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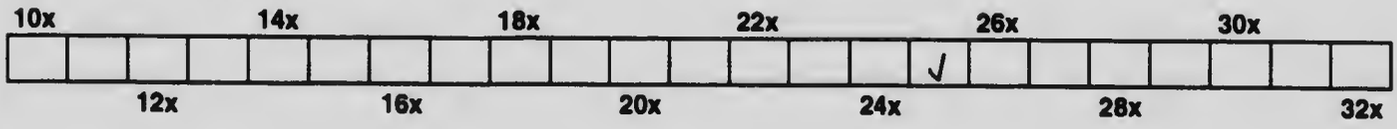

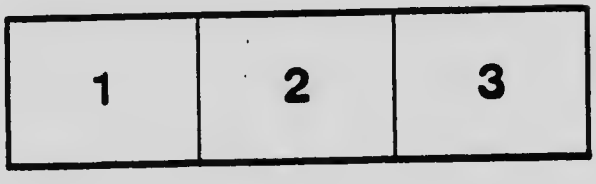

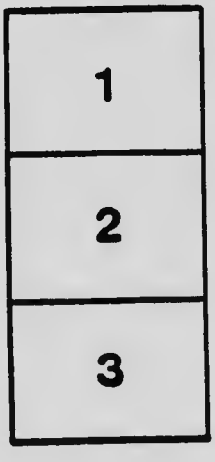

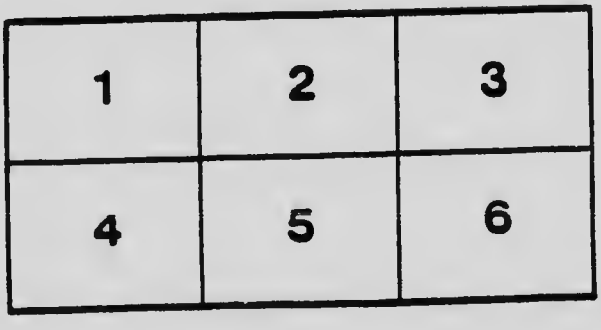

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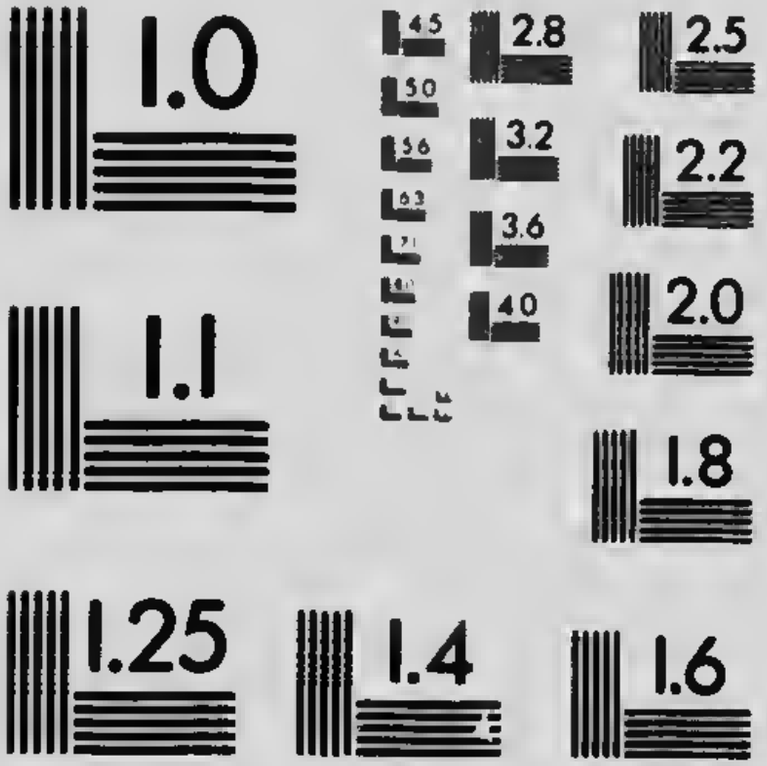

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Nova Scotia.

Deep Gold Mining.

Report on the best methods of testing the value of the deeper Gold Deposits of Nova Scotia.

BY

E. R. FARIBAULT, C. E.,
Geologist of the Canadian Geological Survey.

Printed by order of the Government of Nova Scotia.

THE COMMISSIONER OF PUBLIC WORKS AND MINES, KING'S PRINTER.
1903.

MINES OFFICE, HALIFAX, AUG. 20, 1903.

The Honourable Arthur Drysdale, K. C., M. P. P. Commissioner of Public Works and Mines,

SIR,—I beg to hand you herewith the text of an Act passed at the last session of the Legislature, entitled "An Act to encourage Deep Mining in the Gold Fields of Nova Scotia," being Chapter 9 of the Acts of 1903.

WHEREAS, it is desirable that deep mining should be encouraged in the gold fields of Nova Scotia:

Be it therefore enacted by the Governor, Council, and Assembly, as follows:

1. The Governor-in-Council shall and they are authorized to appropriate a sum of money sufficient to assist in the sinking of not more than three deep shafts in the gold fields of the province.

2. Such shafts shall be sunk in such places as may be determined upon by the Governor-in-Council, and shall be under the direction of the Inspector of Mines, and the sinking shall be under such regulations as may be made by the Governor-in-Council.

3. The Governor-in-Council shall only assist in the sinking of a shaft below 500 feet from the surface, and to a vertical depth not exceeding 2000 feet, and in such assistance the government shall not bear more than half the expense of the actual sinking.

4. The Governor-in-Council is authorized in carrying out the objects of this Act to enter into arrangements with any mining company, corporation, or person carrying on the business of gold mining, or with any person, firm or corporation that may hereafter enter into the business of gold mining.

The subject of the working of mines in Nova Scotia to depths commensurate with those reached in gold districts in other countries, has for some time received the consideration of your honourable Government. Hitherto the practice of local mining enterprise in this Province has been to work out such pay streaks or rich portions of veins as happened to show on the surface, and then to abandon the veins. This system of mining, however pardonable in the beginning, is inexcusable in view of the present advanced knowledge acquired by mining operations throughout the world.

Hundreds of gold mines, deep and profitable, have shown that gold is not a surface mineral, but follows copper, lead and other minerals to depths which, if not quite beyond reach, are inaccessible by ordinary working.

As the Canadian Geological Survey had for many years devoted much attention to the accumulation of the facts connected with gold mining in this Province, and had placed their work in the hands of Mr. E. R. Faribault, Geologist to the Survey, it has been deemed advisable to utilize the intimate knowledge this gentleman has acquired of our gold fields.

After procuring authority from the Legislature of Nova Scotia, Mr. Faribault, with the permission of the Director of the Canadian Geological Survey, has prepared a preliminary report. In this he presents the facts he has collected and given in fuller detail in the publications of the Survey, which show the presence of bodies of gold bearing quartz deeper than any hitherto mined.

In view of the importance of the subject of deep gold mining to the Province, this report of Mr. Faribault's is now printed for distribution among those interested in gold mining. It is believed that the facts and deductions presented by Mr. Faribault will be new and of interest to many, and to those familiar with his reports their presentation in a concentrated form will be of service.

The report is issued in the belief that it will assist companies and individual operators in considering the subject, and in arriving at a clear understanding of the localities best suited for deep sinking and for assistance on the part of your honourable Government.

I have the honour to remain,

Yours obediently,

E. GILPIN, JR.,

Deputy Com. P. W. & M.

Deep Gold Mining In Nova Scotia.

By E. R. FARIBAULT.

Possibility of Deep Mining Demonstrated by the Geological Survey.

The knowledge now gained by a detailed survey of the principal gold districts of Nova Scotia proves conclusively:

That the veins which coincide with the stratification and out-crop at the surface are the remnants of north or south legs of superimposed "saddle-veins" occurring on anticlinal folds, the apices of which have been truncated by extensive denudation.

That these saddle-veins are underlaid by a succession of other superimposed saddle-veins which do not out-crop at the surface, but occur deeper down on the axis-plane of the anticlinal folds.

That all the mining done for the last forty years has been confined to the saddle-veins outcropping at the surface, and the richest and most workable portions of these are now mostly exhausted. It is therefore desirable that the succession of underlying saddle-veins should be developed in depth, as it affords an extensive field for deep gold mining.

Analogy of the Bendigo Saddle-Reefs.

From the analogy of the gold-bearing saddle-reefs of Bendigo, Australia, occurring in a similar manner and profitably operated to depths reaching four thousand feet, it may be inferred that the Nova Scotia underlying saddle-veins will be found as large in size and as rich in gold as those cropping at the surface.

Deep Mining Proved by Actual Practice.

It is difficult, however, to induce capitalists to invest money in such extensive mining developments in Nova Scotia, unless similar undertakings have already proved successful in actual practice. It is therefore very gratifying to know that the recommendations of the Geological Survey have already been put into practice at the Doliver Mountain, Richardson, Blucnose and Dufferin mines; and

although the developments are as yet limited the results obtained are most satisfactory and conclusive, and testify to the accuracy and value of the work done by the Survey. They prove that auriferous saddle-veins may be found to recur underneath one another to even greater depth and in much closer succession than in Australia, and what has been accomplished at these mines can also be done in many other districts in the Province where the conditions are favourable.

Appendix (A) gives some observations and sectional plans by the writer, taken from the summary report of the Geological Survey for 1902 (to be published this month) on the important developments recently made on the arch-core of the anticlinal folds at the Bluenose, Dufferin, Richardson and Doliver Mountain mines.

Opportunity for Government Aid.

The time is opportune, and it is desirable that the Provincial Government should encourage deep gold mining in Nova Scotia, by assisting in the development and testing of the underlying saddle-veins and prove conclusively in actual practice their recurrence and value to great depths. An Act recently passed by the Provincial Government authorizing an appropriation to aid in the sinking of three deep shafts to depths reaching 2000 feet is most welcomed by those who have a knowledge of the great possibilities of the Nova Scotia gold fields for deep mining. Such developments, if properly carried out, will be a good object lesson as to what may be accomplished at other mines; they will attract the attention of foreign engineers and capitalists, and will undoubtedly be the inauguration of a new era of extensive and permanent gold mining in Nova Scotia.

Conditions for Success.

The following observations are intended to indicate some of the means by which the objects contemplated by the above Act can be most economically and effectually attained. They may also be of service in encouraging a better general system of underground development, which will result in establishing gold mining in Nova Scotia as an industry more permanent than it appears to be under present methods.

To be successful it is absolutely necessary that the knowledge accumulated for the last twenty years by the work of the Geologica Survey in the Nova Scotia gold fields and the vast experience gained in the Australian gold fields should be fully taken advantage of.

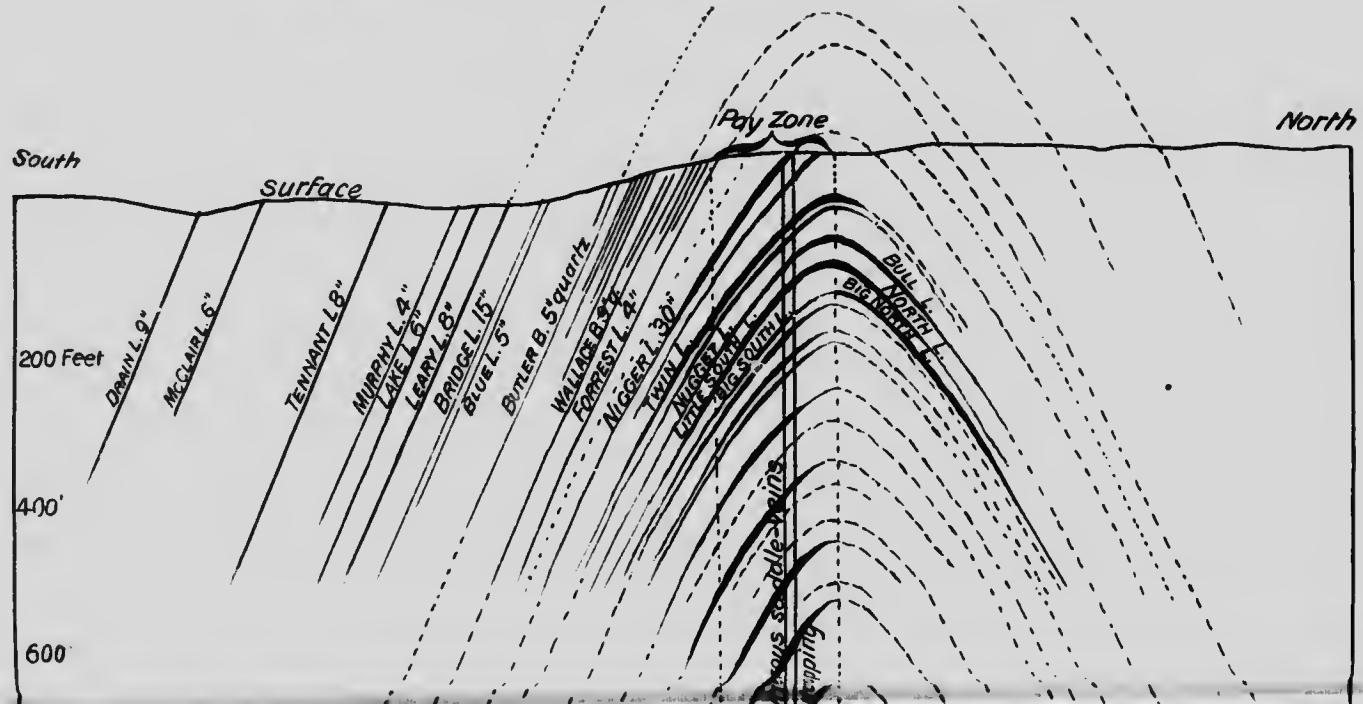
CROSS-SECTION OF TANGIER GOLD DISTRICT NOVA SCOTIA,

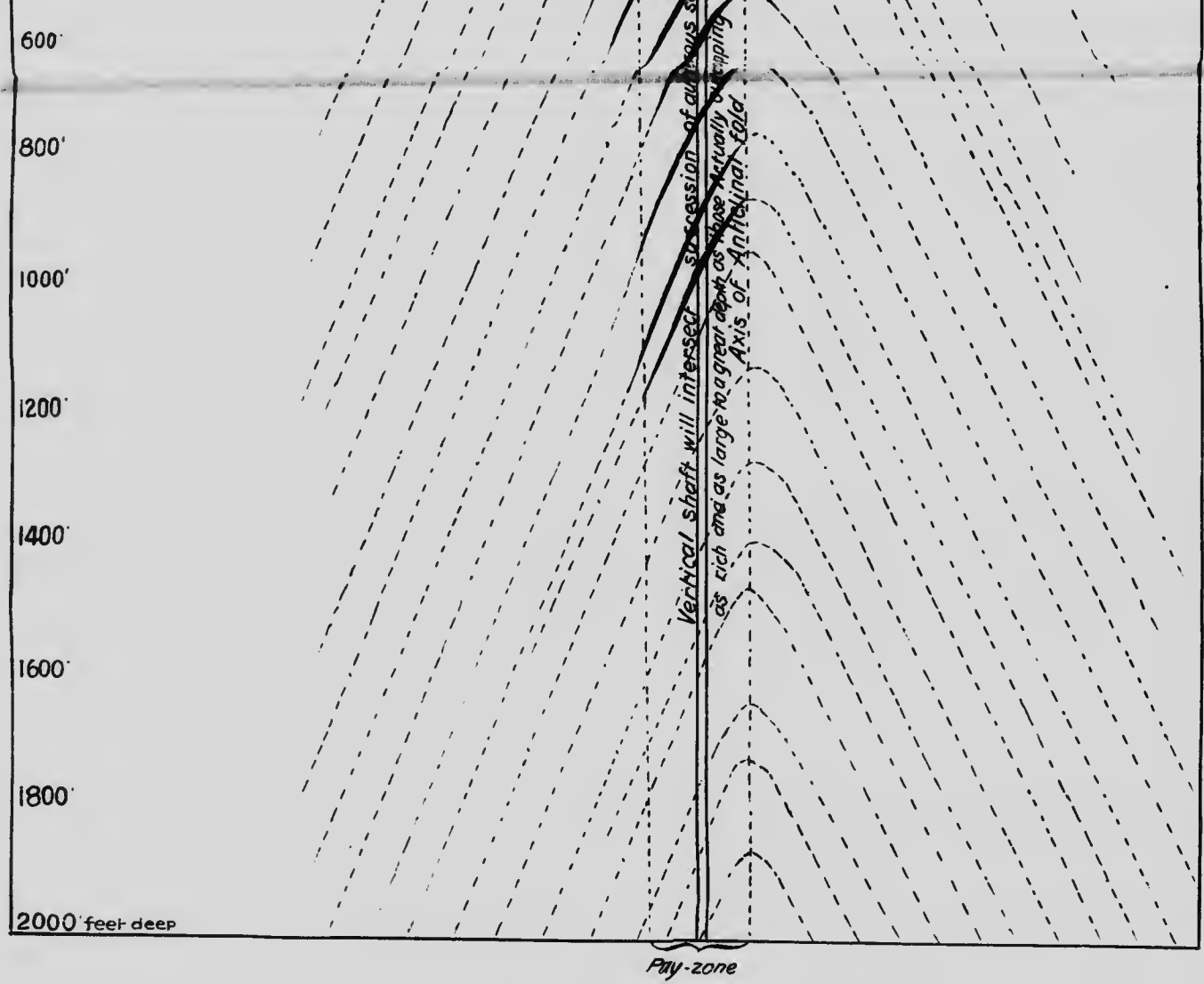
BY

E.R. Faribault B.A.Sc.

Scale in feet

100 0 100 200 300 400 500 600 700 800 900





Example of a VERTICAL ANTICLINAL FOLD showing that a vertical shaft properly located would require no cross-cutting to

Mr. C. K. Leith's Testimony.

Mr. C. K. Leith, of the United States Geological Survey, who has reviewed in the Journal of Geology, Jan.-Feb., 1900, the writer's "Gold Measures of Nova Scotia and Deep Mining," concludes by saying:

"This work of Mr. Faribault will be of immediate practical advantage to mining men, some of whom have already testified to its accuracy and value. It is another instance, lately of frequent occurrence, of geological work done from a purely scientific standpoint having direct economic value.

"From a scientific standpoint also, the results are of interest as illustrating a principle of ore deposition. In many districts, and particularly in the Lake Superior district, it has long been known that ore deposits were partial concentrates in pitching troughs by descending water. Van Hise has lately enunciated the principle that the openings in arches or pitching folds are favourable places for the concentration of ore deposits by *upward moving waters.* The formation of the gold-bearing veins in Nova Scotia seems likely to have occurred in this way."

Australian Deep Mines.

At Bendigo, Australia, fifteen mines are worked over 2,700 feet in depth, and eight over 3,000 feet; the deepest shaft on the Landell's 180 mine is over 4,000 feet deep. All these mines are operated on systems of anticlinal saddle-veins which do not outcrop at the surface, but have been developed successfully underneath one another by means of vertical shafts and by a series of cross-cuts and drifts driven every hundred feet (see cross-section of the Lazarus mine).

Much practical information may be obtained from the official reports of the Victoria Department of Mines at Melbourne, and other literature published on the subject in the transactions of the Australian Mining and Scientific Societies.

Selection of Most Favourable Places.

The success of deep gold mining in Nova Scotia depends above all on the selection of the most favourable districts and the proper location of the vertical shafts, and this can only be done after a careful study of the structure and conditions peculiar to each district, irrespective of any other consideration or influence.

Classified List of Gold Districts.

It has been attempted, at the request of the Nova Scotia Government, in the following list to classify the different gold districts according to the geological structure and the size of the veins operated. (W. P. signifies that water-power is available.)

CLASS I.—SADDLE VEINS.

Vertical Folds:

(*a*) *Largest Saddle-veins:*

1 Dolliver Mountain.....W. P.
2 Richardson.....W. P.
3 Mooseland.....W. P.

(*b*) *Smaller Saddle-veins and legs:*

1 Tangier, centre (free claim).....W. P.
2 Oldham.....
3 Caribou, on dome.....

Inclined Folds:

(*c*) *Largest Saddle-veins:*

1 Goldenville, east end.....W. P.
2 Dufferin.....W. P.

(*d*) *Smaller Saddle-veins and legs:*

1 Fifteen Mile Stream, east end, 3 anticlines...W. P.
2 Moose River, north anticline.....W. P.
3 East Waverley.....W. P.
4 Killag

(*e*) *Largest leg-veins:*

1 Renfrew, Foundation group (faults).....W. P.
2 Goldenville, south dip at centre.....W. P.
3 West Waverley.....
4 Wine Harbor, east end.....
5 Mount Uniacke, centre.....
6 Gold River, Gammon leads.....W. P.
7 Beaver Dam.....W. P.
8 Cochran Hill, Mitchell group.....
9 Harrigan Cove, immediately south of south anticline.....
10 Lawrencetown, immediately south of north anticline.....W. P.

(*f*) *Smaller leg-veins:*

1 Montague.....W. P.
2 Goldenville, centre of Wellington zone.....W. P
3 Wine Harbor, centre.....

4 Molega.....W. P.
5 Isaac's Harbor, Mulgrave zone.....
6 Lake Catcha.....W. P.
7 South Uniacke.....
8 Harrigan Cove, St. Anthony zone.....
9 Country Harbor.....
10 Kemptville.....
11 Whiteburn.....
12 Forest Hill.....
13 Mill Village.....W. P.
14 Gold River, south dip.....W. P.
15 East Rawdon.....
16 Miller Lake (Liscomb).....W. P.
17 Pleasant River.....
18 Brookfield.....
19 Crow's Nest.....
20 South Stewiacke.....
21 Gold Lake (Scraggy Lake).....
22 Head Chezzetcook.....W. P.
23 Moosehead.....
24 Carleton.....
25 Ovens.....
26 Ardoise.....
27 Leipsigate.....
28 Liscomb Mills.....W. P.
29 Indian Path.....
30 Vogler's Cove.....
31 McKay Settlement.....
32 Gegoggin.....
33 West River, Sheet Harbor.....

SUBORDINATE CRUMPLES:

1 Isaac's Harbor, North Star and Hurricane Point crumple.....
2 Mt. Uniacke, West Lake crumple.....
3 Gold River, Vermilion lead crumple.....
4 Ecum Secum, Cameron lead crumple.....
5 Lawrencetown, Shanghai and Bennett crumple.

CLASS II.—FISSURE AND CROSS VEINS.

1 Brookfield, Libbey's.....
2 Caribou, lake lode (Getchell's) and others.....
3 Leipsigate.....
4 Central Rawdon, Cope lode and others.....

5 Blockhouse.....
6 Cow Bay.....
7 Oldham.....
8 Lake Catcha.....
9 Vogler's Cove.....
10 Ardoise.....
11 Fifteen-mile Brook.....

Fissure and Cross-Veins.

In the above list the gold districts are divided into two distinct groups according to the class of veins operated, namely. *Class I, the saddle-veins*, following the planes of stratification along the crests of anticlinal folds, and *Class II, the fissure or cross-veins*, crossing the measures at various angles. The veins of the former class have hitherto been the principal source of the gold production, and they offer an extensive field for deep mining. A few of the fissure and cross-veins have also proved good producers, but they should not be considered in the present selection of a district for deep test-shafts; for, a deep shaft might prove the continuation of a chute of pay-ore within *one fissure-vein* to a greater depth than it is worked at present and would necessarily benefit the company operating; but, beyond this it would develop nothing new and would not attain the object in view, viz: to prove the recurrence in depth of a *succession of numerous saddle-veins* as rich and large as those actually outcropping and being worked at the surface.

In a few gold districts, like Caribou, Oldham and Lake Catcha, productive fissure veins and saddle veins have been worked quite close to one another and sometimes crossing each other. In no case, however, is it found possible to locate a vertical shaft that would advantageously develop conjointly both classes of veins.

Large Saddle-Veins Preferable.

It is acknowledged by the best authorities that the development of the gold-fields in Nova Scotia has been retarded by the persistence of the prospector in neglecting for years the problem of large supplies of low-grade ore in favour of isolated rich veins. It is believed that the districts presenting the largest workable saddle-veins offer the best prospects for permanent and deep mining and should receive the preference. The deepest mines in the Australian gold-fields are operated on the largest saddle-reefs.

Vertical and Inclined Systems of Saddle-Veins.

In locating a vertical shaft for deep mining, the dip of the anticlinal axis has to be taken into consideration, so that unnecessary

cross-cutting may be avoided. In the case of a vertical fold (see cross section of Tangier) like (*a*) and (*b*) in the above list, a vertical shaft would run parallel with its axis-plane, and very little cross-cutting would be necessary if the shaft is properly located, as it will keep in the pay-zone all the way down. But if the fold is inclined as at Goldenville (see cross-section of Goldenville) the vertical shaft would necessarily approach or recede from the axis plane as it is sunk to greater depth, according to its position with reference to the fold; and the deeper the shaft the more cross-cutting will have to be done to develop the pay-zone. *Underground developments on vertical folds will thus require to be less extensive and will cost much less than on inclined folds, and they should generally receive the preference for deep mining.*

Veins in Close Succession.

For the same reason it is desirable that the saddle-veins should underlie one another in close succession, and on this point the Nova Scotia saddle-veins are more advantageous than those operated in Australia.

Value of the Ore.

The general value and character of the ore already extracted from the veins outcropping at the surface in a certain district should also represent a fair estimate of what the underlying veins may be like in that district.

Water Powers.

A district with a good water-power should also be given the preference over one where steam has to be used. The transmission of power by compressed air for short distances and electricity for longer distances has now been proved practicable and is being extensively used elsewhere, and it could be applied successfully at several gold districts in the province where important water-powers are lying idle on account of their being too far away to be utilized by other means. Now that gold mining is being established on a more permanent footing in the Province, it is desirable that more advantage should be taken of the water-powers, as this would greatly reduce the cost of operation.

Choice of Company.

A good, strong, bona fide mining company that has already given proof of its ability should be preferred to a new company with no practical experience in mining, or one being formed with the special purpose of taking advantage of the Government's offer, unless the

engineer in charge is especially qualified for such undertaking, and the directors are good reliable business men.

Locating Deep Shafts.

The proper location of a vertical shaft is even of more importance than the selection of the district, for in most districts a vertical shaft well located, with properly directed underground developments, may prove successful, while in the most promising districts the results may be otherwise if the shafts and developments are not well located.

Importance of Cross-Cuts.

Second in importance to the location of the shaft, is the problem of properly planning out the system of underground developments to be carried out from each shaft, viz.: the direction and length of the cross-cuts and drifts to intersect the zone of pay-ore. It has been shown above that in the case of an inclined fold, much cross-cutting is required to intersect the pay-zone, otherwise the vertical shaft would be of little use. The necessity of cross-cutting is well shown in the section given of the vertical shaft sunk at Lazarus Mine, Bendigo.

Cross Cuts Under Control of Government Engineer.

Thus to ensure success, the Provincial Government should retain the control of the underground developments, and it might be desirable that Government aid should be extended to necessary cross-cutting and drifts which might be driven at successive levels, a few hundred feet apart, as the case required, this to be determined by the Government engineer in charge.

Tests.

The Government should also see that the veins intersected be carefully sampled and assayed and separate mill-tests made of the most promising, in order to determine the workable portions and pay-chutes. Such mill-tests should be under the direct supervision of the Government engineer, or some competent person appointed by him, who should take samples of the tailings at regular intervals during the mill run and have them assayed.

Underground Plans and Sections.

It is very desirable that the structure of the strata and veins intersected be recorded on a large-scale plan before the rock is concealed by the timbering of the shaft. A complete set of underground plans and sections should also be kept constantly up to date

of the cross-cuts, drifts, winzes, rises, etc., showing the values, sizes and structure of the different veins opened up. Such plans would show the distribution of the workable ore-bodies within the area developed, and also assist in defining the direction and extent of the pay-zone and in laying out the development work.

It is believed that the Government should have a competent officer, especially appointed to superintend the sinking of the three proposed shafts, to make surveys and to keep plans of the underground workings in order to determine what cross-cuts, drifts, etc., should be made so as to properly develop the pay-ground.

E. R. FARIBAULT,
Geologist to the Geological Survey.

Ottawa, 24th July, 1903.

APPENDIX (A)

The following observations and plans are taken from the Summary Report of the Geological Survey of Canada, 1902, by E. R. Faribault (to be published this month) on the important development recently made on the arch-core of the anticlinal folds at the Bluenose, Dufferin, Richardson and Dolliver Mountain mines:

GOLDENVILLE.

BLUENOSE MINE.

Much credit is due to the late Mr. Simson A. Fraser for having first undertaken, and Messrs. Thos. Cantley and A. G. McNaughton for having executed so successfully at the Bluenose mine, a new system of mining development on the Goldenville anticlinal fold, which should be an object lesson for the gold miners of the province.

Transverse Section.

A detailed survey was made on October 15th last of the new developments, and a transverse section was prepared which is here reproduced on a reduced scale. The section is made through the main shaft on the Springfield belt, and along two cross-cuts driven north, one above the other, at the depths of 280 and 364 feet, and at a distance of 30 feet west of the main shaft. The upper cross-cut is 230 feet and the lower 250 feet long. They show the structure of the Goldenville anticlinal fold, with a subordinate smal flexure on the north leg, and disclose the recurrence of large auriferous saddle-veins, from the surface to below 364 feet.

The saddle-veins are remarkably well developed on the apex of the fold, where they attain a large size, and they continue downwards very regularly on both legs, the veins diminishing but little in size, more especially on the south leg, which goes to prove that they will extend to a great depth as well as parallel with the anticlinal.

Most of the veins developed have proved auriferous, and two of them, the McNaughton belt on the south dip and the Cantley belt on the north dip, have already been profitably worked.

McNaughton Belt.

The McNaughton belt measure 6 feet 8 inches in width at the upper level and 6 feet at the lower, and is composed of large irregular quartz rolls and stringers pitching westerly 15 to 22 degrees in slate and a few thin layers of whin. It has been opened 300 feet in length on the upper level and 500 feet on the lower, and the greater part of the block of ore between the two levels has been extracted by backstopping. A rise of 65 feet has been made above the upper level, where the belt has widened to 8 feet and 10 inches and begins to curve towards a saddle higher up. The official returns of the ore extracted from the McNaughton belt for the year 1902 are 11,211 tons, yielding 2,391 ozs. of gold, which is very satisfactory, considering the size of the vein.

The Springfield belt was profitably worked to a maximum depth of 400 and a length of 900 feet, and is still found auriferous at the bottom of the main shaft, which is being sunk some 50 feet deeper for a third cross-cut to develop new saddles and backstope the McNaughton and probably the Faribault belt. The South Springfield belt was mined 113 feet in depth and 242 feet in length.

Pay Zone on South Dip.

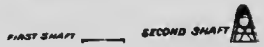
As the McNaughton belt has been profitably mined almost to the apex of the fold, 145 feet above the lower level, we may conclude that the denuded portion of the Springfield belt, about 150 feet, has pay-ore, which added to the depths worked, 400 feet, would give a possible total depth of 550 feet of pay-ore on the south dipping leads. The McNaughton belt may therefore be expected to carry pay-ore for 400 feet deeper than the 364 feet level.

On the south dip the zone of pay-veins is thus 150 feet in width and lies immediately south of the anticlinal axis along which it extends to great depth, unless a change should be found in the structure of the fold, of which there is so far no indication.

In length the Springfield belt has been profitably worked for over 900 feet, and there is good reason to believe that if prop- le-

The Gold Measures of Nova S

ova Scotia and Deep Mining.


FIRST SHAFT
SECOND SHAFT

veloped will be found to carry pay-ore for a much greater length and the McNaughton belt will probably be workable for as great a length. A continuous zone of pay-veins has been worked to limited depths all along the south limb of the Goldenville anticlinal fold, for a length of 4,400 feet from the Springfield to the Palmerston belt, beyond which development works have been prevented by the swampy nature of the ground. The surface developments are sufficient to prove that this zone affords a field of virgin ground, large enough for several mines like that operated by the Bluenose Company.

Geo. W. Stuart's New Shaft.

Mr. George W. Stuart is also at present sinking a shaft on area 743, and 75 feet west of the open cut on the Palmerston belt, in order to develop the zone of pay veins, which has proved very rich in gold in this vicinity, by a system of cross tunnels and drifts at different levels.

Pay Zone on North Dip.

The developments on the north dip at the Bluenose mine have not yet been sufficient to determine the pay zone, but on the Cantley belt they show that the workable portions of the veins are restricted to certain parts of the subordinate flexure occurring on the north limb of the main anticline, and further developments will, no doubt, determine some well defined zones of pay-chutes pitching like the flexure, easterly 20°.

Royal Oak Mine.

The most regular and continuous pay-chutes worked in Goldenville were operated on the north dip. In the plan and report of that district published in 1897, three zones of pay-chutes are given: the Wellington, Hayden, and McRae lines of pay-chutes. In the Summary Report for the same year, page 109, referring to the Hayden line of pay-chute, I said: "A swamp lying north-west of the Little Hayden has, no doubt, prevented prospecting further north-west on this undulation, but there is every reason to believe that rich streaks occur there." It is gratifying to learn that this prediction has been fulfilled and several rich pay-chutes have since been developed with a great deal of skill by Mr. Wm. McIntosh, the superintendent of the Royal Oak Mine, and for the year 1902, 4310 tons of ore have yielded the handsome return of 2394 oz. 16 dwts. of gold.

SALMON RIVER GOLD DISTRICT.

Dufferin Mine.

A general description of the mining developments on the arch-core of the anticlinal fold at the Dufferin mine has already been given in the Summary Report for 1899, page 183, and a transverse section showing the structure of the saddle veins is now ready for publication. This section shows that a vertical shaft 420 feet deep with cross-cuts across the anticlinal fold at 134, 200, 315 and 420 feet levels, have developed a succession of superimposed saddle-veins which do not crop at the surface, five of which have been worked between the surface and the 315 feet level. This mine has been one of the best gold producers in the Province, 117,906 tons of ore treated having yielded 41,497 oz. 5 dwts. 20 grs. of gold valued at $788,448, giving an average of 5 dwts. 20 grs. per ton of 2000 lbs. Through one cause or another, the mine is at present idle, but will, undoubtedly, be taken in charge by some skilful mining engineer and developed intelligently and operated as successfully as before, as has been the case with several other abandoned mines lately reopened.

UPPER ISAAC'S HARBOUR GOLD DISTRICT.

A special plan of this district, also called Upper Seal Harbour, was made in 1897, and descriptive notes were published in the Summary Report for that year, in which it was pointed out, at page 106, that "large belts of low-grade ore, conforming with and similar to that of the Richardson vein, certainly occur along this fold, but they will only be found on the apex of the fold, along which more prospecting should be done, and this could be accomplished most readily and at least cost by sinking vertical shafts along the axis." This recommendation has since been successfully put into practice at the Richardson and Dolliver Mountain mines.

The production to date of this district shows 73,314 ounces of gold from 226,355 tons of ore treated.

Richardson Mine.

At the Richardson mine a vertical shaft was sunk 160 feet in depth, about 900 feet to the eastward of the cropping of the apex of the Richardson vein, intersecting at the depth of about 100 feet the south leg of an overlying saddle-vein giving ten feet of quartz and slate, which was developed at the depth of 160 feet by a drift 60 feet eastward and a cross-cut 84 feet long to the north leg,

where it shows six feet of ore. The character of the ore and the structure of the saddle-vein is identical with that of the Richardson vein, but for some reason or other the work of sinking has been stopped. The property, however, has been acquired by a strong American Company, who contemplate important mining developments by means of a vertical shaft with up-to-date equipment, and alterations are already in progress. It is reported that the large cyanide plant is to be replaced by a new process of gold extraction and the 60 stamp mill improved and 20 more stamps added.

Dolliver Mountain Mine.

At Dolliver Mountain, on the same anticline and one mile west of the Richardson mine, Mr. G. J. Partington has, during the last two years, developed in a very skilful manner a succession of large saddle-veins similar to the Richardson.

The exact position and direction of the anticline and the structure and value of three superimposed anticlinal saddle-veins outcropping at the surface were first ascertained by Mr. Partington. These were the Howard, Forge and Partington saddle-veins, measuring respectively 10, 30 and 33 feet vertically on the apex, the former pitching eastward 12° and the latter 16°.

Vertical Shaft.

A vertical shaft 17 ft. 6 in. by 5 ft. 3 in. in the clear, was then sunk on the anticline, on area 774, at a distance of 400 feet eastward of the cropping of the Partington belt, to intersect the three saddle-veins as well as others underlying at their apex. After going through 55 feet of quick sand, small veins were intersected at depths of 55, 92 and 102 feet, which, although not apparently of workable size, proved the shaft to be exactly on the apex of the fold. At the depth of 130 feet the Partington saddle-vein was intersected. It measures about 33 feet in thickness on the apex, is being developed on the north and south legs, and has yielded about 6000 tons of auriferous ore, highly mineralized, composed of rolls, bunches and stringers of quartz running through a belt of slate and resembling much that of the Richardson mine.

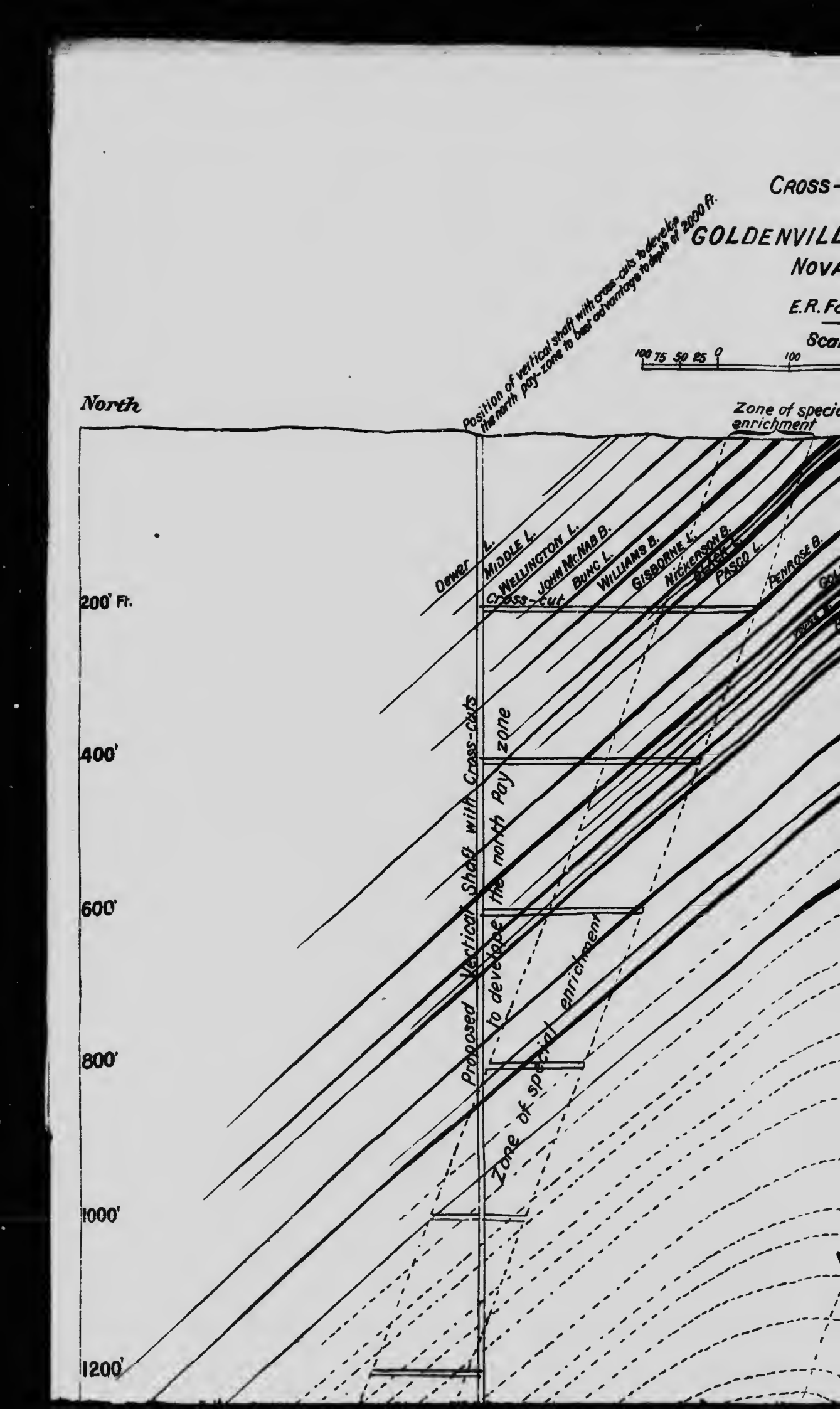
The shaft was on May 25th, 257 feet deep and the company is wisely continuing sinking without interruption, until 1000 feet has been reached. It will thus intersect successively the Forge and Howard veins and a great number of other new underlying saddle-veins, on the apex of the fold, where they are of greater size and value.

Plant.

The company is erecting a large modern plant, and they have a fine water-power at the head of the tide on Isaac's Harbor River, capable of generating 750 H. P. The power is transmitted to the mine by electricity, where an electrical hoist and a fifteen-drill air compressor have been installed, and an eighty stamp mill in which forty stamps are to be used at once.

Developments Based on the Structure.

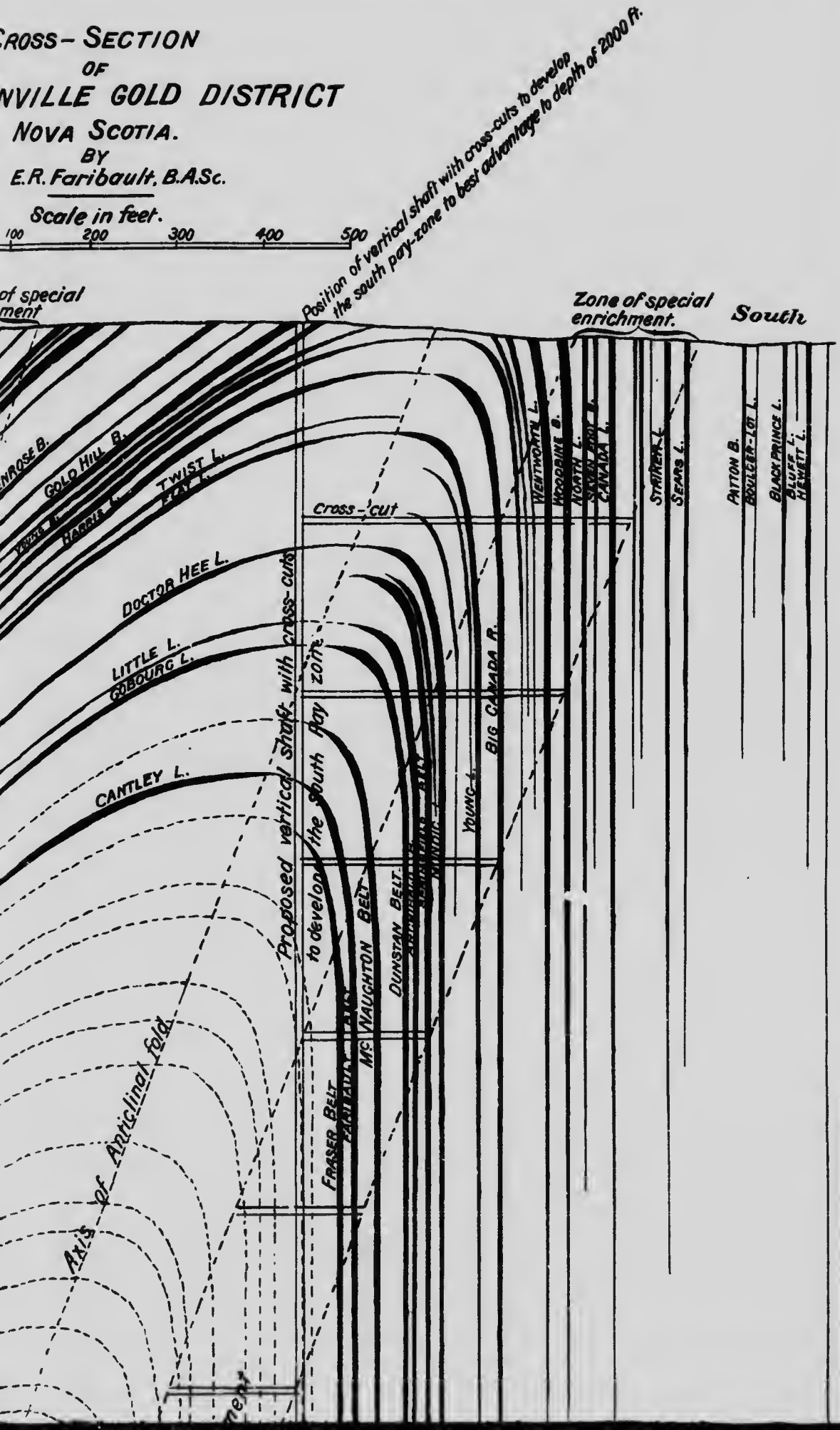
These operations are well worth recording as the first instance in Nova Scotia where a series of saddle-veins has been systematically developed, with due regard to its geological structure and a proper knowledge of its possibilities for extensive and permanent mining. What has been accomplished at the Doliver Mountain mine can also be done along Upper Isaac's Harbour anticlinal fold and in many other districts in the Province where the conditions are favorable.

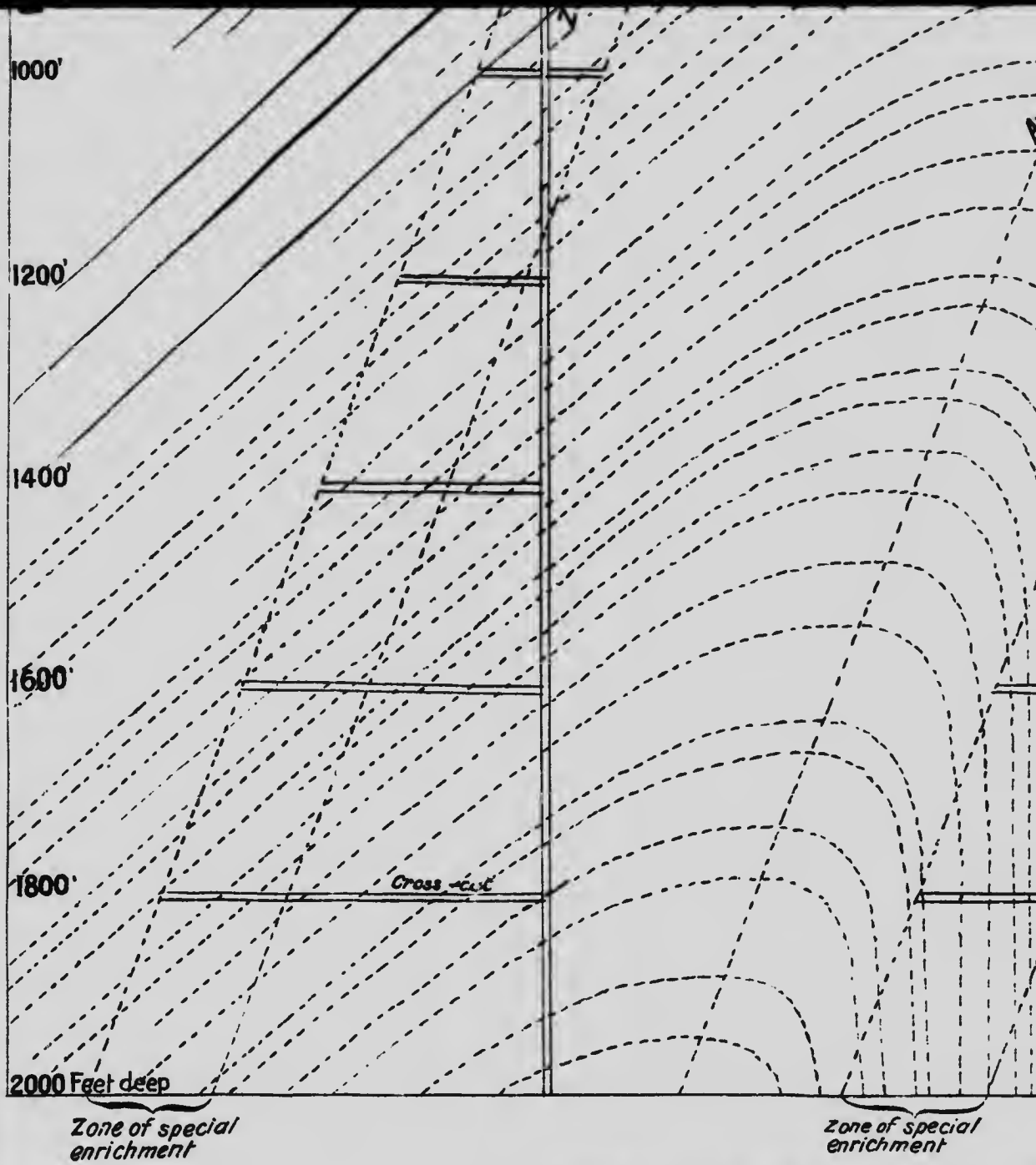

CROSS-
GOLDENVILL
NOVA
E.R. Fo
Scal
100 75 50 25 0 100
North
Position of vertical shaft with cross-cuts to develop the north pay-zone to best advantage to depth of 2200 ft.
Zone of specie enrichment
Dewer L.
MIDDLE L.
WELLINGTON L.
Cross-cut
JOHN Mc NAB B.
BUNG L.
WILLIAMS B.
GISBORNE L.
NICKERSON B.
PASCO L.
FENROSE B.
200' Ft.
400'
600'
800'
1000'
1200'
Proposed Vertical Shaft with Cross-cuts to develope the north pay zone
Zone of special enrichment

CROSS-SECTION
OF
NVILLE GOLD DISTRICT
NOVA SCOTIA.

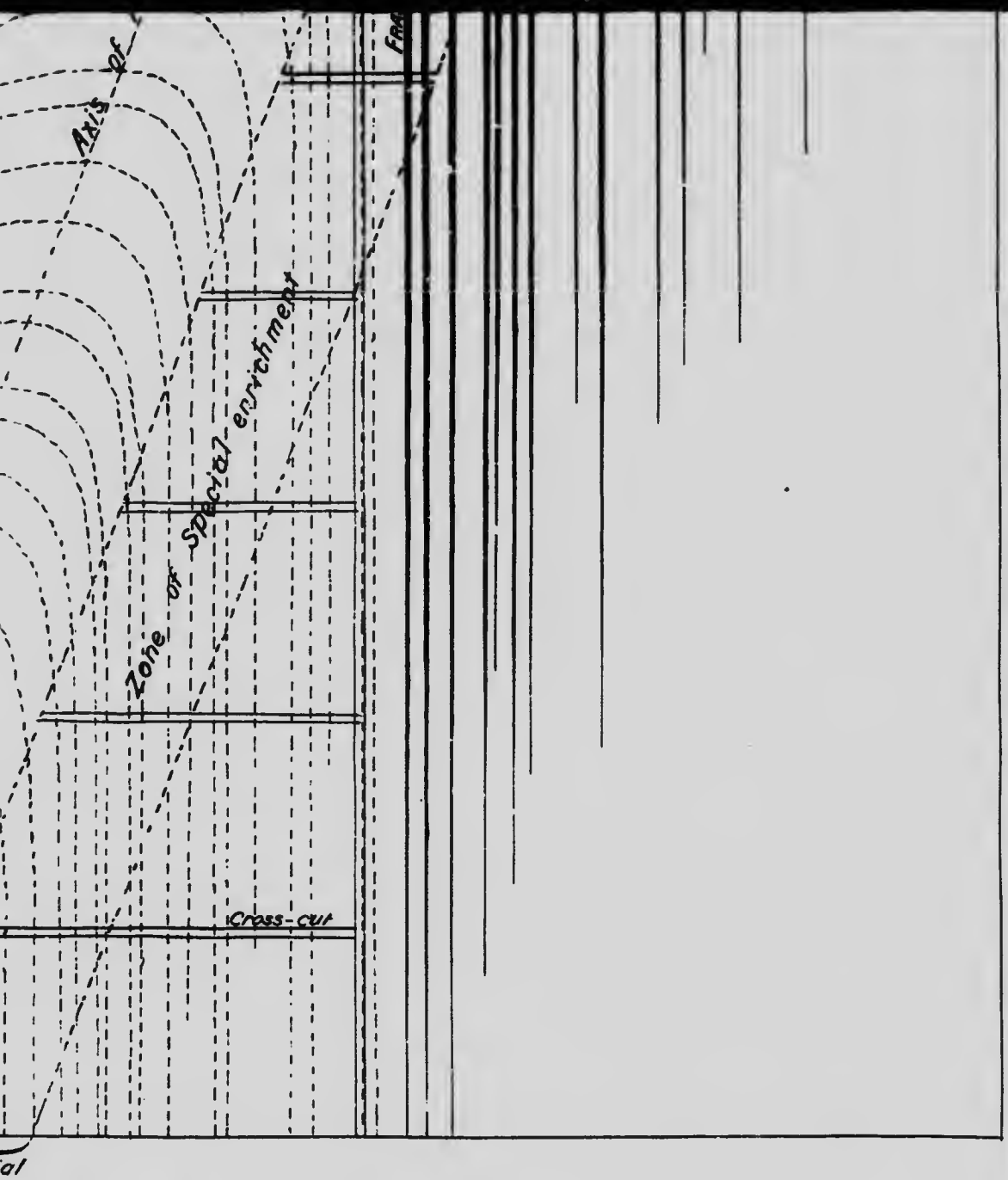
BY
E.R. Faribault, B.A.Sc.

Scale in feet.
100 200 300 400 500

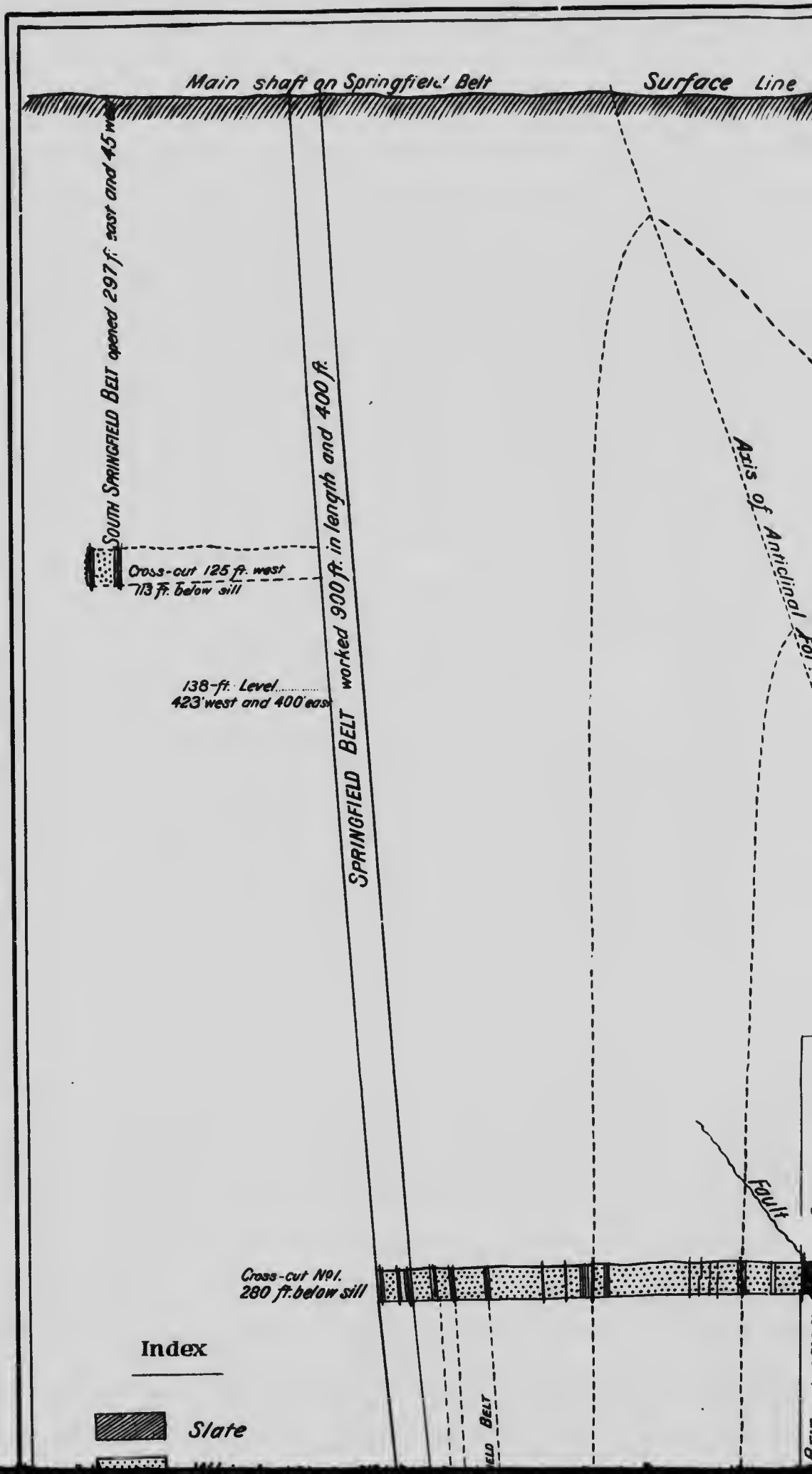


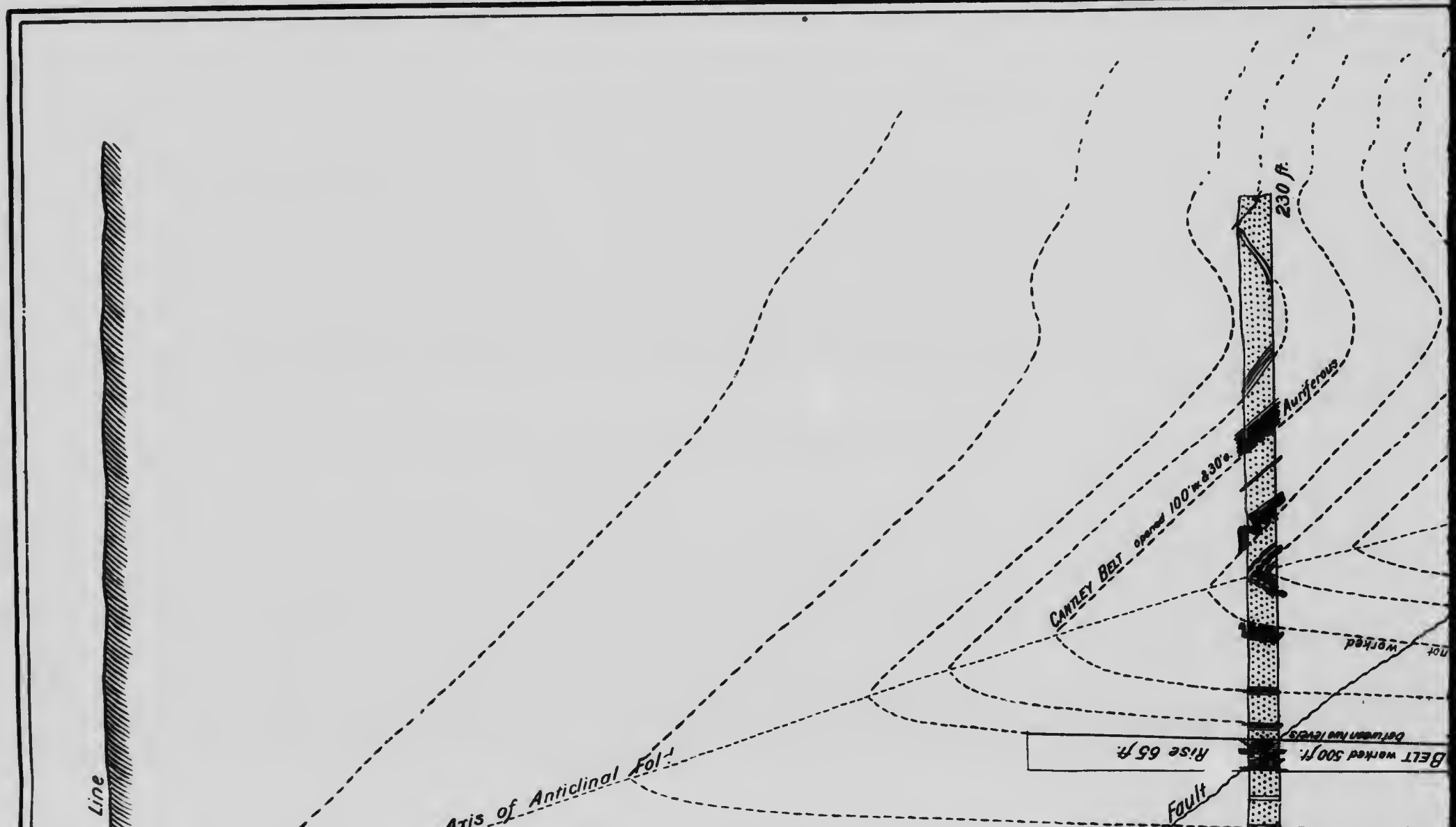


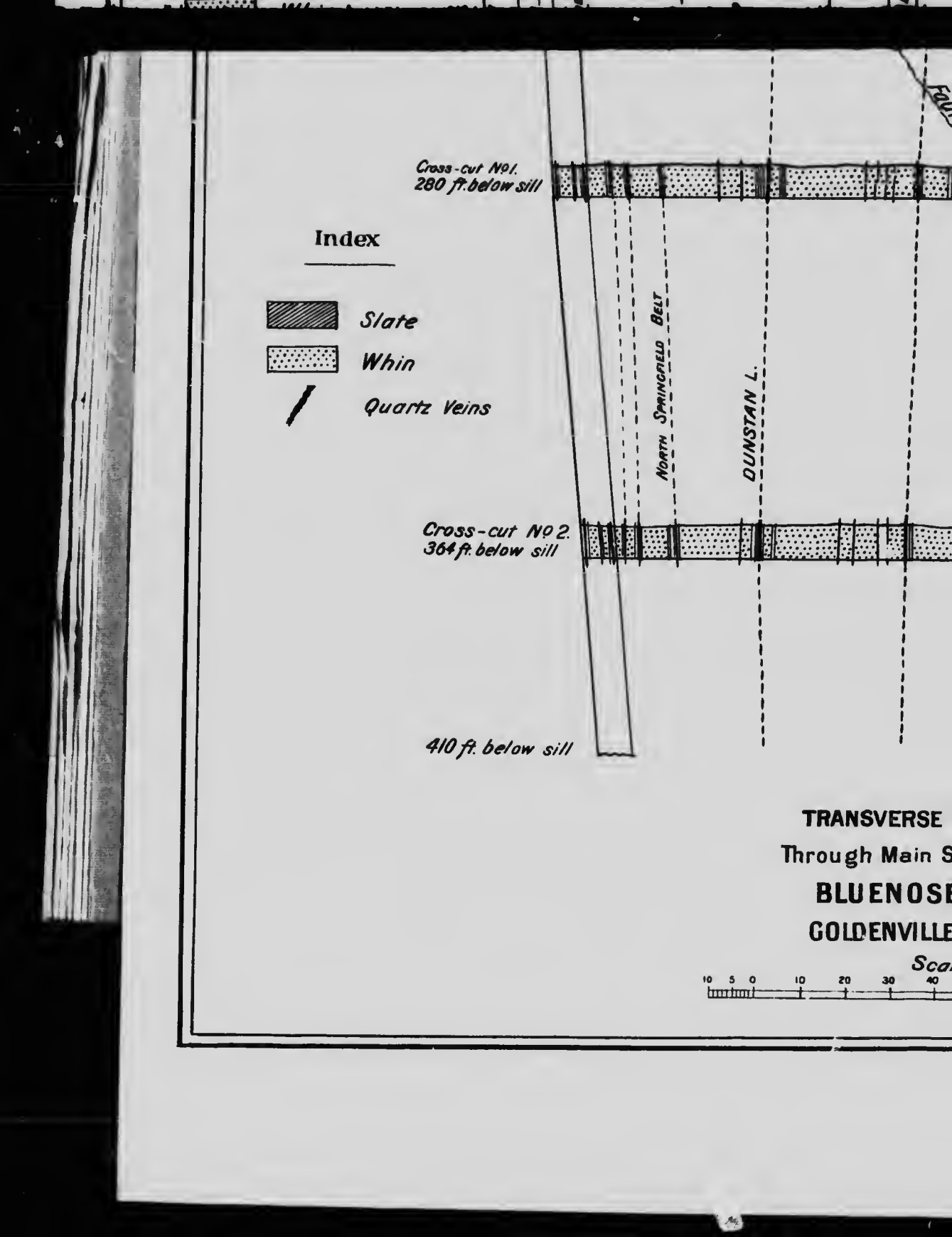
Example of an INCLINED ANTICLINAL FOLD re
to develope the pay-zones to best adva

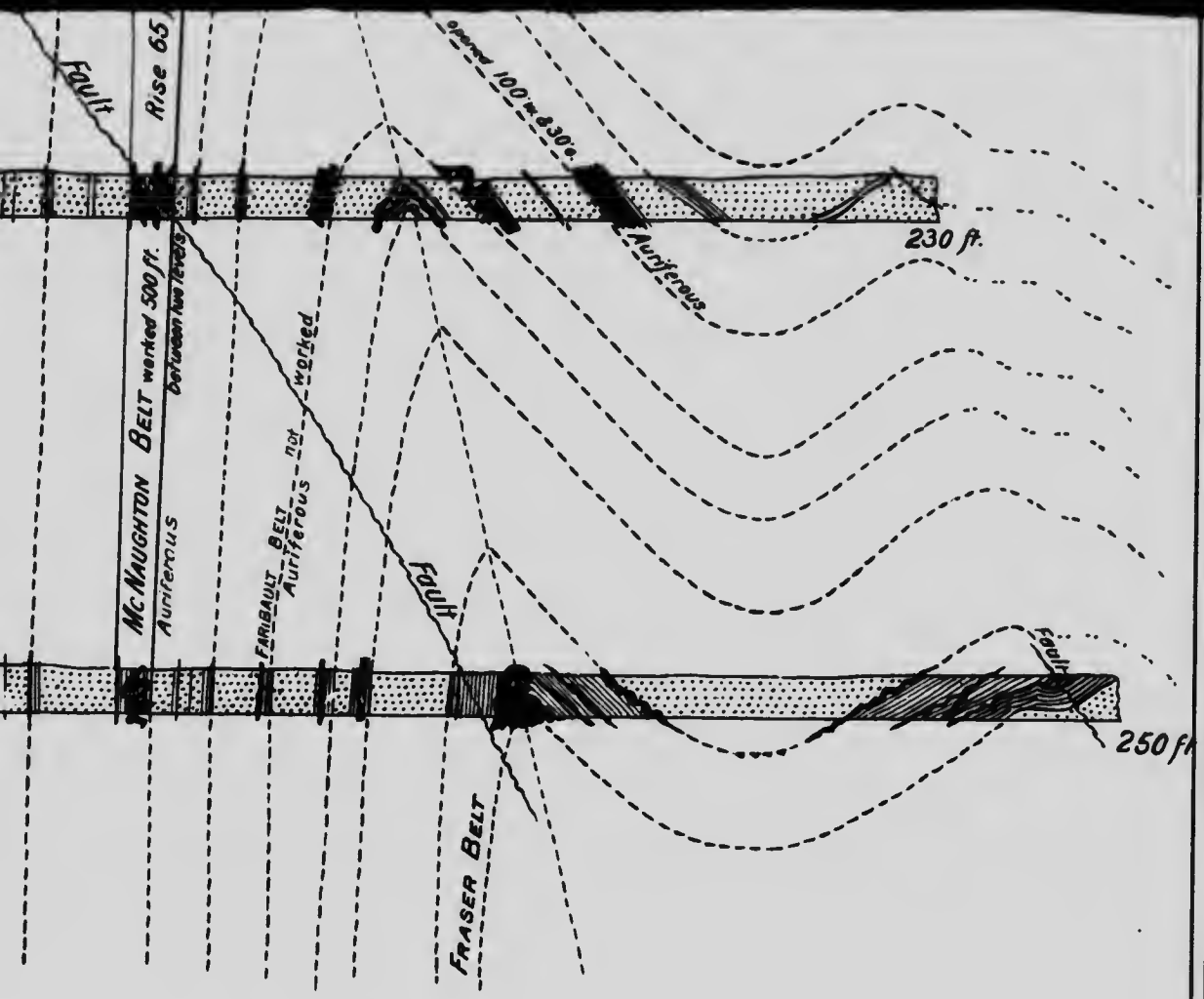


FOLD requiring vertical shafts with CROSS-CUTS
st advantage


Main shaft on Springfield Belt
Surface Line
South Springfield Belt opened 297 ft. east and 45 ft.
Springfield Belt worked 900 ft. in length and 400 ft.
Axis of Anticlinal
Cross-cut 125 ft. west
713 ft. below sill
138-ft. Level
423' west and 400' east
Fault
Cross-cut No 1.
280 ft. below sill
Index
Slate


230 ft.
Auriferous
CANTLEY BELT opened 100' x 830'.
not worked
BELT worked 300 ft.
between two leads
Rise 65 ft.
Fault
Axis of Anticlinal Fold
Line


Cross-cut No1.
280 ft. below sill
Index
Slate
Whin
Quartz Veins
North Springfield Belt
Dunstan L.
Cross-cut No 2.
364 ft. below sill
410 ft. below sill
TRANSVERSE
Through Main S
BLUENOSE
GOLDENVILLE
Sca
10 5 0 10 20 30 40



VERSE VERTICAL SECTION

Main Shaft and Cross-cuts

NOSE GOLD MINE,

NVILLE, NOVA SCOTIA.

Scale of feet.

30 40 50 60 70 80 90 100 110

NOVA SCOTIA MINES

GOLD AND SILVER.

Licenses are issued for prospecting for Gold and Silver for a term of twelve months. They comprise areas 150 by 250 feet, and any number can be obtained, at a cost of 50 cents per area. Leases of any number of areas can be obtained at a cost of $2.00 per area, for a term of 40 years, subject to an annual rental of 50 cents per area.

Licenses are issued to quartz mills, which make returns and pay royalty on the gold at the rate of two per cent, on milled gold valued at $19.00 per ounce.

Minerals other than Gold & Silver.

LICENSES TO SEARCH over five square miles for eighteen months, cost $30.00; leases for four renewable terms of twenty years each can be selected from them at a cost of $50.00, and are subject to an annual rental of $30.00.

All titles, transfers, etc., are recorded free of charge by the Department. The royalty on coal is 10 cents per large ton.

The Gold district covers over **three thousand square miles**, and the deposits of coal, iron ore, etc., are practically unlimited.

FOR FURTHER INFORMATION APPLY TO

A. DRYSDALE, **Commissioner Public Works and Mines,**
Halifax, N. S.