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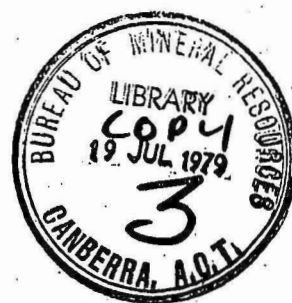
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GEOLOGICAL NOTES ON THE
HILLGROVE MINE

by

N.H. FISHER

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GEOLOGICAL NOTES ON THE HILLGROVE MINES.

INTRODUCTORY.

Two days, November, 10th and 11th, were spent in the Hillgrove area and brief examinations were made of the North Cosmopolitan, Garibaldi, Metz Black Lode, and Damifino Mines, as well as the surface of Eleanora, Freshold, Baker's Creek and other formerly worked lodes. For a general description of the geology of the Hillgrove Field reference is made to Mineral Resources Volume No. 8, Report on the Hillgrove Gold Field, by E. C. Andrews, issued in 1900. Little, if any, regional geological work has since been done in this area. Messrs. F. W. Booker and F. N. Hanlon of the New South Wales Geological Survey have recently completed an examination of the operating mines and their report and plans will shortly be available.

At present Hillgrove is a small township with a post-office and two stores. Nearest hotel accommodation is at Armidale, 18 miles distant westwards by good road. Immediately east and south of Hillgrove the plateau country gives away suddenly to the steep and often precipitous sides of the spectacular Baker's Creek and tributary gorges, along the sides of which most of the mineral-bearing reef outcrops were found. One inclined tramline - the Baker's Creek line - is still in working order and was in operation at the time of inspection. Otherwise access to the gorge is down various narrow tracks.

The Black Lode on the Metz side is being worked for antimony, and J. Usher's scheelite mine is in continuous production. Development is proceeding on the North Cosmopolitan and Garibaldi antimony mines, and a little gouging is being done in the Swamp Creek and Baker's Creek gorges.

THE NORTH COSMOPOLITAN MINE. This mine is situated on the east side of Baker's Creek gorge, west of the town of Hillgrove, and lies approximately on a continuation to the north-west of the Eleanora line of lode. It is wholly within the granite, some distance from the slate contact, a most unusual feature for antimony lodes in the Hillgrove area. As a rule the antimony and gold lodes occur in the slate and the scheelite within the granite. On the surface the North Cosmopolitan ore shoot was worked for a length of approximately 200 feet across a spur on the side of the gorge. The depth of this working is not known, but probably did not exceed 100 feet. The present working consists of an adit driven some 200 feet below the highest outcrop in a north-westerly direction.

15 The lode channel, as is the case with most of the Hillgrove lodes examined, is a well defined, nearly vertical fault fissure, marked by definite evidences of movement, with usually a few inches of gouge and laminated crushed material. This was followed in the drive for 366 feet without finding anything more than two or three inches of gouge containing antimony, and on the best showing, at 290 feet, a winze is being sunk. Immediately below the floor of the adit, the lode opened out to 2 feet 6 inches of good stibnite ore. The mineralisation has made out from the parent fissure mainly on the south-west (footwall) side and appeared to be better in the north-west than in the south-east end of the winze, the depth of which at that time was about 14 feet. Unfortunately time was not available to make a longitudinal section of the lode to show the exact relation of this make of ore to that worked on the surface, but the position appears to correspond fairly closely. In view of this and the fact that the surface shoot was apparently fairly extensive, there seems to be good grounds for hoping that the antimony showing in the winze may develop into an appreciable shoot of ore. Much of it is sufficiently high-grade to be shipped direct. The gold content is low. The most usual condition at Hillgrove appears to be a general steep pitch to the south-east of the axis of mineralisation, with shoots and lenses of ore of greater or less continuity making in down this pitch, and the existence of a shoot of ore in the position

now being developed in the North Cosmopolitan would be in conformity with this general condition. Until further work is done, it is not possible to make any estimate of the amount of ore which may be available here, but the blocking out of the ore shoot should be proceeded with as expeditiously as possible.

THE GARIBALDI.

This lode is the south-eastern continuation of the main Eleanora reef, from which it is separated by a blank of several hundred feet. A conspicuous feature of the Eleanora lode was the presence along the lode channel of an altered granitic dyke, with the ore on both walls between the dyke and the enclosing slate. This condition also prevails in part for the Garibaldi, to the south-east of the shaft. The dyke and the accompanying ore shoot appear from the exposures on the surface and the 200' level, to pitch to the southeast at an angle of 80° . On the 200' level, the lode is split into two sections from 100 to 200 feet southeast of the shaft. Both sections have been stoped overhead. The footwall or southwest branch apparently contained rich values over a limited extent of shoot. Mr. O'Brien thinks that this shoot played out about 40 feet above the 200' level and considers that it should be worth while putting out a short southwest caddy from the main lode drive in the corresponding position on No. 1 level, between 60 and 70 feet from the shaft, to test for a further shoot of ore. This would appear to be sound procedure. The lode in the main drive on the 200' level is solid underfoot and has been sampled by Messrs. Bocker and Hanlon. An average of 10 samples over a length of 200 feet gave 9.13% Sb. and an average width of 13.8 inches. The mine has so far not been re-opened below the 200' level, so it is impossible to say to what depth this ore may extend, or whether it has been worked up from the 300' level. On the dimensions and grade exposed on the 200' level, the content of metallic antimony would be 1.66 tons per vertical foot. Exploration down the pitch of the shoot by re-opening the 300' and 400' levels and by driving the 400' level to cut the ore as outlined by Mr. O'Brien is to be recommended. The gold values in dwts. are generally of a similar order to the antimony in percentages, but high gold values do not necessarily correspond to high antimony values.

Elsewhere on the 200' level the lode fissure is well defined enough, but contains little ore. Near the northwest end it is offset by a northeast - southwest crossfault with a displacement apparently to the northeast, and has not been picked up beyond the fault.

THE BLACK LODGE.

The outcrop of this very persistent fissure extends at least from the top of the Baker's Creek gorge, just east of the village of Metz, for several hundred feet in an easterly direction down the slope. Lenses of ore of limited extent are found at widely separated intervals along the lode channel, rendering development costly. One such lens is now being worked on tribute by Smith, Witherden and party in the bottom tunnel, shown in Plan on Plate 1 and in the accompanying longitudinal section. To locate this shoot some 500 feet of driving was necessary. No values were obtained in the drive, but were found immediately above the back by rising, and some 50 feet length of shoot has so far been developed. The ore is solid, averaging 5-9 inches in width, and consists mainly of fine-grained massive stibnite, though some bands of acicular crystals are present. Gangue contained in the ore is broken slate and quartz. The fine grain and the intermingled slate impart a dark colour to the ore, hence the name "Black Lode", and the prill ore is lower grade than the more coarsely crystalline stibnite of other lodes. The country rock is slate and strikes and dips more or less parallel to the lode fissure. The relation of the principal shoot mined on the surface to the ore in the bottom tunnel is shown on the accompanying longitudinal section. It will be seen that the usual steep

easterly or south-easterly pitch is maintained. The shoot as at present exposed contains about 1 ton of antimony concentrates per vertical foot, but its horizontal limits have not yet been determined.

110 feet vertically above the lowest tunnel Austin and party are working on a branch off the Black Lode. The fissure was displaced lefthandedly by a small crossfault and made into ore on the far side of the fault. This was just being opened at the time of inspection and a 12" thickness of fairly good crystalline stibnite, mixed with slate, different in quality from the Black Lode ore, was exposed for a length of 6 feet in the end of the drive. Workings also exist on the Black Lode itself in Austin's tunnel, presumably on the main shoot, but their position and extent were not ascertained.

On the slopes in the vicinity of the Black Lode, several branch or sub-parallel lodes occur, particularly on the north side of the Black Lode, and small shoots of antimony have been extracted from several of these. One such branch, containing antimony is definitely exposed in the bottom tunnel (see Plan, Plate 1) and it is proposed to develop it further when opportunity offers. It is likely that ore shoots in these branch reefs favour locations in the vicinity of their junctions and it should be possible by a detailed survey of this area to obtain sufficient information to define the dips and directions of the various lodes, the pitch of the reef junctions, and the pitch relations of the ore shoots.

THE DAMIFINO SCHEELITE MINE. This mine is owned and worked by Jock Usher of Hillgrove. Six men are employed. It is located within the granite at no great distance from the contact, a few hundred feet above the bottom of Baker's Creek gorge on the east side. Access is by horse track from Hillgrove, and the ore is hauled up the side of the gorge on an overhead ropeway. The reef has been a persistent producer and has been worked for nearly 500 feet from the surface, though the length of the shoot is seldom more than 100 feet. The strike is the usual northwest - southeast and the dip very steep to the north-east. A crosscut from the side of the hill leads to the lode, which has been stoped out from the surface to 45 feet below the adit level. Driving is now proceeding on the 105' level and stoping between the 105' and 45' levels. The reef fissure is not so well defined as is the case with the antimony lodes, and it is not so easy to follow when the scheelite plays out. Small parallel stringers may be present. The scheelite is only a few inches wide as a rule, sometimes fairly solid, sometimes mixed with granite. Stibnite is present in places and is regarded as an impurity. Mr. Usher has developed a technique for removing the antimony by boiling with caustic soda. A sample of scheelite-stibnite ore has been sent to Dr. F. L. Stillwell for mineralogical examination. The ore is dressed, where necessary by hand-jigging, up to as high as 78% WO_3 . A prominent flat fault passes through the workings which displaces the ore several feet to the left. The fault appears to be pre-ore and values fall off in its immediate neighbourhood.

The accompanying plans and longitudinal section are self-explanatory. It is estimated that the lode is capable of producing 1 to 1.5 tons of scheelite concentrate per foot of depth, but no large increase on present production is possible, due to the limited extent of the shoot.

OTHER MINES.

As underground observations were confined to the four mines mentioned above, no detailed description can be given of any of the other mines in the Hillgrove Area. The Freehold property is situated near the edge of Swamp Creek gorge, south-east of Hillgrove mainly within the slate, although the northwest end of the lode runs across the contact into the granite.

Dykes follow the course of the lode and the ore is thought to have been localised into bunchy shoots. This mine is said to have been very wet, and any proposal to re-open it should include consideration of the merits of driving an adit along the course of the lode from the side of the gorge. Average of six samples taken by Messrs. Booker and Hanlon from the Freehold dumps, which Mr. O'Brien is proposing to treat when the mill is completed, is 2.75% Sb.

The Baker's Creek and other gold lodes are at the moment of historical interest only.

GENERAL FEATURES OF THE HILLGROVE LODES. Following is a summary of some of the more interesting features of the lodes from the point of view of their economic geology, as far as observed in the limited time spent on the field.

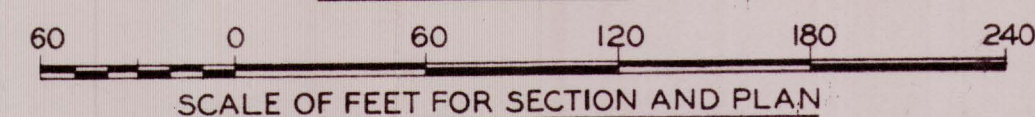
- (1) The lode fissures are well-defined and persistent, striking northwest - southeast and dipping steeply to the northeast.
- (2) The reefs in slate conform in strike and dip to the general direction of the bedding.
- (3) As a general rule, scheelite reefs occur within the granite, antimony, gold-antimony and gold reefs in the slate, with the proportion of antimony higher near the granite contact and relatively decreasing away from it.
- (4) The small crossfaults which often displace the reef fissures a few feet are earlier than the ore.
- (5) There is a consistent pitch of about 80° to the southeast of the principal axis of mineralisation of the ore bodies. This is known to hold for the Eleanor, Garibaldi, Baker's Creek Big and Little Reefs, the Black Lode and the Cosmopolitan.
- (6) Most of the ore is contained in lenticular ore shoots down the general pitch. In some mines, as on the Baker's Creek reefs, the ore shoots appear to have been continuous (refer to Andrew's Report, Plates XII and XIII). In others low-grade or barren sections intervene. On long lines of reef the productive ore-bodies are separated by extensive blank areas, in which very small minor shoots may occur sporadically.

The localisation of the shoots in antimony lodes such as the Black Lode at Metz is a problem which might respond to detailed geological mapping. It may be that the ore shoots hug the central portion of the fissure, which would in the average case be the locus of greatest movement. The guiding principle in the search for ore seems to be that exploration should be directed down the general pitch of the shoot.

N. H. Fisher
N. H. FISHER,
Chief Geologist.
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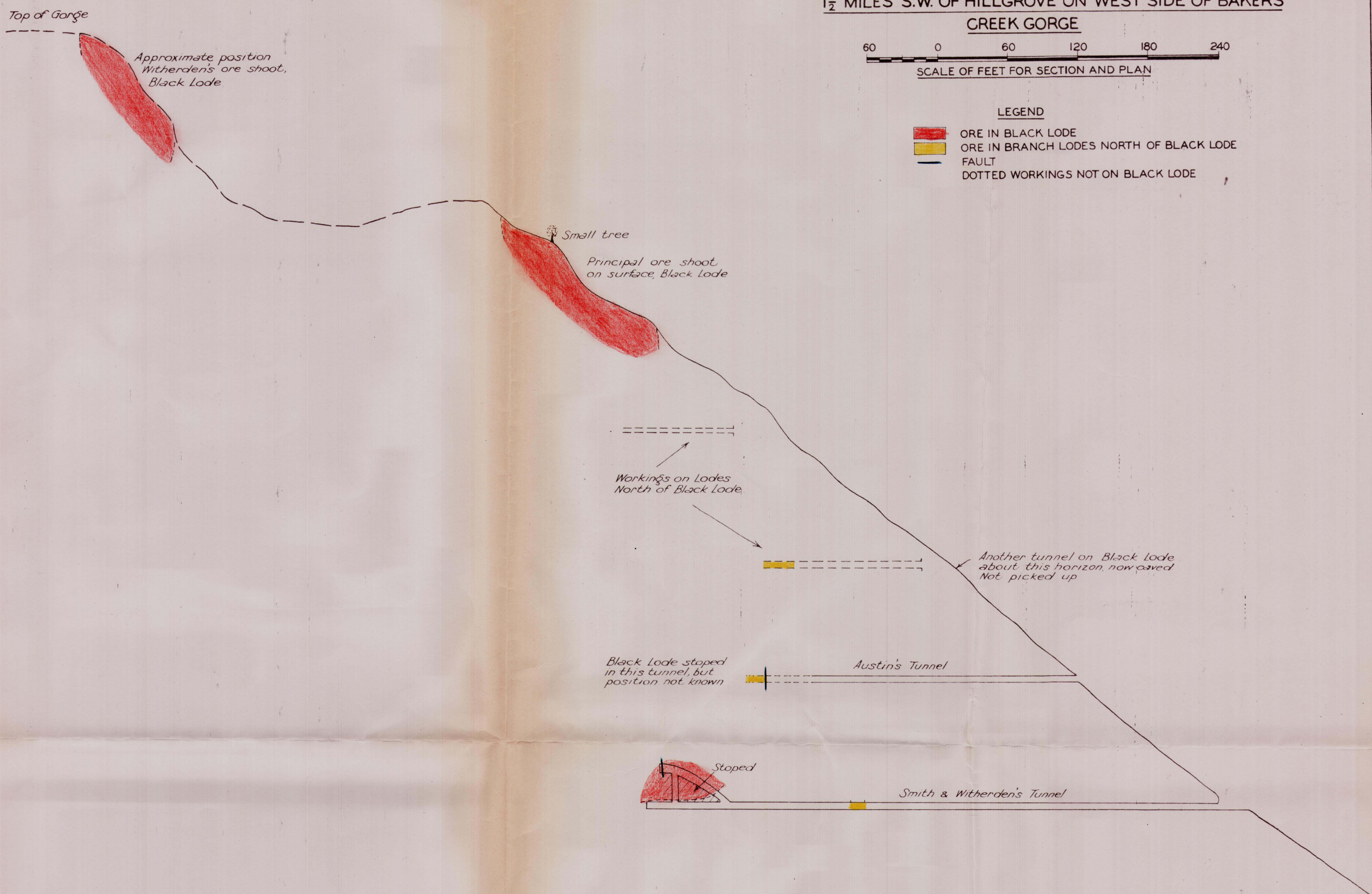
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LONGITUDINAL SECTION, BLACK LODGE, METZ,
1 1/2 MILES S.W. OF HILLGROVE ON WEST SIDE OF BAKERS
CREEK GORGE



LEGEND

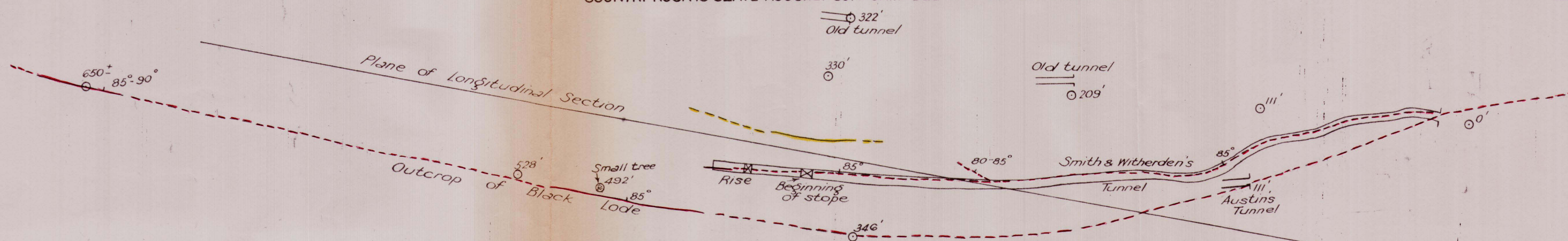
- ORE IN BLACK LODGE
- ORE IN BRANCH LODES NORTH OF BLACK LODGE
- FAULT
- DOTTED WORKINGS NOT ON BLACK LODGE



GEOLOGICAL SKETCH PLAN OF OUTCROP AND LOWEST WORKINGS
OF BLACK LODGE, METZ.

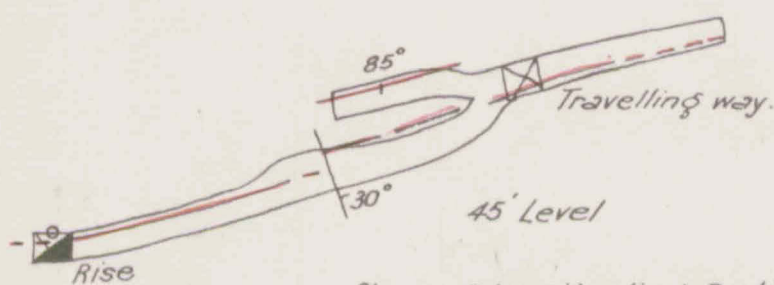
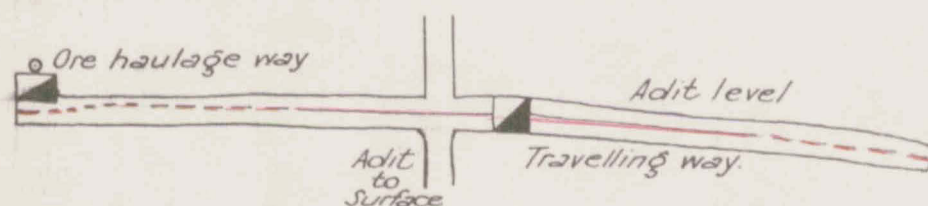
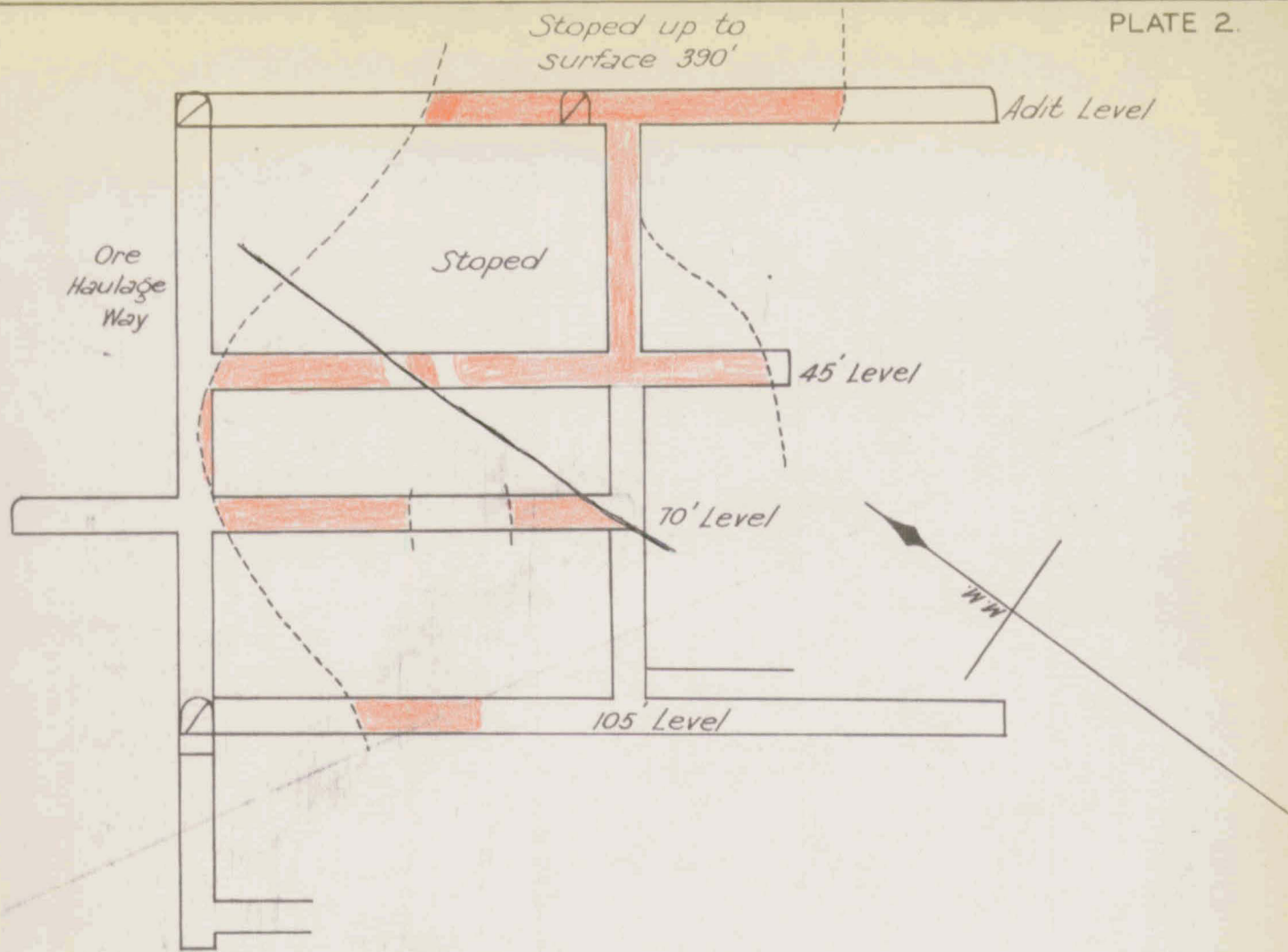
LEGEND

- HEIGHTS MEASURED ABOVE FLOOR OF ADIT AT MOUTH
- BLACK LODGE FISSURE
- ORE SHOOT
- COUNTRY ROCK IS SLATE ROUGHLY CONFORMABLE WITH LODES IN STRIKE AND DIP.

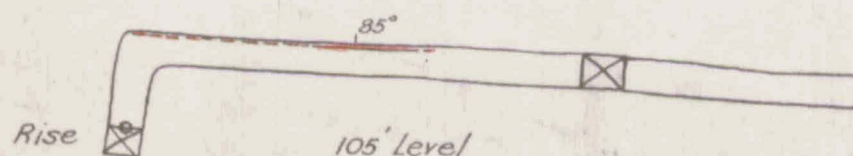
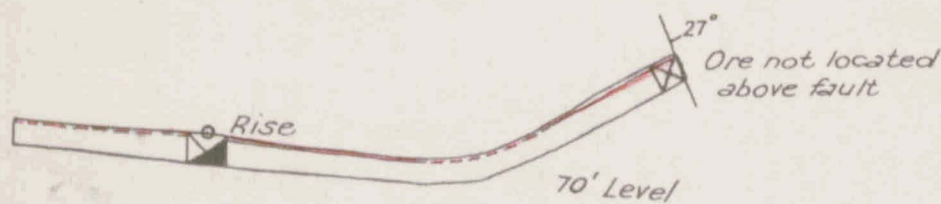


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16-11-42.

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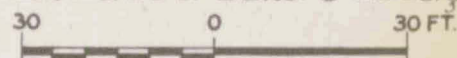
Plane of Longitudinal Section



LONGITUDINAL SECTION
AND LEVEL PLANS.

DAMIFINO SCHEELITE MINE

(3/4 Mile W. of Hillgrove. On
East side of Baker's Ck Gorge)



—Legend—

- Scheelite Lode
- - - No payable ore
- Fault
- Country rock all granite

W.H. Kahan

Chief Geologist
Mineral Resources Survey Branch
16-11-42.

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