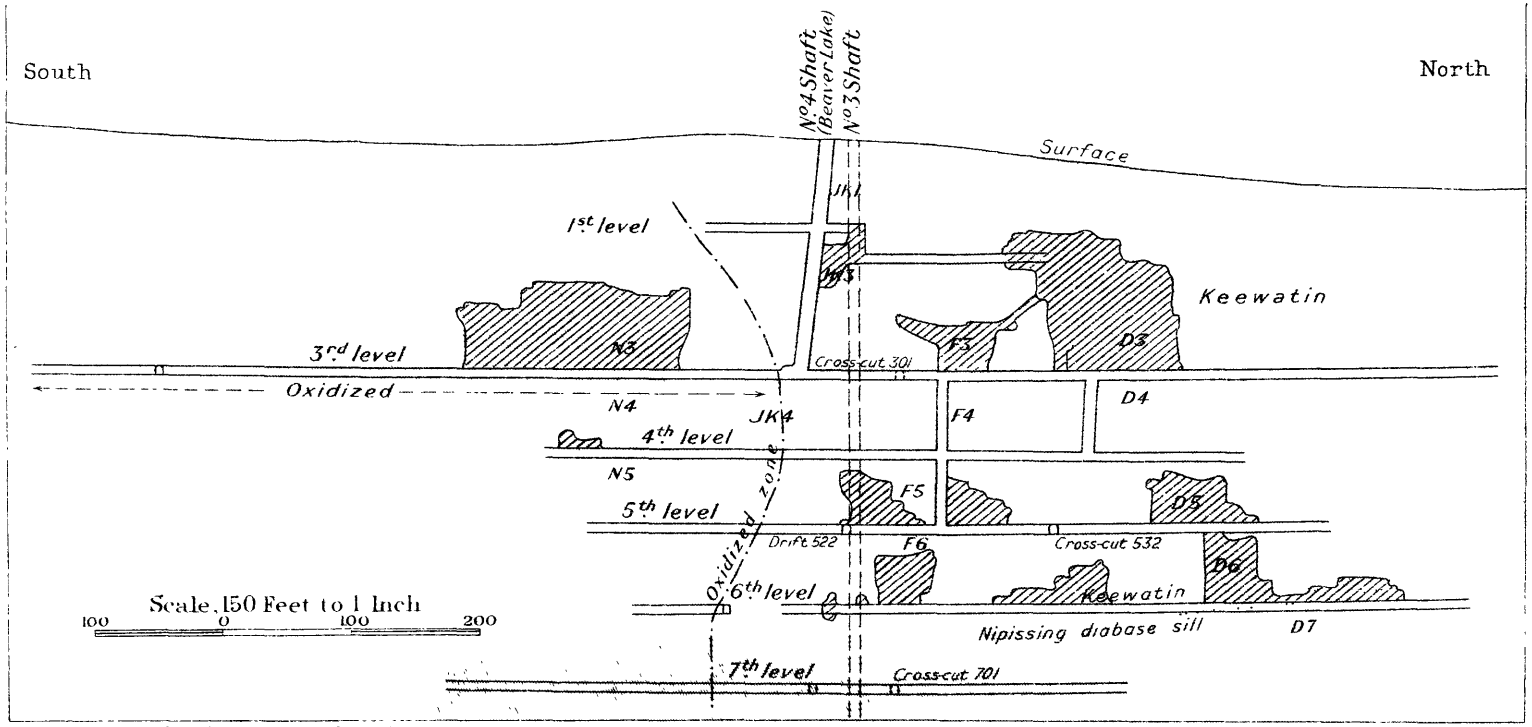
Analysis of Reddish-brown Clayey Material (altered Mica-Lamprophyre Dike) Keeley Mine, 235-ft. level, Wood's Vein, in Oxidized Zone.

	Per Cent.
Silica	44.30
Ferric oxide	13.37
Ferrous oxide	Trace
Alumina	24.19
Lime	1.25
Magnesia	2.24
Soda	0.72
Potash	0.32
Water	12.97
Carbon dioxide	0.90
Total	100.26

Some of the pale greenish-grey clay in the oxidized zone of Wood's vein was tested by W. K. McNeill who showed that this clay contained the iron largely in the ferrous state, while in the red and brown clay the iron is largely in the ferric state.

In the south part of Wood's vein there is a stope 175 feet long and 75 feet high in the oxidized portion of the vein. In this stope the width of the oxidized zone varies; in places it is but six inches wide. In December, 1921, a little of the oxidized ore was being treated in the mill, but in November, 1922, none of this material was being used. It is difficult to treat with the present process in use at the mill, and some other method will be adopted for treating it.

In the stope referred to above there are, here and there, thin films of native silver deposited on top of films of reddish-brown oxide of iron. As these oxides are certainly secondary, it follows that this leaf silver must also be secondary in origin. This secondary silver has probably been leached out from portions of the vein higher up.



(Section is drawn along foot wall of Wood's vein)

(Furnished by the Keeley Silver Mines Ltd.)

STOPE SECTION ON WOOD'S VEIN, KEELEY MINE

SOUTH LORRAIN, DISTRICT OF TIMISKAMING, ONTARIO

To accompany Ontario Department of Mines Report, Volume XXXI, Part 2, 1922, by Cyril W. Knight *on the Cobalt Silver Area.*

Wood's fault near the south end of the drift branches, one branch continuing southward along the general strike of the vein and the other turning and striking southeastward. The southeast branch, judging from the fault-breccia, is the stronger fissure. On the south face of this southeast branch the rock is decomposed across five or six feet to a soft, grey, clay-like material. This branch of the fissure contains a rusty quartz vein one to six inches wide, carrying here and there galena, zinc blende and iron pyrites. It is curious that some of these sulphides should be perfectly fresh, while the country rock is so much decomposed that it is now altered in places to a soft, clay-like substance. In the fault breccia there is much reddish-brown (ferric) material.

No. 6 vein is in a minor fault, as evidenced by a small gouge and breccia one-half to one inch wide. The vein in this fault may average two or three inches in width, and is as wide as six inches. In places there is no vein material whatever in the fault. The vein and fault breccia are slightly oxidized, beginning about 125 feet south of the shaft. In this part much cobalt bloom occurs along the vein.

Second level, 164 feet below the collar of No. 3 shaft.—The level is in Keewatin basalt. No. 6 vein is a strong-looking calcite vein one to eight inches wide. It contains some small shoots of smaltite a few feet in length, but carries no silver. No. 6 vein and its branch, No. 9, have been drifted on for 300 feet. No. 6 shows a fault breccia and gouge about half an inch in width. The south end of No. 6 vein and country rock is oxidized for 50 feet. Wood's vein was not worked on this level.

First level, 100 feet below collar of No. 3 shaft.—This level is in the Keewatin basalt. No. 6 vein and its branch, No. 9, have been worked. No. 6 averages in width from two to three inches of calcite and is wider in places. No. 9 vein is 12 inches in width in places, consisting of calcite; it also shows four inches of smaltite in one place. South of the shaft there is a stope on No. 6 vein about 30 feet long and some 15 feet high. It is reported that one of the old companies obtained a small quantity of silver from this stope. No. 6 vein shows evidence of movement along the wall; there is a fault breccia of about an inch. The vein dips 75° westward, whereas on the sixth level it dips eastward.

Workings from No. 4 Shaft (Beaver Lake).

No. 4 shaft is also called the Beaver Lake shaft, it having been sunk on the Beaver Lake claim, H.R. 21, which is now a part of the Keeley Silver Mines, Limited. The shaft was sunk on Wood's vein, and is, therefore, an inclined one as the vein dips eastward about 65°. There are two levels, namely the 74-ft. level, and the 98-ft. level, known as the intermediate. These two levels are shown on the plan of the third level of the No. 3 shaft. The No. 4 shaft extends down to the third level of the No. 3 shaft.

74-ft. level.—This is a short level and consists of a drift 120 feet long on Wood's vein. Had the original workers continued the drift a short distance farther north, an important high-grade shoot of ore known as "D3" would have been encountered, although it is largely on the original Keeley claim H.R. 19.

98-ft. (intermediate) level.—This level was run by the present operating company, and on it was encountered the high-grade shoot of ore known as "D3" referred to in the preceding paragraph. The shoot was 60 or 70 feet long and was one of the longest high-grade shoots in Wood's vein. The back of the stope was, at the time of our examination in October, 1922, about 55 feet below the surface (stope section facing page 34).

Workings from No. 1 Shaft, Original Discovery, Keeley Mine.

The mine workings from No. 1 shaft are those which were first worked by interests connected with the Farmers Bank. The original discovery was made there by J. W. Wood and R. J. Jowsey. The present company has not attempted to operate these old workings.

On October 28th, 1922, the writer made an examination of these workings. The levels were fortunately all accessible, owing to the fact that the water was kept pumped out for use on the property. The old workings are distinct and separate from the later workings, and have not been connected with the latter. No silver production has come from them since the present company bought the property. Including drifts, crosscuts and shafts the length of the workings amounts to some 1,800 feet. They are in Keewatin basalt and Nipissing diabase, the first 168 feet of the shaft being in Keewatin. The top of the Nipissing diabase sill was encountered at this depth, and the work below this, on the third level, was all done in the diabase. The workings show that the contact of the diabase and Keewatin dips at about 28° to the west.

There are three levels, at 61, 131 and 206 feet, respectively, below the collar of the shaft. No stoping was done on the third level. There is a small stope about 25 feet long in Keewatin on the second; and there are four stopes on the first level, the largest of which is about 90 feet in length, all in Keewatin. The first level was the only one of importance as far as production is concerned.

These old workings produced 24,337 ounces of silver, according to the records of the Ontario Department of Mines.

Beginning with the bottom level the following notes may be of interest:—

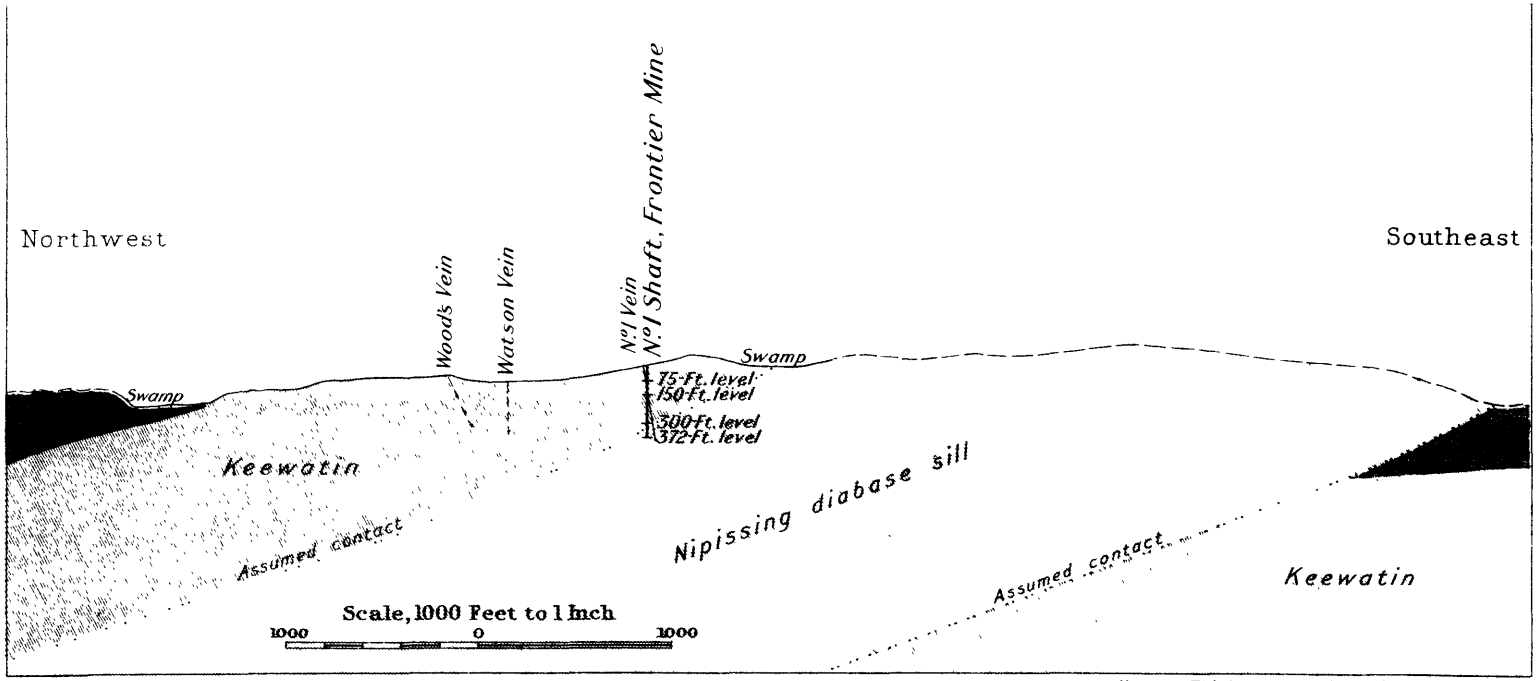
Third level, 206 feet below the collar of No. 1 shaft.—The level is entirely in the Nipissing diabase, at the top of the sill The contact between the diabase and Keewatin in the shaft is approximately 38 feet above the level.

There are some twelve veins on the level, consisting of pink and white calcite, barren of silver. They are more or less parallel and strike west 10° to 30° north. The veins are mostly from a half to an inch or two in width; the largest is No. 1 A vein at the shaft which is from a half to four inches in width.

Second level, 131 feet below the collar of No. 1 shaft.—The west part of the level is in Keewatin, and the east part Nipissing diabase, the contact dipping 26° westward. Practically all the work has been done on No. 1 vein which, west of the shaft, shows in one place five parallel veins from one-half to three inches in width, one of them showing two inches of smaltite and niccolite. A stope about 25 feet long occurs here. East of the shaft this vein is scarcely more than a pronounced joint crack, showing evidence of a little movement.

At the east end of the workings No. 8 vein is a fault vein dipping 60° southwest. It carries a little cobalt bloom. The work on the level below had not been, it would seem, carried far enough northeast to encounter this vein.

First level, 61 feet below the collar of No. 1 shaft.—Most of the silver production came from the first level. It is almost wholly in Keewatin, except about 20 feet at the southeast corner of the workings which is in Nipissing diabase. No. 1 vein at the shaft has a stope about 90 feet long and some 30 feet high, as far as could be ascertained. No. 8 vein at the northeast part of the workings is a fault vein with a dip of 80° to 90° southwest. There are two stopes on this vein, one 20 feet long and the other 15 feet. A vein at right angles to No. 8 vein has a stope about 20 feet long. There are thus four stopes on the first level. The veins, as far as could be seen, vary in width from fractions of an inch to four inches.



Note:- *Thickness of Nipissing diabase sill is not known. It is at least hundreds of feet thick.*

VERTICAL SECTION THROUGH NO. 1 SHAFT, FRONTIER MINE

SOUTH LORRAIN, DISTRICT OF TIMISKAMING, ONTARIO

To accompany Ontario Department of Mines Report, Volume XXXI, Part 2, 1922, by Cyril W. Knight *on the Cobalt Silver Area.*

Frontier and Crompton.

In 1922 the Mining Corporation of Canada, Limited, was working the Frontier and Crompton properties. The number of the Frontier claim is H.R. 16, and that of the Crompton H.R. 25. The Crompton is a narrow claim, about 500 feet wide, between the Frontier on the north and the Keeley on the south. Both properties are worked from the same shaft, namely, No. 1. In the spring of 1923, however, a new shaft, No. 3, was begun.

The Haileybury Silver Mining Company originally owned H.R. 16. In the year 1909 this company sold the south half of the claim, 20 acres, to the Haileybury Frontier Mining Company. The Mining Corporation of Canada, Limited, subsequently bought the north and south half of H.R. 16, and this claim, H.R. 16, is now generally referred to as the Frontier. The company also owns the Little Keeley, H.S. 40, north of the Frontier, and the Forneri, H.S. 42, north of the Little Keeley. Other claims have been acquired.

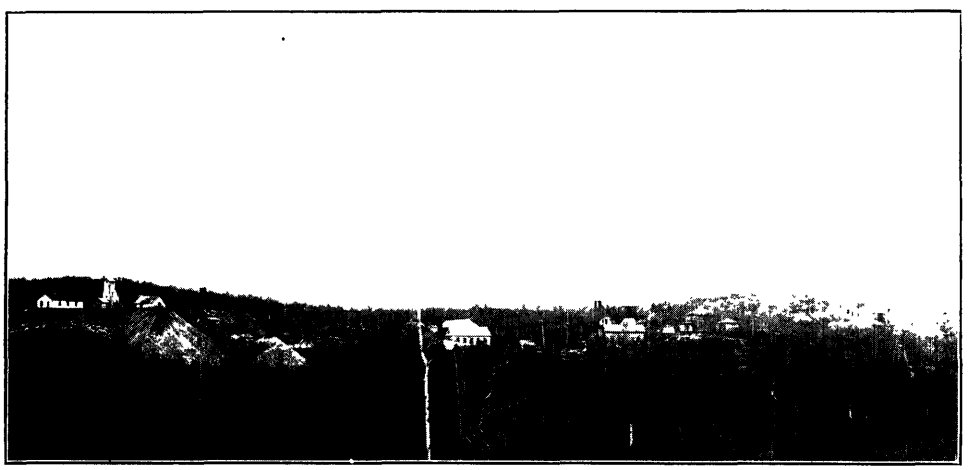


Fig. 9.—Frontier mine on left, Keeley mine on right.

Examination of the property was made in the fall of 1921 and 1922, and a brief visit was paid in May, 1923.

The ore-shoots at the Frontier mine, like those at the Keeley, occur at the top of the Nipissing diabase sill, both in the diabase and in the overlying Keewatin.

Almost the entire surface of the Frontier and Crompton is composed of Keewatin basalt, showing in places pillow structure, and volcanic fragmental rocks. The Keewatin is cut by lamprophyre dikes of Haileyburian age. At the southeast corner of the Crompton, the top of the Nipissing diabase sill is exposed. The mine workings prove that the diabase dips under the Keewatin rocks. No. 1 shaft of the Frontier, for example, passes through 322 feet of Keewatin and then encounters the top of the Nipissing diabase sill; the diabase is thus proved to dip under the Keewatin at an angle of about 25°, drawing facing page 37.

There are four main veins on the property, namely, No. 1, the Watson, Wood's, and the Haileybury silver. Of these veins Wood's has proved to be the most productive up to the end of April, 1923.

The mine, referring to the Frontier and Crompton, is worked from No. 1 shaft, and has four levels, which are 75, 150, 300 and 372 feet, respectively, below

the collar of the shaft. There is also a shallow shaft, No. 2, on the Wood's vein; and a shaft on the Haileybury Silver vein, now no longer in use.

At the end of April, 1923, fifteen shoots of high-grade silver ore had been met with, two of which were on the Crompton, and the remainder on the Frontier. Three of these were on the second level, but were small and unimportant. The remaining twelve shoots were on the third level; one of them occurred in Wood's vein, another in the Watson vein, and the other ten were in No. 1 vein.

The longest silver shoot was in Wood's vein, at the south end of the Crompton; this shoot had a length of 102 feet and an average height of 35 feet, although it was 57 feet high in one place. The shoot produced to the end of April, 1923, approximately 900,000 ounces of silver, and was the most important ore-shoot in the mine up to that time. At one place the vein was 40 inches wide of which 36 inches consisted of high-grade, the remaining four inches being calcite. When the writer examined this stope on May 7th, 1923, the vein in the back showed 30 inches of high-grade silver ore in one place, Fig. 10.

Of the other silver shoots one was about 60 feet in length. The shoot in the Watson vein was only 30 feet long and 22 feet high, but it produced approximately 125,000 ounces of silver. Some of the other shoots appeared to have a length of only a few feet.

All of these ore-shoots occur within 100 to 200 feet of the contact between the top of the Nipissing diabase sill and the Keewatin; most of them are within 100 feet of the contact.

The tendency of No. 1 vein to follow a lamprophyre dike may be noted. This dike was observed here and there along the drifts which follow the vein; and on the third level an attempt was made to map it.

Pre-Glacial Weathering.

In places the lamprophyre dike referred to in the preceding paragraph is decomposed to a soft clayey material, having a pale, greenish-grey colour. Possibly this alteration is all that now remains of the deep-seated portions of pre-glacial weathering.

Early History of Frontier Mine.

As the early history of a mine is always of interest, the writer asked Mr. Horace F. Strong if he would give the Department an account of how he became interested in the Frontier, how he found certain ore-shoots, and how he was instrumental in turning the property over to the Mining Corporation of Canada, Limited. The Department is indebted to Mr. Strong for the following account of the early history:—

What is now known as the Frontier mine was originally the south half of the property of the Haileybury Silver Mining Company's claim, No. H.R. 16. It contains about twenty acres, and is situated to the north of the Keeley claim and separated from the same by the Crompton fraction. The latter is about 500 feet wide.

One, Henry Newburger, of Memphis, Tenn., bought the south half of H.R. 16 from the Haileybury Silver Mining Company in 1912 for $100,000 cash and formed the Haileybury Frontier Company. This company sank two shafts, one to the southwest to a depth of ninety feet and one near the northern boundary to a depth of 150 feet. From the latter was done about 100 feet of crosscutting and fifty feet of drifting on the 75-foot level, and about 250 feet of drifting on the 150-foot level. Both levels showed a strong vein carrying smaltite, but no silver was in evidence. In the meantime Henry Newburger died and the company went into liquidation in 1914. Joseph Newburger, a cotton king of Memphis, Tenn., and brother of the deceased, bought in the property in the interests of his brother's widow, and the mine remained closed until the autumn of 1920. During the summer of 1920, Joseph Newburger had the mine dewatered and examined by representatives of several silver-mining companies. At this time J. G. Harkness, who had dewatered the mine, had collected options on control of the Haileybury Silver property and advised Mr. Newburger to purchase same. The latter, however, failed to do so and after a couple of weeks allowed the Frontier to fail.

During the autumn of 1919 and spring and summer of 1920, the writer was doing considerable investigation into the various sources of cobalt ore for a large consumer of the metal in the U.S.A., and during a shortage had supplied his client with several carloads of high cobalt, low silver ore. During the month of August, 1920, the situation became so acute that the writer asked his client to be allowed to purchase the Haileybury Silver and Frontier properties, using the argument that several hundred tons of high cobalt, low silver ore could be cheaply developed, with reasonable chances at the same time of running into shoots of high-grade silver ore. The force of the argument was seen, and the writer was allowed to proceed. The Haileybury Silver property was bought outright early in September for $15,000 cash, and negotiations started for the Frontier. The latter proved more difficult, but eventually, in November, 1920, the writer had secured a reasonable lease for a year and further option to purchase. Dewatering was proceeded with immediately, and the first machine started on December 16th. A thorough sampling of the old working showed a short shoot of mill ore on the 75-foot level. Drifting proceeded at the rate of 200 feet per month until May 1st, 1921, and the work put into sight about 400 tons of high cobalt, low silver ore, and two short shoots of 500-ounce silver ore.

Having worked out the geology of the property, the writer prevailed upon his client, the cobalt ore situation being in the meantime settled temporarily, to allow the 150-foot shaft to be sunk to the contact zone. This entailed a further 150 feet of sinking and 27 feet of crosscutting. The sinking was very much retarded by extremely hard rock, the Keewatin greenstone proving very baffling. Eventually the desired horizon was reached about the end of August, and the vein cut within a few inches of the projected point. A short patch of high-grade silver was encountered in the second or third round of the drift, and in 300 feet of drifting driven during September and October at least 200,000 ounces in high-grade was indicated. The writer then put two propositions before his client. First, that he should put up an additional $200,000 for the purchase of adjoining properties, install a suitable mining plant, etc., and proceed to develop and mine on a larger scale, or, second, to sell the property. The latter course was decided on, and in November, 1921, the writer concluded the sale under option to the Mining Corporation of Canada, Limited, at a price of $525,000 over a period of two years.

Description of Frontier Mine Workings.

Commencing with the bottom level, the mine workings may now be described.

Fourth level, 372 feet below collar of No. 1 shaft.—This was the bottom level of the Frontier mine in April, 1923. There were about 2,600 feet of workings. The northeast half of the same is in Nipissing diabase, the remainder in Keewatin. The contact between the diabase and Keewatin dips about 15° to the southwest. The Keewatin consists of basalt, cut by lamprophyre dikes of Haileyburian age.

No. 1 vein averages two or three inches in width, swelling in places to 12 or 15 inches. It consists for the most part of pink and white calcite, and strikes southwestward. It contains a few small shoots of almost pure smaltite and niccolite, but is barren of silver, excepting for the presence of one small sample. It is wider in the diabase than in the Keewatin. Its contacts with the wall rock are frozen.

The Watson vein was also barren of silver on this level. It is 2 to 4 inches or more in width and is vertical. A little movement appears to have taken place in the fissure which contains the Watson vein, as shown by a gouge about one-quarter of an inch wide, and a fault breccia an inch or two in width. In places the joint planes, adjacent to the vein, are lightly covered with thin films of red iron oxide. There are vugs in the Watson vein.

Third level, 300 feet below collar of No. 1 shaft.—This was the most extensive and most productive level in the mine; in April, 1923, there were about 2,850 feet of workings. The Nipissing diabase was met with about 40 feet northeast of the No. 1 shaft. The contact of the diabase and Keewatin occurs in the shaft about 22 feet below the third level. The rest of the level to the southwest is all Keewatin basalt, cut by Haileyburian lamprophyre dikes.

An attempt was made to map an irregular hornblende-lamprophyre dike which appeared parallel to No. 1 vein in the vicinity of the winze. This winze is about 230 feet southwest of No. 1 shaft. The lamprophyre dikes occur in various

parts of the level. They are irregular intrusions, difficult to map after the walls have become covered with rock dust following blasting. Some of the dikes are sill-like in form, that is, they have flat dips. Towards the southwest end of No. 1 vein a lamprophyre dike is decomposed to a soft rock.

The presence of a dike of pink feldspar-porphyry was noted about 60 feet southwest of the winze referred to in the preceding paragraph. Presumably it cuts the lamprophyre, although the relationship was obscure owing to rock dust on the walls and back, and the small exposure.

In No. 1 vein ten high-grade shoots of silver ore had been met with. The vein is a strong one, in places up to a foot in width, but towards the southwest end, before entering the Watson, it is but an inch or two in width, and in places is little more than a crack. There appears to have been no movement along the crack in which the vein occurs. Little or no gouge or fault breccia was noted.

What appeared to be the longest of these shoots in No. 1 vein occurred about 230 feet southwest of the shaft. A winze was sunk on this shoot, and it was found to extend about 40 feet below the third level. This shoot of high-grade silver ore averaged five or six inches in width on the northeast face of the winze. It was wholly in the Keewatin rocks, and did not extend down to the fourth level where the Nipissing diabase occurred. A small fault, with only fractions of an inch of fault material, intersected the vein, displacing it about an inch. The rich ore occurs above and below the fault At the time of examination, in the middle of October, 1922, the ore-shoot had not been mined, save for the ore taken out of the winze.

The Watson vein strikes about north and south, bending southwestward at the south end. North of its junction with No. 1 vein, it is a strong calcite vein up to a foot in diameter, and, in places, contains smaltite six inches to a foot in width. This part of the vein is characterized by the presence of many irregular vugs lined in places with smaltite on which have grown calcite crystals. One of these vugs rises at least five feet above the back of the drift, and is six inches wide.

The Watson vein, south of its junction with No. 1 vein, may average an inch or two in width of banded calcite, bulging in places up to five or six inches. The banding consists of alternate layers of pink and grey material, as many as 30 or 40 bands to an inch. About 260 feet south of its junction with No. 1 vein a wonderfully rich shoot of high-grade silver ore was met with. This shoot is reported to have produced 125,000 ounces of silver, and was only 22 feet high and 30 feet long. In one place it was said to be 23 inches wide. The ore consisted mainly of smaltite and native silver.

To the south of this stope the Watson vein is weak-looking, and along most of the distance is a mere rock. In one place vugs of calcite were noted.

The Watson vein is a fault vein; this is shown by the presence of gouge small fractions of an inch in width, and a fault breccia of an inch or two in width; in places the fault breccia is wider than this. The displacement along the fault is not known. A lamprophyre dike was noted here and there along the Watson vein; it was not determined whether the dike was continuous along the vein. Pink feldspar was noted in the latter.

Wood's vein is about 300 feet west of the Watson vein, and it strikes about north and south, dipping 65° to the eastward. It is difficult to say what is its average width; in the stope at the south end, described below, it is 40 inches wide in one place, but it is doubtful whether the width of the vein will average more than a few inches along the whole length. It consists mostly of pink and white calcite, in places finely banded. Some pink feldspar occurs here and there. About an eighth of an inch of gouge and three or four inches of fault breccia occur in the fault; in places the fault breccia is wider.

The longest and most important shoot in the mine occurs in Wood's vein at the south end of the workings, near the Keeley boundary line. As stated elsewhere in this report, the stope on this level is 102 feet long with an average height of 35 feet; 900,000 ounces of silver had been mined from the stope to the end of April, 1923. The stope produced some very fine specimens of argentite with wire silver "sprouting" from the argentite. These specimens occurred in vugs in the vein.

A lens of smaltite occurs in Wood's vein at the north part of the workings.

On the third level, at the northeast end, two prominent faults occur. The first one is 90 feet north of the shaft, and was drifted on for about 90 feet. It strikes about east and west, and is almost vertical, dipping steeply to the north. This fault has about an eighth to a quarter of an inch of gouge, and six to eight

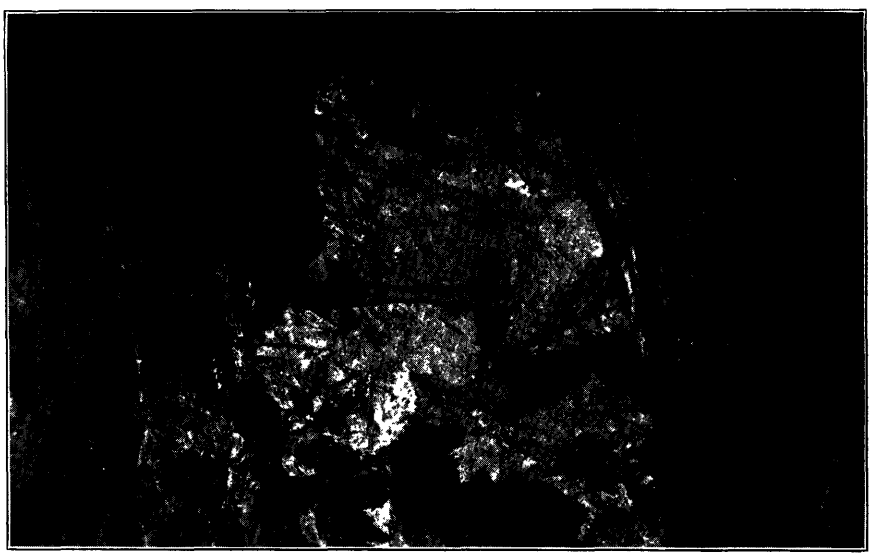


Fig. 10.—Wood's vein, Crompton mine, 300-ft. level, back of stope; showing a width of 30 inches of high-grade silver ore. Photograph furnished by the Mining Corporation of Canada, Limited.

inches of fault breccia. No. 1 vein passes through the fault, and high-grade ore was found north of it, and for a few feet south. At the time of examination a stope was being worked in this ore-shoot, which had reached a height of about 25 feet and a length of about 25 feet.

At the top of this stope, the second fault, dipping about 34° to the northwest, was met with. This fault had a fault breccia about a foot wide. The vein had not been found above this fault at the time of examination. That the fault was older than the ore deposits appeared to be shown by the presence of leaf silver and ruby silver in the fault breccia, in which these two minerals had evidently been deposited. But there was some later movement which faulted the vein a little. This fault was followed on the level in a drift which begins 50 feet north of the shaft. In this drift the fault breccia is 6 to 24 inches wide. It appears to be an important fault.

Second level, 150 feet below the collar of No. 1 shaft.—This level is entirely in Keewatin basalt, but is cut by younger dikes of feldspar-porphyry and lamprophyre. Towards the south end of the workings No. 1 vein appears to follow an irregular lamprophyre dike.

No. 1 vein has been followed for about 1,000 feet, but only three small, unimportant shoots of high-grade silver ore were found. The vein may average two inches, and is five or six inches wide in places, but is merely a crack elsewhere. At times the vein contains small lenses, five or six inches wide, of pure smaltite.

At the shaft No. 1 vein encounters a well-defined fault, showing several inches of gouge and breccia, and there is an apparent horizontal displacement of about 30 feet.

At the north end of the workings there is what is known as the Haileybury silver vein. It is a barren pink calcite vein dipping 70° to the northeast. There is a raise or shaft to the surface; some smaltite was obtained in the raise years ago.[1]

First level, 75 feet below collar of No. 1 shaft.—Only about 250 feet of work has been done on this level, partly on No. 1 vein and partly on a fault which meets the vein not quite at right angles. The vein is about six inches wide and appears to follow a lamprophyre dike. The workings northeast of the shaft were not accessible.

Wettlaufer.

The Wettlaufer claim, H.R. 85, is contiguous to the Keeley on the southeast.

The mine had, up to the end of the year 1922, the largest production of silver in South Lorrain, the output amounting to about 2,564,584 ounces at that

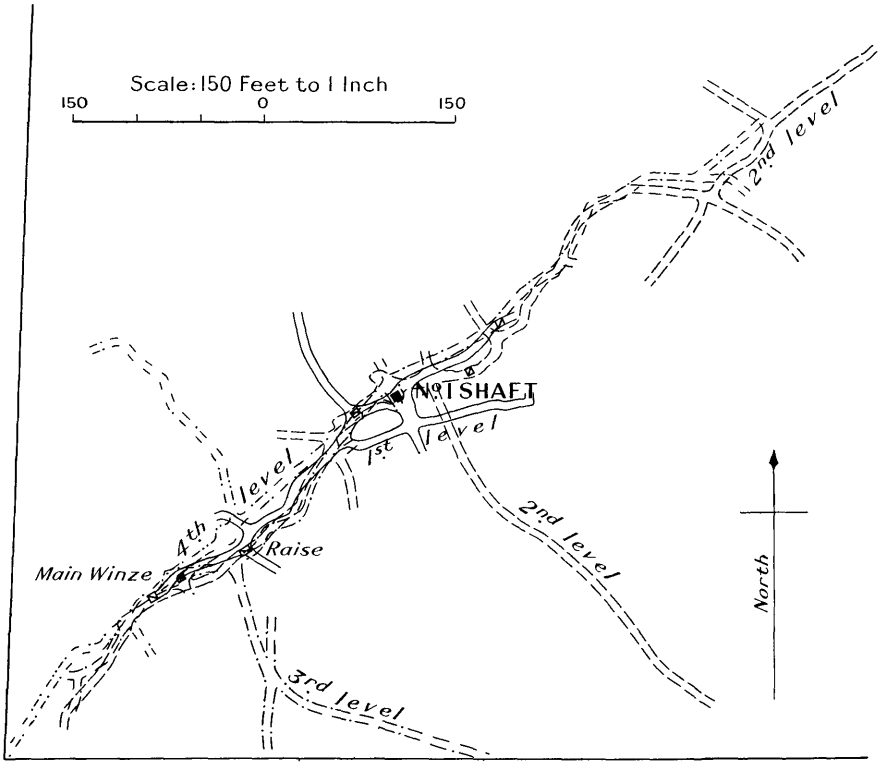


Fig. 11.—Plan showing mine workings of Wettlaufer. Furnished by Mr. Horace F. Strong.

[1]The Cobalt-Nickel Arsenides and Silver Deposits of Timiskaming by Willet G. Miller, Annual Report of the Ont. Bur. Mines, 1913, Vol, XIX, Part II, p. 143.

date. It has not, however, yielded much silver since 1913, although it has been worked on and off since then.

The property was idle and flooded at the time it was visited in the fall of 1922, and hence it was impossible to examine the mine workings.

From information gathered from various sources it appears that there is practically one vein on the property. This vein occurs only in the top of the Nipissing diabase sill, and does not extend into the overlying Keewatin, in which respect it differs from veins on the Keeley and Frontier, which occur both in the diabase and overlying Keewatin. One may note on the surface that the vein does not enter the Keewatin.

The Wettlaufer vein strikes about north 60° east. It outcrops along the side of the Wettlaufer valley, and it enters the valley at a gentle angle. The Wettlaufer valley probably represents a fault; and as it strikes north 41° east it is seen that if the vein continues far enough to the northeast with a strike of north 60° east it would gradually enter the Wettlaufer valley fault.

It is reported that silver occurred on the surface in the Wettlaufer vein. The vein may still be examined on the surface, and shows a width of one to three inches of smaltite in places. Quartz is also found in the vein, stained with cobalt bloom and having a width of two inches.

The vein runs about at right angles to the contact between the Nipissing diabase and the Keewatin.

The writer is indebted to Horace F. Strong, who was manager of the Wettlaufer at one time, for his kindness in writing the following description of the underground geology:—

The Wettlaufer mine was one of the early discoveries of high-grade silver in the South Lorrain field, and has the unique feature that its comparatively large production came entirely from the Nipissing diabase and from a depth of from 100 feet to 250 feet below the Keewatin contact.

It is essentially a "one-vein" mine, though a branch of the main vein produced ore for a length of 150 feet and a depth of 60 feet.

The main vein runs in width from a fracture up to six inches, and is usually accompanied by two or more parallel fractures from a few inches to two feet away on either or both sides. The strike is northeast-southwest, and the dip is practically vertical.

The channel of mineralization would appear to be a minor reverse fault, striking approximately north and south and dipping to the west at about 20°. At the fourth or 230-ft. level the vein is displaced by a throw of 15 feet. The silver-bearing solutions circulated upward from this fault for a distance of 100 to 150 feet. A few patches of ore were found below the fault, but not more than a maximum of 45 feet below.

In the plane of the vein the ore-shoots rake to the southwest at from 15° to 30°, more or less, conforming with the dip of the contact between the diabase and the overlying Keewatin. At the shaft the contact was, before erosion, about 100 feet above the collar; and high-grade was found in the outcropping of the vein at the shaft. At the southwest corner of the property, 500 feet distant along the strike of the vein, the contact is about 100 feet above the top of the ore zone. This is an interesting feature, and shows a relation between ore zone and contact similar to many cases in Cobalt where the ore zones in the conglomerate of the Cobalt series conform to the Keewatin contact at a more or less regular distance from it.

After the vein leaves the Wettlaufer ground, at the southwest corner, it crosses the northwest corner of the Silver Eagle property, H.R. 97, a length of 20 feet on the fourth, or 230-ft. level, and "feathers" out on the Curry or Pittsburg Lorrain Syndicate property, H.R. 105, in a further fifty feet. Considerable high-grade was taken out of the Silver Eagle, but no ore was found on the H.R. 105 property for more than 20 feet southwest of the line. Northeast of the shaft the vein continues, from two inches to four inches in width, for a further 500 feet, where it weakens, splits into fractures and practically dies out. No ore was found for more than 80 feet beyond the shaft in a northeast direction.

It might be added that the diabase in the vicinity of the vein shows little jointing or fracturing. Consequently, leaf silver penetrated only a few inches into the wall rock, and the quantity of mill-rock from the walls was negligible.

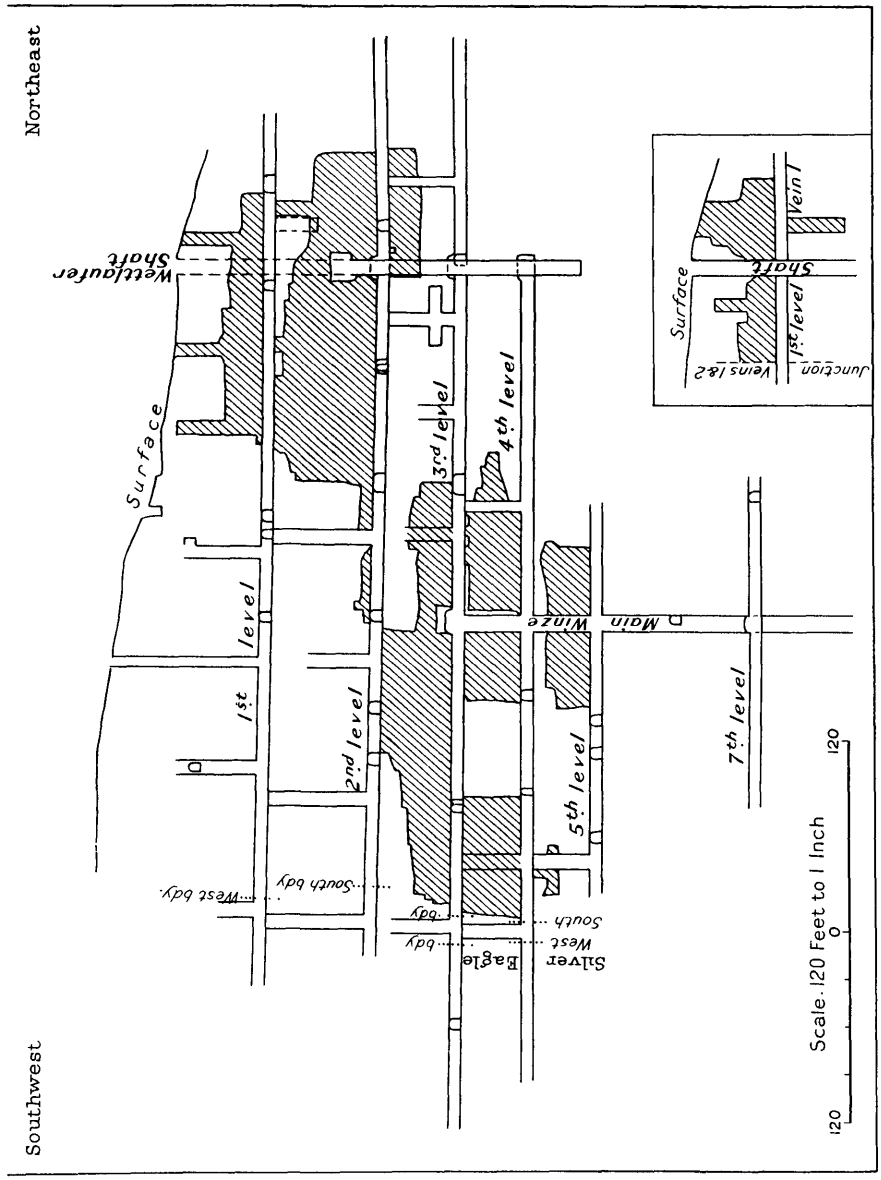


Fig. 12.—Stope section of Wettlaufer vein. Furnished by Mr. Horace F. Strong.

Mr. Strong has also very kindly furnished the writer with a stope-section of the vein, and with plans of the various levels; Figs. 12 and 11.

A. G. Burrows, who examined the area in 1908 for the Ontario Bureau of Mines, has this to say about the Wettlaufer.—

On the Wettlaufer claim, H.R. 85, there were found three parallel veins with a strike northeast and southwest. Of these, the two northerly veins had rich shoots showing native silver in sheet form, while the south vein carried smaltite with low silver values. The veins were narrow, but parts of them attained a width of six inches. Flake silver is shot into the diabase wall rock from one to three inches. The distance from the north to south vein is about ninety feet.[1]

[1]Annual Report Ontario Bureau of Mines, Vol. XIX, 1913, Pt. II, p. 141.

The Ontario Department of Mines is also indebted to J. B. Tyrrell for information concerning the dip of the top of the Nipissing diabase sill in the mine workings of the Wettlaufer. The information was conveyed in the following personal letter to the writer:—

At that time (1913) five levels had been driven, though I have not a definite record of the depths of the levels, except that the first one was 65 ft. below the collar of the shaft. This level was driven westward to the contact of the diabase and Keewatin, and on it the contact was 30 ft. farther west than at the surface, making it dip westward at an angle of 64°. The other levels had not reached the plane of this 64° slope or the contact, so that my determination of the slope was taken from these two points.

The Inspectors of Mines for Ontario have published from time to time the following information concerning the Wettlaufer:—

In 1908 the following work was accomplished: This claim, H.R. 85, adjoins the Keeley to the southeast. Most of the claim is in diabase, and the vein found runs about at right angles to the contact of the diabase with the Keewatin, and in a northeast and southwest direction. The vein or fissure has been stripped for a considerable distance, and some test pits have been sunk on it. The vein opens up in lenses in places three to four inches in width, carrying good values in silver. A company has been formed known as the Wettlaufer Lorrain Silver Mines, Limited, of which Mr. Wettlaufer is president, Mr. F. C. Loring, managing engineer, and Mr. A. C. Bailey, superintendent.[1]

In 1909 work was done as follows:—

The Wettlaufer mine is the largest producer in South Lorrain. The main shaft is 150 feet deep, with first level at 65 feet and second level at 140 feet. On the first level, on No. 1 vein, drifts have been run south 190 feet. No. 2 vein is cut by a crosscut from the shaft 79 feet in length. On this vein some 200 feet of drifting has been done. It joins No. 1 vein about 100 feet southwest from the shaft. On the second level the drift southwest from the shaft is 300 feet in length and is driven northeast 175 feet. At a point 75 feet southwest of the shaft a winze is being sunk having a depth at date of inspection of 32 feet. No stoping of any amount has been done.[2]

Regarding operations for the year 1911, the Inspector of Mines reported as follows:—

The Wettlaufer is the largest and hitherto the only steady producer in South Lorrain. It is owned and operated by the Wettlaufer Lorrain Silver Mines, Limited, which have an authorized capital of $1,500,000 shares of a par value of $1.00, and have paid $450,000 in dividends to June first, 1912. On the advent of electric power to the camp from the British Canadian Power Company, a new plant was installed, consisting of a 12-drill compressor, driven by a 200-h. p. motor. A 30-ton concentrating mill has been erected. The main shaft has been sunk to the fourth level, a depth of 250 feet. Levels have been run at depths of 65 feet, 140 feet, 185 feet, and 250 feet. The vein has been developed for a length of 500 feet, the drifts on each level having been run approximately this distance. A winze was sunk at a point 210 feet southwest of the shaft from the fourth to the fifth level, and a drift runs south 160 feet and north 70 feet.[3]

According to the Inspector of Mines, operations carried on in 1912 were the following:—

The Wettlaufer was the only shipper in South Lorrain during 1912. It is owned and operated by the Wettlaufer Lorrain Silver Mines, Limited. The main shaft has been sunk to the fourth level, a depth of 250 feet. At a point 210 feet southwest of the shaft a winze has been sunk to the seventh level a total depth from the surface of about 500 feet. On the fifth level drifts have been run northeast and southwest of the winze, distances of 70 and 180 feet, and on the seventh level 120 feet and 130 feet respectively. The mill has a capacity of about 30 tons a day.[4]

In 1913 the Wettlaufer operated until October 31st, when it was decided to cease active work at the property. During the year $141,659 were paid in dividends. Some 1,390 feet of drifts, crosscuts, raises and winzes were run.[5]

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[1] Annual Report Ont. Bur. of Mines, Vol. XVIII, Pt. I, 1909, p. 124-125.
[2] " " " " " Vol. XIX, Pt. 1, 1910, p. 114-115.
[3] " " " " " Vol. XXI, Pt. I, 1912, p. 147.
[4] " " " " " Vol. XXII, Pt. I, 1913, p. 123.
[5] " " " " " Vol. XXIII, Pt. I, 1914, p. 157.

In 1916 the Inspector of Mines reported as follows regarding the Wettlaufer:

The Comfort Mining and Leasing Company operated the Wettlaufer property under lease from the Wettlaufer Lorrain Mining Company. Work during the year was confined to milling of fines in the dump and jig tailings from previous milling operations. The tailings were hoisted on an incline and dumped into a raise near the mill, and trammed to the shaft on the 50-ft. level. Work was discontinued during the year.[1]

In August, 1917, the Pittsburg-Lorrain Syndicate acquired the Wettlaufer mine and mill under lease, and during the autumn of 1917 the Wettlaufer dump was milled. About 750 feet of drifting and crosscutting was done on the third and fourth level, but no new veins were discovered.[2]

In 1918 the Pittsburg-Lorrain Syndicate operated the Curry and Wettlaufer mines until November 30th, 1918, when work was suspended at both properties. The surface dumps were worked over and a considerable amount of mill-rock was obtained from the underground workings.[3]

In June, 1919, the Pittsburg-Lorrain Syndicate began to re-treat sand and tailings at the Wettlaufer mill and were handling 20 to 30 tons daily during the autumn. Two small shipments of concentrates were made.[4]

Curry Claim. H.R. 105.

The Curry claim is contiguous to the Wettlaufer on the southwest. It was not working at the time it was visited and the mine workings were not accessible. Considerable underground work has been done on the property from an inclined shaft. The Inspector of Mines gives an account of the underground work accomplished, and Horace F. Strong makes reference to the vein and mining operations in his report on the Wettlaufer mine on page 43 of this report. It would appear that the Wettlaufer vein extended about 50 feet into the Curry and then "feathered" out; about 20 feet of the vein on the Curry is reported to have yielded some ore.

On the dump there are pieces of vein matter, showing eight to eleven inches of almost pure smaltite.

About 300 yards southwest of the inclined shaft there is another shaft sunk in Keewatin rocks. On the dump from this shaft there are pieces of vein matter consisting of fine-grained, banded calcite, or dolomite. The dump also has blocks of diabase, but most of the dump consists of Keewatin basalt.

The following information from the annual reports of the Inspector of Mines is reprinted below.

In reference to operations in 1912 on the Curry, H.R. 105, the Inspector of Mines reported:—

On H.R. 105, adjoining the Wettlaufer on the southwest, the Pittsburg-Lorrain Syndicate have been engaged in development work under consulting engineer, J. A. Rice. An inclined shaft has been sunk 271 feet, and a crosscut driven 45 feet to connect with the Wettlaufer workings.[5]

The Inspector of Mines, referring to operations in 1914, reported:—

The Pittsburg-Lorrain Syndicate operated this property adjoining the Wettlaufer mine during the year, with a force of 15 to 25 men. The workings consist of a shaft of which the first 200 feet is an incline of about 45° and the next 200 feet is vertical, about 330 feet of raises and winzes and 1,650 feet of drifts and crosscuts. This represents the work done up to November first, 1914, in the two years the property has been working.[6]

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[1] Annual Report Ont. Bur. of Mines, Vol. XXVI, 1917, p. 132.
[2] " " " " " Vol. XXVII, Pt. I, 1918, p. 131.
[3] " " " " " Vol. XXVIII, Pt. I, 1918, p. 153.
[4] " " " " " Vol. XXIX, Pt. I, 1920, p. 110.
[5] " " " " " Vol. XXII, Pt. I, 1913, p. 123.
[6] " " " " " Vol. XXIV, Pt. I, 1915, p. 129.

The property was worked continuously in 1915 by the Pittsburg-Lorrain Syndicate. The Inspector of Mines' report was as follows:—

The shaft has been sunk 275 feet on the slope, the first 175 feet is at 45° and the remaining 100 feet 85°. On the fourth or 175-ft. level a winze was started about 500 feet southeast of the main shaft and was sunk for 115 feet at 80°. Levels were opened off the winze at 50 and 100 feet, and by February, 1916, the drifting done on these winze levels was: on the 50-ft., 50 feet to the northwest and 50 feet to the southeast; on the 100-ft., 20 feet to the northwest and 75 feet to the southeast. A No. 1½ special Sirocco reversible fan is used for ventilating the winze workings. Just above the winze a body of high-grade ore was encountered. The shoot is about 60 feet long; and north of the winze it extends to a known height of 85 feet above this level, while south of the winze it runs for 40 feet above. It is in the Keewatin series just above the Keewatin-diabase contact.[1]

In 1916 the Pittsburg-Lorrain Syndicate worked the Curry mine continuously during the year. The Inspector of Mines reported as follows:—

The shaft in the main workings is now 400 feet deep, and work during the year consisted of drifting on the fifth level and raising on the fourth. The winze workings from the fourth level were abandoned. Shaft No. 2 is 110 feet deep, and 500 feet of drifting in the direction of No. 1 shaft was done during the year.[2]

In 1917 the following work at the property was done:—

Development of the Curry mine, in South Lorrain, was continued during 1917 by the Pittsburg-Lorrain Syndicate. Some high-grade ore was stoped on the fourth level. In August, 1917, the syndicate acquired the Wettlaufer mine and mill under lease. Operations at the Curry were suspended, and during the autumn of 1917 the Wettlaufer dump was milled. At the Wettlaufer about 750 feet of drifting and crosscutting were done on the third and fourth levels, but no new veins were discovered. Underground work at the Curry mine was resumed and the mill has since been treating Curry ore.[3]

In 1918 the Pittsburg-Lorrain Syndicate operated the Curry until November 30th, 1918, when work was suspended.[4]

Silver Eagle Claim, H.R. 97.

The Silver Eagle is contiguous on the south to the Wettlaufer. Horace F. Strong states that the Wettlaufer vein crossed the northwest corner of the Silver Eagle and that some high-grade ore was mined from this part of the Silver Eagle claim (See report on Wettlaufer by Strong, on page 43 of this report). The claim produced 7,989 ounces of silver in 1918.

Bellellen Claim, R.L. 470.

The Bellellen is contiguous to the Little Keeley on the east. It was formerly known as the Newman. The property has produced 31,630 ounces of silver.

It was not pumped out at the time of examination in October, 1922. On the surface most of the rock is Keewatin basalt, but the Nipissing diabase sill is exposed on the southwest part of the claim. The diabase probably dips below the Keewatin, judging from the structure at the Keeley and Frontier mines.

On the dump from the main shaft there are blocks of vein material, showing the vein to have a width of 12 to 15 inches of white calcite. Both smaltite and chloanthite are found in these blocks. The presence of chloanthite was determined by W. K. McNeill, Provincial Assayer. On the dump are blocks of mica-lamprophyre and feldspar-porphyry.

The following information regarding the underground workings is reprinted from the reports of the Inspector of Mines.

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[1] Annual Report Ont. Bur. of Mines, Vol. XXV, Pt. I, 1916, p. 126.
[2] " " " " " Vol. XXVI, 1917, p. 132.
[3] " " " " " Vol. XXVII, Pt. I, 1918, p. 131.
[4] " " " " " Vol. XXVIII, Pt. I, 1919, p. 153.

Referring to the year 1909, the following work was done:—

Considerable trenching had formerly been done on this claim. The present owners, under the direction of Norman R. Fisher, have sunk a shaft 75 feet and drifted 100 feet.[1]

In 1911 the following work was done:—

No. 1 shaft is 80 feet deep, with 144 feet and 114 feet of drifting north and south of the shaft on the 80-ft. level; some stoping has been done. No. 2 shaft is 100 feet deep, with 200 feet of drifting and crosscutting at the 100-ft. level.[2]

In 1912 work was done as follows:—

On R.L. 470 the Bellelen Silver Mines, Limited, have been engaged part of the year in carrying on development work. All work is confined to No. 2 shaft, which is 100 feet deep with drifts west 56 feet and south 120 feet. A winze 35 feet deep has been sunk from the south drift, and a drift started north from the bottom of this winze.[3]

In September, 1915, work was resumed on the Bellellen:—

On the 100-ft. level, about 100 feet north of No. 2 shaft, a winze has been sunk 75 feet. On the 40-ft. level of this winze 30 feet of drifting has been done, and at the bottom of the winze a drift extends to the south a distance of 125 feet.[4]

Regarding work accomplished in 1916, it is reported that work was carried on continuously during the year:—

The winze on the 100-ft. level, about 100 feet south of No. 2 shaft, was down 145 feet when inspected in November, 1916. About 75 feet of drifting was done at the bottom level. Shaft No. 1 is 70 feet deep with drifts to north and south at the bottom level. Work during the year was confined to No. 1 shaft.[5]

In 1917 work was continued most of the year:—

The winze on the 100-ft. level was sunk to a depth of 275 feet, and at the 200-ft. winze level a drift was run to the south, a distance of 100 feet.[6]

Maidens Claims, H.R. 69, H.R. 70, H.R. 67, H.R. 66.

The Maidens claims are less than half a mile west of Lake Timiskaming. The property was not being worked in the fall of 1922.

There are two shafts about 100 yards apart, and two adits; most of the work has been done on H.R. 69.

On the dump of the most easterly shaft leaf silver was noted; and there were also noted thin films of a black mineral which W. K. McNeill determined to be a sulphantimonide of silver, but the quantity of the mineral obtained was too small for the determination to be absolutely definite. Pieces of the vein on the dump show a width of six to eight inches of calcite and a little quartz. The vein also carries some smaltite. Some of the blocks of vein matter show rock fragments cemented with calcite, suggesting a fault vein; a little cobalt bloom was noted in this fault breccia, and some pure smaltite. Judging from the rock seen on the dump the Nipissing diabase was not encountered in the workings. Blocks of lamprophyre were found on the dump.

The dump from the east adit shows a calcite vein which is over a foot wide in places.

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[1]Annual Report Ont. Bur. of Mines, Vol. XIX, 1910, Part I, p. 113-114.
[2] " " " " " Vol. XXI, 1912, Part I, p. 147.
[3] " " " " " Vol. XXII, 1913, Part I, p. 123.
[4] " " " " " Vol. XXV, 1916, Part I, p. 125.
[5] " " " " " Vol. XXVI, 1917, Part I, p. 132.
[6] " " " " " Vol. XXVII, 1918, Part I, p. 131.

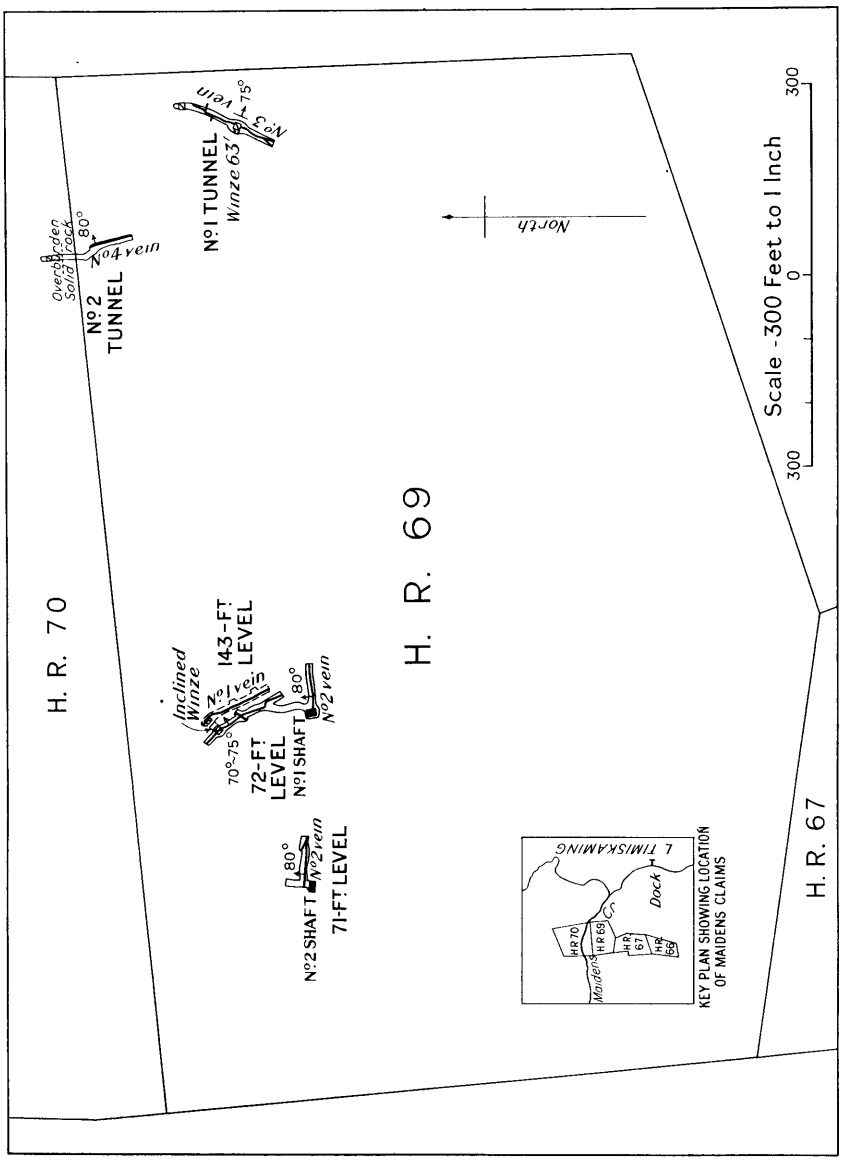

Fig. 13.—Plan showing mine workings of Maidens claim, H.R. 69. Furnished by Dr. J. Mackintosh Bell.

On the southeast corner of H.R. 69 the Nipissing diabase is exposed. The rest of the claim is underlaid by Keewatin basalt, although much of the Keewatin is heavily covered with drift. The contact between the Nipissing diabase and Keewatin is drift-covered, so that it is not known whether the Nipissing diabase dips below the Keewatin. It is important to determine how the diabase dips, so that some idea may be obtained as to how far the top of the diabase sill is below the surface in the vicinity of the veins. At the Keeley, Frontier and Wettlaufer mines most of the ore has been obtained along the contact, within 100 or 200 feet above or below.

The nearest contact of the Nipissing diabase and the Keewatin is about one mile westward from the Maidens on claims R.L. 461 and H.S. 11. Here the

contact is vertical. The contact is also vertical about half a mile to the northwest on claim B.C. 105.

Thus, all that can be said is that the nearest exposed contacts to the Maidens claims are vertical. Diamond-drilling or shaft-sinking will alone determine the dip of the diabase sill on the Maidens claims.

The Keewatin is cut in one place by a hornblende diabase intrusion; it has the appearance of a dike of Haileyburian age.

As the mine workings were not accessible at the time the claims were visited, an examination was not made. The writer is indebted to J. Mackintosh Bell for the following description and accompanying plan (Fig. 13) of the property:—

Two vertical shafts have been sunk on the property, and two tunnels driven from the surface in the valley of Maidens Creek. No. 1 shaft which, including a sump, is 80 feet deep, communicates with a level at 72 feet, from which a winze sunk on the dip of No. 1 vein provides entry to a sub-level 71 feet vertically below. There is an 8-foot sump at the bottom of the winze. Three hundred feet of drifting and crosscutting have been done in the main level, and 125 feet in the sub-level.

No. 2 shaft is 85 feet deep, and 91 feet of crosscutting and drifting have been done from a level of 71 feet. The shaft was commenced on No. 2 vein, which, however, is carried by its northerly dip out of the workings.

No. 1 tunnel driven on No. 3 vein is 162 feet long, and from it a winze reported to be 63 feet deep has been sunk.

No. 2 tunnel, 160 feet long, is a crosscut for 100 feet from the audit, and for the remainder of the distance, 60 feet, is driven on the course of No. 4 vein. The entrance of this tunnel, approximately 40 feet above Lake Timiskaming, has been taken as the datum level. The entrance of No. 1 tunnel is 1.7 feet higher; the collar of No. 1 shaft, 147.6 feet; and the collar of No. 2 shaft, 153.7 feet.

Four strong veins have been so far discovered on the property, all of which have been opened up to a small extent by the developments previously described. In addition, a large number of minor veins have been located in the sub-surface workings, branching from the principal veins.

No. 1 vein, which dips at an angle of about 75° to the northeast, has been opened up for 145 feet in the No. 1 level of No. 1 shaft and for 120 feet in the No. 2 level thereof. The vein, which consists principally of shattered country rock and calcite, contains in places considerable amounts of smaltite and some native silver. It is noteworthy that the silver values which are found both in the vein and the adjoining country rock occur over a greater length and are in general higher at the second than at the first level. The shoot of silver-bearing material has a length of 15 feet at the first level, which assays as follows:—

10 feet from North Face	11 oz.	over 48	inches.
15 " " " "	8 "	" 54	"
20 " " " "	56 "	" 25	"

At the second level, irregular values show for a length of 65 feet, measuring southward from the north wall of the sump, as follows:

North Wall of Sump	12	inches.	52 8 ounces
10 ft.	18	"	5.2 "
15 "	30	"	1 6 "
20 "	16	"	1 8 "
25 "	38	"	.8 "
30 "	4	"	12 2 "
35 "	48	"	1.0 "
40 "	16	"	28 0 "
45 "	26	"	79 0 "
50 "	49	"	.2 "
55 "	18	"	.4 "
60 "	31	"	18.4 "
65 "	21	"	.4 "

No. 2 vein, where it has been developed both in No. 1 and No. 2 shafts (85 feet in the former and 78 feet in the latter) consists almost entirely of soft, highly fractured country rock containing in places some calcite and generally much pyrite. The vein occupies what is clearly a pronounced fault fracture. The strike is easterly, and the dip varies from high angles northerly to high angles southerly, but is generally the former. Wire silver is reported to have been found in the soft vuggy material contained in the vein in the portion now hidden by the shaft timbers.

No. 3 vein is a particularly strong deposit of pink calcite commonly 18 inches or near in width, and containing in many places considerable smaltite. The silver values are low in the portion so far developed. The vein strikes northeasterly and dips 75° to the southeast.

No. 4 vein resembles No. 3 in mineralogical character, but in general it appears to be somewhat weaker. It strikes a little west of north and dips at 80° to the easterly.

In 1913, A. G. Burrows described the Maidens claim in the following words:—

On H.R. 69, Maidens claim, there has been extensive development work. Near the east side-line a tunnel has been driven from the base of a hill a distance of 285 feet on a calcite vein [No. 3]. At 100 feet a winze has been sunk to a depth of 60 feet. The vein in places has a width of 12 inches. Smaltite and niccolite are found in bunches in the vein. Low silver values are reported to have been obtained on assay. On vein No. 4 to the northwest a tunnel has been driven 225 feet. The vein filling is chiefly calcite with smaltite and niccolite in portions of the vein, 5 to 7 inches in width. The veins are in Keewatin, just north of the contact with the Nipissing diabase, and strike a little east of north.[1]

The Inspectors of Mines for the Province of Ontario have given in their Departmental reports the following information regarding the Maidens claims. In 1908 the work done was as follows:—

On mining claim H.R. 69, which lies about one mile northwest of the new government dock, the company are doing mining work south of the government road, consisting of adits driven south into the hill, which has an elevation of over 100 feet above the road. No. 1 adit was driven 63 feet through clay to the rock and 135 feet farther, part of it being on the vein which was encountered. Another adit has been begun 300 feet west of the No. 1 and has been driven 50 feet through clay to the rock.[2]

In 1909 the two adits were driven farther into the hill.

In addition to trenching and test pitting, two adits have been driven, No. 1 having a length of 285 feet and No. 2, 225 feet.[3]

For the year 1914 the report on the property is as follows:—

The Maidens Silver Mining Company was operating its property during most of the year with a force of six men. A winze was being put down in November about 200 feet from the shaft and had reached a depth of 60 feet below the 75-ft. level. There is another shaft of the same depth, 85 feet, which was not working.[4]

Little Keeley Claim, H.S. 40.

The Little Keeley is north of the Frontier. The property was flooded at the time of examination in the fall of 1922. Little underground work has, however, been done, and the records of the Department do not give an account of this work. The rocks on the surface are almost wholly Keewatin basalt.

The property has been acquired by the Mining Corporation of Canada, Limited

Lorrain Consolidated Claim, H.R. 24.

The Lorrain Consolidated, formerly known as the Harris, was not working and was flooded in the fall of 1922. The property is contiguous to the Frontier on the east. A shaft has been sunk to a depth of 263 feet and 800 feet of drifting and crosscutting done on the bottom level.

On the dump are rocks consisting of Keewatin basalt and of Nipissing diabase. The shaft was begun in Keewatin, and evidently the shaft or other workings passed through this formation into the Nipissing diabase.

Judging from the dump the workings followed a strong vein; blocks on the dump show the vein to be as wide as one foot, and to contain almost pure smaltite and niccolite six inches wide in places.

The vein has been exposed on the surface by some deep trenches; these have partly fallen in. Where the vein is now seen in the trench it is from three to six inches in width, consisting of calcite with some pure smaltite and niccolite.

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[1] Annual Report Ontario Bureau of Mines, Vol. XIX, Part II, 1913, p. 143.
[2] " " " " " Vol. XVIII, Part I, 1909, p. 124.
[3] " " " " " Vol. XIX, Part I, 1910, p. 114.
[4] " " " " " Vol. XXIV, Part I, 1915, p. 130.

Regarding the work done in 1908 the Inspector of Mines made the following remarks:—

This claim lying to the east of and adjoining the Haileybury Silver Mining Company property is owned by Mr. Mark Harris. Captain Terrill is in charge of this work and has sunk two pits to a depth of 22 feet and 18 feet respectively.[1]

The work done during the year 1916 is thus summarized by the Inspector of Mines:—

The Lorrain Consolidated Mining Company, formerly known as the Harris, continued development work at its property in South Lorrain during the year (1916). Work was in charge of J. G. Harkness, on contract; the shaft was sunk to a depth of 263 feet, and about 800 feet of drifting and crosscutting done on the bottom level. It closed down on June 15th, 1917.[2]

Montrose, H.R. 459.

The Montrose, R.L. 459, joins the Keeley on the east. A shaft has been sunk to a depth of 110 feet in the Nipissing diabase.[3] On the dump there is a vein of brown weathering calcite or dolomite evidently carrying some ferrous iron.

T.C. 71.

Regarding this claim, T.C. 71, A. G. Burrows reported in 1913:—

On T.C. 71, east of Loon lake, a tunnel has been driven 100 feet on a strong calcite vein about a foot in width.[4]

Taylor Claim, R.L. 471.

The Taylor claim adjoins the Bellellen on the north. A. G. Burrows reported in 1913:—

On R.L. 471, near the east side line, there is a strong vein of massive smaltite, on which a shaft has been sunk 65 feet. The vein is in the Keewatin.[5]

Alice Lorrain Claim, R.L. 467.

The claim is about one-quarter of a mile north of the Bellellen.

The Inspector of Mines reported in 1912 that a shaft had been sunk on the property to a depth of 75 feet.[6] This shaft is in the Nipissing diabase sill at a point about 100 yards east of the contact between the Keewatin and Nipissing diabase. The diabase is the acid variety containing pink spots which consist of a micrographic intergrowth of quartz and pink feldspar. About 125 yards southwest of the shaft the contact between the Keewatin and diabase is exposed for 40 feet, and the contact may be seen to dip steeply westward.

On the dump there are pieces of a calcite vein one to six inches wide.

A plant had been erected, but has since been burnt.

Forneri Claim, H.S. 42.

The Forneri claim adjoins the Little Keeley on the north, and has been acquired by the Mining Corporation of Canada. It is almost entirely underlain with rocks of the Cobalt series, except at the south end where the Keewatin series outcrops. A specimen from a vein on this claim was submitted to W. K. McNeill, Provincial Assayer, who found that the sample was cobaltite. This vein may be the northward extension of Wood's vein, though this has not been proven as yet.

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[1] Annual Report Ontario Bureau of Mines, Vol. XVIII, Part I, 1909, p. 123.
[2] " " " " " Vol. XXVI, 1917, p. 133.
[3] " " " " " Vol. XXI, Part I, 1912, p. 147.
[4] " " " " " Vol. XIX, Part II, 1913, p. 143.
[5] " " " " " Vol. XIX, Part II, 1913, p. 143.
[6] " " " " " Vol. XXI, Part I, 1912, p. 147.

A. G. Burrows in 1913 reported on this claim as follows:—

On H.S. 42 (Forneri claim) there is a vein about three inches in width, with strike north-northeast, and occurring in conglomerate. The vein material is smaltite and copper pyrites in calcite and quartz. A surface sample on assay showed no silver values. A shaft has been sunk to a depth of 75 feet. At 35 feet the vein dipped from the shaft. It is reported that silver values were obtained on assay at 14 feet depth.[1]

Sharp Lake Claim, B.C. 100.

For the year 1911 the Inspector of Mines reports as follows regarding this claim, which is a mile north of the Forneri:—

On claim B.C. 100 the Sharp Lake Mines, Limited, have sunk a shaft a depth of 50 feet. At the 50-ft. level a drift has been run south 145 feet and east 60 feet.[2]

H.R. 63.

On H.R. 63, on the shore of Lake Timiskaming near Maidens creek, a tunnel has been driven 300 feet into the Nipissing diabase at the foot of a high cliff. The tunnel strikes west 35° south, and was driven to intersect a narrow calcite vein, striking west 32° north, which outcrops about 100 yards south of the portal of the tunnel. The tunnel apparently was not run far enough to reach the vein; at any rate the vein was not encountered. The vein occurs in a joint plane of the diabase along which some horizontal shearing has taken place. The vein is rusty in places. At the end of the tunnel there is a pink calcite vein from one-quarter of an inch to an inch in width. A horizontal fault, with a little calcite in it, was noted in the tunnel. At the tunnel portal, there is a diabase dike cutting the Nipissing diabase.

H.R. 14.

This claim, H.R. 14, is two claims south of the Maidens claim. A. G. Burrows in 1913 reported as follows concerning it:—

On H.R. 14, near the west side line, some native silver has been obtained in a narrow vein in the diabase.[3]

Tallen Claim, H.R. 106.

The Tallen claim is at the northeast corner of Trout lake. The following information concerning the property has been published by the Inspector of Mines:—

Mr. J. D. Dodd has a contract for sinking a shaft on the property of the Tallen Mining Company, Limited, half a mile southwest of the Curry, in the latter half of the year. Work was started in a prospect shaft 60 feet deep, from the bottom of which 120 feet of drifting had been done. This shaft had a depth of 180 feet on March 1st, 1915.[4]

Regarding operations for the year 1915 and early in 1916, the Inspector of Mines stated:—

On claim H.R. 106, South Lorrain, the Tallen Mining Company, Limited, has sunk a two-compartment shaft 200 feet.

On the 200-ft. level a drift is being run north 40° west. In February, 1916, the face of this drift was 200 feet from the shaft. Eight men are employed. All the work done in this shaft is in diabase, with the exception of the last 20 feet at the face of the above mentioned drift, which is in Keewatin.[5]

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[1]Annual Report Ontario Bureau of Mines, Vol. XIX, Part II, 1913, p. 143.
[2] " " " " " Vol. XXI, Part I, 1912, p. 147.
[3] " " " " " Vol. XIX, Part II, 1913, p. 143.
[4] " " " " " Vol. XXIV, Part I, 1915, p. 130.
[5] " " " " " Vol. XXV, Part I, 1916, p. 126.

A. G. Burrows in 1913 remarked:—

On H.R. 106, adjoining Trout lake on the northeast, a five by seven shaft has been sunk 50 feet on a calcite vein carrying smaltite.[1]

King George Claims, H.R. 110, H.R. 170.

These two claims are at the northeast corner of Trout lake, and are mostly in the bed of this lake.

For the year 1911 the Inspector of Mines reports as follows on the claims:—

Active development work was carried on during 1911 on claims H.R. 110 and H.R. 170. The main shaft has been sunk to a depth of 272 feet, with 30 feet of crosscutting at the 250-ft. level.[2]

T.C. 73.

Claim No. T.C. 73 is about one-quarter of a mile east of Trout lake. In 1913, Mr. A. G. Burrows reported as follows on this claim:—

On T.C. 73 there is a shaft down 40 feet on a calcite vein with disseminated smaltite and copper pyrites. These veins have not proved to carry appreciable silver values. The rock is the Nipissing diabase.[3]

Toronto Lorrain Claim, No. H.S. 308.

At the north end of H.S. 308, near the shore of Lake Timiskaming, there is a calcite vein exposed at the top of the hill which rises up from the shore. The vein is three or four inches wide and strikes westward, dipping steeply to the north. The vein occurs in banded Keewatin basalt, the banding dipping steeply to the north, and the vein following about the dip of the banding of the basalt. A little blasting has been done on this vein. Near the foot of the hill there is a shaft reported to be about 30 feet deep, following a small calcite vein and an aplite dike. This shaft is in coarse-grained Nipissing diabase. It is some 60 or 70 feet below the vein at the top of the cliff. Further work will show whether these two veins join. The contact between the diabase and the overlying Keewatin is covered on the hillside above the shaft, but is exposed a short distance to the north, where it dips 25° to 30° to the southwestward.

In January, 1923, the Toronto Lorrain Silver Mines, Limited, was organized to take over this claim, together with mining claim No. 19247, surveyed as H.F. 9, and mining claim No. 19389, surveyed as H.R. 123. The president and general manager of the company is Walter J. D. Penley.

H.S. 500.

This claim is about one-quarter of a mile southeast of Oxbow lake.

There is a shaft on the property reported to be 38 feet deep in the Keewatin. On the dump beside the shaft there is a calcite vein about half an inch in width. The shaft is 400 or 500 feet south of the Nipissing diabase. The diabase contact is exposed on the hillside, dipping 37° to 40° southeastward. Some unusually deep trenches have been made on the claim.

H.R. 56.

On H.R. 56, which is about one-quarter of a mile south of Loon lake, there is a shaft reported to be about 40 feet deep. The shaft is in Keewatin, and is 100 feet east of the west boundary. There is a vein of calcite an inch or two wide, in places six inches wide.

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[1] Annual Report Ontario Bureau of Mines, Vol. XIX, Part II, 1913, p. 143.
[2] " " " " " Vol. XXI, Part I, 1912, p. 147.
[3] " " " " " Vol. XIX, Part II, 1913, p. 143.

Lang-Caswell.

The Lang-Caswell properties, in Lorrain township at the northeast corner of lot 8, in the first concession, were not examined. There is a brief note in the twentieth annual report of the Department which states that:

> Extensive development work was carried on at the Lang-Caswell properties in Lorrain' and while no ore has been shipped, things are said to look very promising.[1]

Giroux.

> On a claim situated on the north shore of Latour lake, concession two, Lorrain township, a shaft has been sunk to a depth of 50 feet and 24 feet of crosscutting done on the 50-ft. level.[2]

Trout Lake Mining Company Claim, H.R. 103.

In the spring of 1923 this claim was acquired by interests associated with the Mining Corporation of Canada, Limited. Under the direction of this company work was begun on a shaft which it was planned to sink on what appeared to be the southward extension of Wood's vein.

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[1]Annual Report Ontario Bureau of Mines, Vol. XX, Part I, 1911, p. 54.
[2] " " " " " Vol. XXV, Part I, 1916, p. 126.

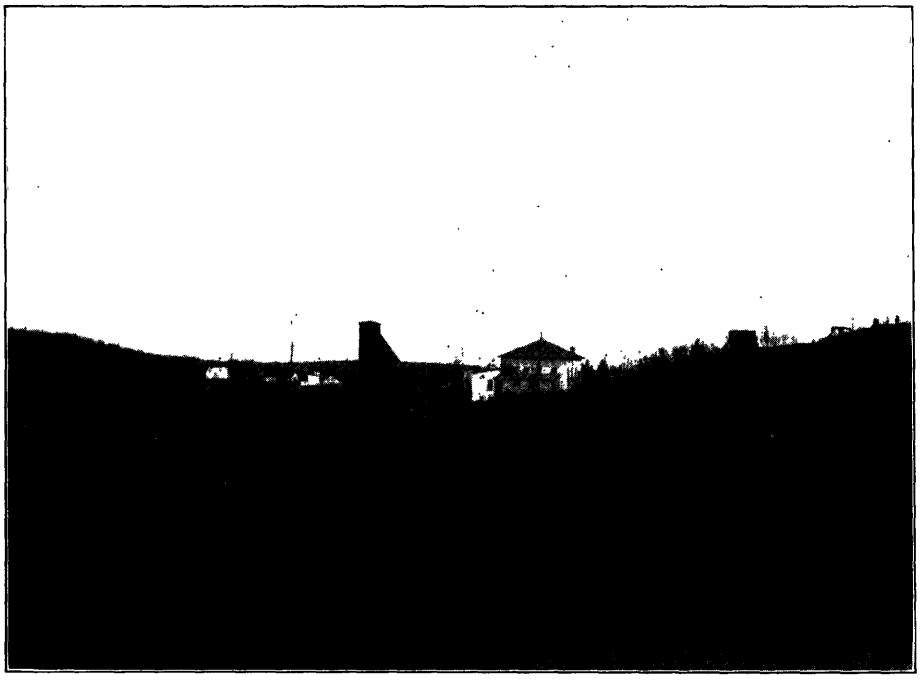
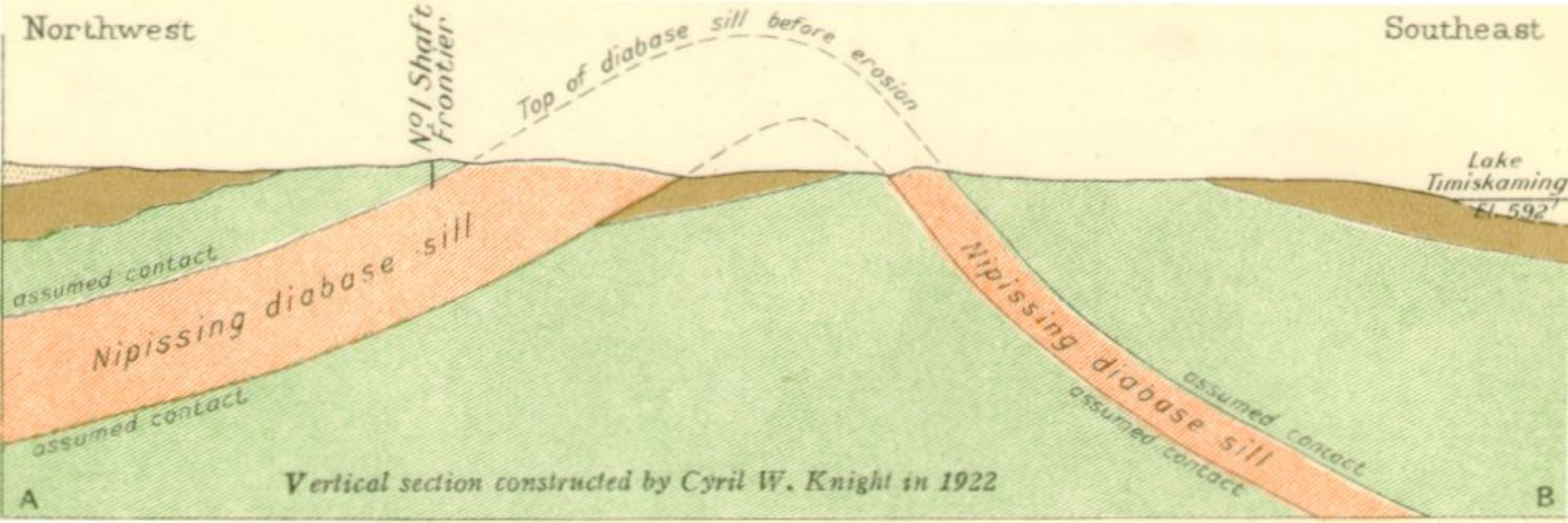
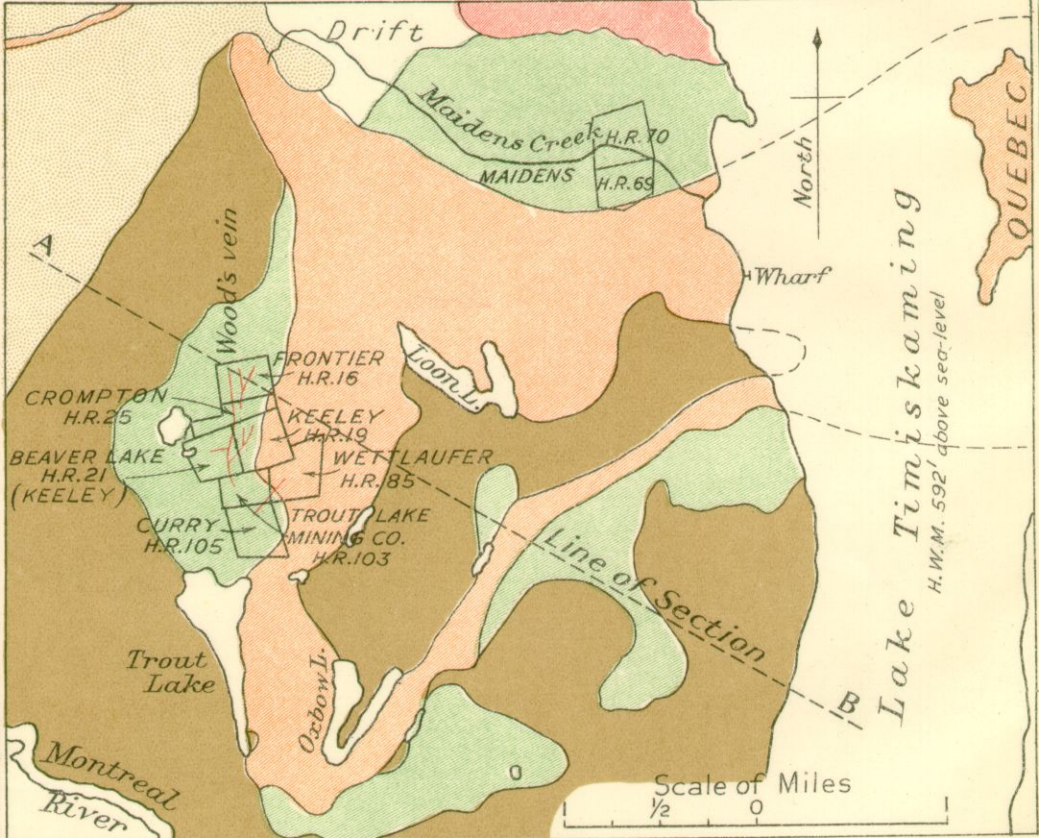


Fig. 14.—Old Keeley workings, No. 1 shaft; the original discovery was made in this place.



Vertical section constructed by Cyril W. Knight in 1922


Drift
Maidens Creek
H.R. 70
MAIDENS
H.R. 69
North
QUEBEC
A
Wood's vein
Wharf
FRONTIER
H.R. 16
Loon L.
CROMPTON
H.R. 25
KEELEY
H.R. 19
BEAVER LAKE
H.R. 21
(KEELEY)
WETTLAUFER
H.R. 85
CURRY
H.R. 105
TROUT LAKE
MINING CO.
H.R. 103
Line of Section
Lake Timiskaming
H.W.M. 592' above sea-level
Trout
Lake
Oxbow L.
B
Montreal
River
Scale of Miles
½
0