DEPARTMENT OF MINES
NEW SOUTH WALES

THE GEOLOGICAL SURVEY OF NEW SOUTH WALES

Geological Survey Report No. 48

CULLULLA SILVER-LEAD PROSPECT

by

D. W. SUPPEL AND A. G. LOUDON

Price: 50c.

Issued under the Authority of the Hon. T. L. Lewis, M.L.A., Minister for Mines.

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Contents

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Abstract

Minor silver-lead mineralization has been exploited in the past at Cullulla. This mineralization occurs in narrow steeply dipping shears in somewhat broadly folded slates and sandstones of probable Ordovician age. Copper mineralization is also known to occur at Curra Creek three-quarters of a mile to the West. A geochemical survey involving stream sampling is recommended as a regional prospecting method if an initial geochemical orientation survey proves satisfactory.

Introduction

1. General

A geological survey of the Cullulla silver-lead prospect was carried out by geologists A.G. Loudon, D.W. Suppel and W.J. Staude between the 15th and 17th of March, 1965.

The area is held under Authority to Enter Application No. 1161—Goulburn by J.S. Romanis, and embraces portions ML's 1, 2, 3, 4, 6, 7 and 8 which cover approximately 260 acres.

2. Locality and Access

The prospect is located south east of Goulburn and 11 miles east of Tarago, in portion 180, parish Cullulla and portions 67 and 68 parish Nadgigomar, county Argyle. It is accessible by 11 miles of gravel surface road which leaves the Goulburn-Braidwood road at Tarago.

3. Power–Transport–Markets–Freight

Electric power lines pass the site and supply the "Silverstream" farmhouse.

Tarago railway yards connect directly with Port Kembla and Sydney; the freight rates being £3/5/5 and £3/15/4 per ton respectively.

Acceptable galena concentrates could be exported, or sold to the Broken Hill associated Smelters Pty. Ltd., at Port Pirie, South Australia.

4. Physiography

(a) Topography

The topography around the prospect is undulating; the maximum relief being of the order of 100 feet, with gradients generally up to 1 in 5. The elevation of Nadgigomar Creek, close to the old workings, is 1,900 feet above sea-level.

(b) Climate and Rainfall

Cullulla, in the Southern Highlands, experiences a mean annual rainfall of 23 inches, with an even distribution of rainfall throughout the year.

The area is characterized by warm summers and cool winters. Mean temperature for July, the coldest month, is 44°F while the mean temperature for the hottest month, January, is 69°F.

(c) Vegetation and Land Use

The area mapped has been cleared and is now used for grazing, but the higher ground is particularly rocky and provides only poor grazing land.

(d) Drainage

The Cullulla prospect is within the Shoalhaven Catchment area and is drained via Nadgigomar Creek, into the Shoalhaven River. Nadgigomar Creek, in the vicinity of the old workings, is broad and swampy. However, a little further downstream, the gradient increases noticeably and the swampy alluvium associated with the creek is no longer present.

5. Accompanying Plans

The report is accompanied by two plans:

Cullulla Silver-Lead Prospect No. C 567

Cullulla Silver-Lead Prospect and Environs No. D 630

Previous Information

The Cullulla silver-lead mineralization was first found in 1889 by O'Neill, Blake and party in the vicinity of shafts 6, 7 and 8 (see plan C 567). The lode which strikes 340° and dips at 20° south, was composed of lead carbonate; no primary sulphide minerals being encountered. The deepest shaft, probably shaft 6, was sunk to a depth of 70 feet.

Between 1892 and 1900 portions ML's 1, 2, 3, 4, 6, 7 and 8 were held around this mineralization by S. Meyer and Co., A. G. de Laurel and W. H. Bladwell.

Pittman (1894) reported that shafts 3 and 4 had been sunk to 60 and 96 feet respectively and that at 92 feet in shaft 4 the lode had a true width of 3 feet 6 inches and assayed 15.45 per cent lead and 2 oz 9 dwt silver per ton. Pittman concluded that although the lode was improving with depth, he considered that it could not be worked economically at that stage.

Jaquet (1897) reported that the Main Shaft (shaft 5) had been sunk to 264 feet. A 283 feet cross-cut on the 250-ft Level intersected a lode 110 feet from the shaft. This lode was followed for approximately 200 feet on this level, but there are no records of its width or grade.

Although there apparently has been some production from Cullulla, it has not been recorded.

Geology

1. Lithology

Rocks of the Cullulla area are shown as being Ordovician in age on the Canberra 1:250,000 Geological Series Sheet. The two dominant rock types encountered in the area are sandstone and slate, and these are generally unevenly interbedded in units from several inches to many feet.

Sandstone throughout the area is generally fine to fine-medium grained, light brown (with a lightly ironstained matrix) and quartzose. The sandstone grades to quartzite in part, and is predominantly a compact rock type, but fairly prominent jointing in most localities would endow permeability. Mullock dumps throughout the area often contain dark "gossanous" sandstone and ironstained quartz. A feature of many sandstone outcrops is the presence of numerous quartz veins mostly less than one eighth of an inch in width but up to twelve inches wide in some localities. These veins are usually straight, but exhibit no particular pattern.

Slates cropping out throughout the area are light grey, fine-grained micaceous, and highly and often irregularly cleaved. In many localities cleavage surfaces are somewhat undulose and this rock type grades into phyllite. In part the slates and phyllites are lightly ironstained. More massive pelitic rocks are also seen and these are generally light brown.

Bedding throughout the area is usually manifested by lithologic contact between sandstone and slate or phyllite, or less commonly between sectile and more massive pelitic rocks. All contacts noted are apparently conformable but paucity of outcrops prevented mapping of individual beds.

An alluvial unit was mapped (see plan C 567). This deposit is essentially a swampy flat of predominantly black soil and detritus of unknown thickness which follows the course of the Nadgigomar Creek. This alluvial flat is cut downstream where the creek valley becomes more youthful.

2. Structure

(a) Bedding

Dip and strike readings of bedding planes indicate that the predominant structure is a broad anticline with shallow dips along the crest and steep dips on the limbs. The broad fold is of the order of half a mile across and the style is concentric. This basic structure is shown on cross-section AA' (see plan C 567). No small scale folding or persistent lineation was seen in the field.

(b) Jointing

Jointing is somewhat irregular throughout the area and apparently best developed towards the south. The majority of joints have a strike within the north east and south west quadrants and dip steeply towards both north west and south east. Many of the joints are filled with quartz veins and in some cases this joint filling may have been the locus of mineralization.

(c) Cleavage

Cleavage is developed in the pelitic rocks throughout the area (see Lithology) and in areas of steeper dips appears to be parallel to bedding as defined by lithologic contact between pelitic rocks and sandstone.

(d) Shearing

A pug zone 2 feet 5 inches wide and an undulating shear zone in adits 1 and 3 respectively are indications of shearing in these parts of the field, although expression of shearing on the surface was not noted anywhere in the field. These shear zones are discussed more fully under mineralization.

Pittman (op. cit.) outlined two lodes which had been prospected by workings in the past; the main one was Meyer's Reef (shafts 3 and 4 on plan C 567), the other was about five chains to the north (shafts 6, 7 and 8). Jaquet (op. cit.) reported on the Main Shaft (shaft 5). From the descriptions by these workers and by Kennedy (1964), and from the observations of the mullock heaps around the Meyer's and Main Shafts, it appears likely that the lodes alluded to are mineralized shear zones.

(e) Mineralization

The position of the shear zone intersected by the shafts on Meyer's Reef (shafts 3 and 4), and the probable extension of this zone exposed by the Main Shaft (shaft 5) about 500 feet to the north east, in which the best known mineralization occurs, is known accurately from the investigations of Pittman and Jaquet. This zone appears to be about 750 feet long, but the shape and size of the mineralized regions within the shear zone are unknown. Mineralization grade and width is known for the environs of Shafts 3 and 4, while mineralization is also known to occur in the vicinity of Shaft 5 over a length of 200 feet, on the 250-ft Level, east of this shaft. It is inferred that both mineralized areas lie within the same shear zone striking 070° and dipping 60° to 70° south. No positive outcrop of this sheared zone was located. North of shafts 3 and 4, shafts 6, 7 and 8 have exploited a somewhat ill-defined lode. Several workings are located to the south and east of these shafts and these have worked more obscure lodes.

Mineralization worked in the past consisted mainly of galena with minor associated sphalerite, chalcopyrite and arsenopyrite and occurs in sheared quartz and silicified sandstone.

(i) Meyer's Reef

According to Pittman, Meyer's Reef at the 92 ft Level in shaft 4 consisted of "dark shaly gangue with streaks and bunches of fine grained galena". The lode was 3 feet 6 inches wide, but there is another 18 inches of unmineralized sheared rock to the east towards a well defined "hanging wall". The 3 feet 6 inch wide galena lode assayed 15.45 per cent lead and 2 oz 9 dwt of silver per ton. This lode strikes north 30° east and dips at 70° to the south east. Mineralization on the mullock dump of shafts 4 and 5 occurred in quartz and silicified sandstone as a crystalline stock work of galena with associated sphalerite, chalcopyrite and arsenopyrite. None of the underground workings of shafts 3, 4, and 5 were accessible. The dump for shafts 3 and 4 contained the following lithologies; fine grained light grey quartzose (?) sandstone with a soft, light grey argillaceous cement; light grey micaceous, well-cleaved, pelitic rock; mineralized silicified sandstone and quartz. Near the shafts brown, iron oxide stained sandstone and slate or phyllite crops out.

(ii) Main Shaft

Jaquet's report on the Main Shaft (shaft 5) indicated that the lode worked here dipped at about 60° to the east (see section of the Main Shaft plan C 567). Details of the workings can be seen under "Previous Information".

Mineralization in the dumps near the Main Shaft occurs as:–

(a) irregular masses and patches of galena to about one half inch in size in a fine grained light grey, generally quartzose, sandstone. This mineralization often accompanies irregular quartz lined cavities. A very minor amount of chalcopyrite is associated.

(b) Smaller isolated bodies approximately one eighth of an inch in size in sandstone which often has numerous fine quartz veins traversing it.

(c) Subparallel veinlets and lenticles approximately one sixteenth of an inch in width forming a stockwork in a dark red brown hematite-rich siltstone.

No mineralization was seen in or near shafts 6, 7 and 8. According to Pittman these shafts intersected a lode containing "slugs of carbonate of lead which were also scattered through shales and mudstones close to the outcrop and having a dip west 20° south at 20°". A feature of shaft 8 is the presence, in the south wall, of a planar iron oxide stained quartz body, striking 200° and dipping 35° east, about 1 foot 3 inches wide. This "vein" may represent joint filling in the country rock. An assay of a sample of this vein taken by the writers during the survey, yielded the following results: gold, trace; silver, trace; lead, less than 0.1 per cent. There is moderate contortion of bedding in this shaft.

(iii) Southern Workings

In the southern part of the area mineralization consisting of galena, arsenopyrite, chalcopyrite and sphalerite in quartz was encountered in shaft 1. The wall rocks of the shaft consist of quartzose sandstone, quartzite, contorted phyllites and iron stained pelitic rocks, although the southern wall is composed in part of a light red brown, fine-grained, somewhat (?) feldspathic sandstone containing abundant fine white mica flakes.

These wall rocks show some small monoclinal folds, and schistosity dips almost vertically and strikes approximately 130°. Some negative sulphides were seen in quartz near the mouth of the shaft.

Elsewhere in the southern part of the area, sulphide mineralization is not apparent, though most shafts and costeans have iron oxide stained, somewhat gossanous, sandstone cropping out nearby. The best illustrations of the type of country prospected are provided by adits 1 and 3.

Adit 1, intersects a near-vertical pug zone striking 030° which assays 0.7 per cent lead and 5 dwt silver per ton. The adit also intersects a sandstone, quartz, limonite breccia vein which assays 0.5 per cent lead and 2 dwt 5 gr silver per ton. No primary sulphide minerals were seen. The rocks intersected by the above mineralization were gently dipping, interbedded sandstones and slates traversed by numerous quartz veinlets.

Adit 3 is 83 feet long. Near the portal the interbedded siltstones, sandstones and slates are horizontal; they become progressively more inclined so that at the face they have attained a dip of approximately 15°. The adit appears to follow an undulating near-vertical narrow, iron oxide stained, shear zone. This shear zone assays 0.2 per cent lead and again no primary sulphide minerals were seen.

(f) Assay Results

Apart from the assay given by Pittman (1894), 5 assays of non-representative samples submitted by the lessee from tailing dumps of the Cullulla Mines have been recorded. The highest silver content was 27 oz per ton in a sample which assayed 31.1 per cent lead. One sample assayed 0.2 per cent arsenic while the others were 0.1 per cent or less. The highest zinc assay was 2.6 per cent, the other samples assaying 0.1 per cent. All bismuth assays were less than 0.01 per cent.

(g) Control of Mineralization

Mineralization in the larger workings seems to be controlled by shearing. Shearing effects were noted in adits 1 and 3, and from both the presence of some sheared sediments on the dumps and the reports of Pittman and Jaquet (op. cit.), it can be deduced that the lodes encountered in the Meyer's Reef shafts (shafts 3 and 4) and the Main Shaft (shaft 5) were in the form of mineralization along shear zones. It is probable that the lodes worked in these lastmentioned shafts represent discontinuous mineralization along a single shear zone which would be over 750 feet in length, having a strike of approximately 030° and which has the above two known localities of mining along its length. Copper mineralization has been worked in the past at Curra Creek, about three quarters of a mile south west of the Main Shaft (Kennedy (1964), see plan D630). Any "zone of control" which would connect Curra Creek with the abovementioned shear zone would have a general strike of 045°, however the suggestion of a shear zone extending between Curra Creek and the Main Shaft would involve lengthy extrapolation of known facts. The shafts which were sunk in portion 180 (see plan D630) are along the strike of bedding as seen in the shafts shown in plan C567. Therefore bedding or an axial structure also become possible factors in control of mineralization throughout the field.

Economic Considerations

Power and water services are available at the site. Topography, access, locality and transport will present no problems for any future prospecting or mining operations.

Assays of ore from the Meyer's Reef area indicate that arsenic, bismuth and zinc values should not incur smelter penalties in a lead concentrate.

Should a geophysical survey be undertaken, the following features should be considered:—

(i) Power lines cross the prospect.

(ii) Depth to permanent water was 35 feet in shaft 6 during a very dry season.

(iii) The area is essentially free of vegetation. Soil cover is minimal except in creek courses.

(iv) Known sulphide mineralization occurs in disseminated form in narrow shear zones.

Conclusions and Recommendations

The weak sulphide mineralization described occurs in steeply inclined narrow shear zones within moderately folded sandstones, siltstones and slates of Ordovician age.

Poor exposure and lack of access to old workings has not permitted further sampling of the main reef (Meyer's Reef). Pittman (1894) and Jaquet (1897) both described Meyer's Reef and their work suggests that shafts 3, 4 and 5 were all sunk on this reef.

South of Meyer's Reef sporadic mineralization occurs at shafts 1 and 2 and adits 1 and 3. Shaft 1 intersects minor disseminated chalcopyrite, galena, sphalerite and arsenopyrite while adits 1 and 3 intersects narrow shear zones, assays of which give minor silver and lead values.

The Curra Creek copper mineralization occurs 4,000 feet west of Meyer's Reef and consists of small inclined rich pipe-like chalcopyrite ore bodies.

3,000 feet north of Meyer's Reef there are numerous costeans and shallow prospecting shafts; no sulphide mineralization was observed in this region.

It is recommended initially, that further prospecting by a stream sampling geochemical method be undertaken over a large area including the subject area, to delineate areas of mineralization prior to any possible geophysical work being undertaken. It is further recommended that an orientation geochemical survey be undertaken prior to a stream sampling programme to determine the suitability of this form of prospecting.

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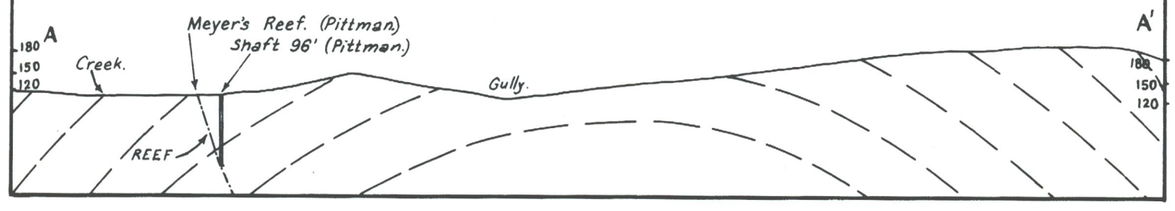
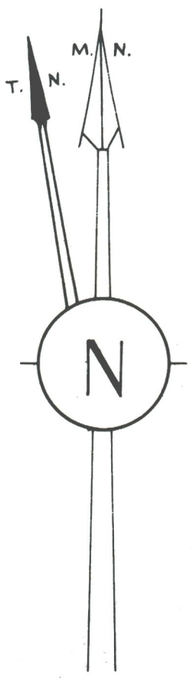
23rd August, 1965.

71637 10.66 V.C.N. Blight, Government Printer

CROSS SECTION, A A'.

SCALE.
VERTICAL & HORRIZONTAL.
0 100 200 300 400
Feet.





Interbedded mudstone and slate.
Os
50°
140
150
160
170
180
190
Massive Sandstone.
6'x 3' inclined shaft dipping 85°E. Fine disseminated negative Sulphides in iron oxide stained sandstone on dump.
Shaft.9. 35' 85°
Small prospecting pits in gossaneous iron oxide stained slate.
Collapsed Main Shaft. (See Plan and Sections.) Dump contains slate and lesser sandstone, galena and minor arsenopyrite occur in quartz and silicified slate.
3'deep costean in sandstone and slate.
Shaft.6. 40'
Shaft.7. 6'
Shaft.8. 30° 35°
6'x4' shaft in Micaceous slate. Water level 40'.
Minor shafts in slate and sandstone
Shaft.5. 22 22 74
2'deep costean exposing iron oxide stained micaceous slate.
130
120
110
100
40°
3'6" lode assaying 15·5% lead and 2½ oz silver per ton at 92' level. (Pittman)
A
Interbedded mudstone and slate.
45° 67
Shaft 4.
10'
Shaft 3.
Shafts on Meyers Reef. (Strike, N.30°E, dip 70°S - Pittman.) Dump contains galena sphalerite minor chalcopyrite and arsenopyrite in reef quartz, slate and sandstone.
DAM
Nadgigomar
Creek.
Qa
Os
Adit. 4. 17°
Outcrop of closely jointed fine grey chert.
25' partly collapsed adit in sandstone, shale and chert
83'long Adit in siltstone and minor shale. Adit follows steeply inclined narrow iron oxide stained undulating shear zone which rolls towards the bedding plane near the face. Shear zone assays 0·2% lead.
Adit. 3 90°
78 14
Section Line
A'
Sandstone.
Collapsed adit, costean cuts interbedded sandstone and shale.
Adit. 2 40
Large partly collapsed shaft in sandstone to 35'. Dump contains slate and sandstone. Traces of galena in quartz veins.
Shaft. 2 35'
Adit. 1.
27'Adit intersecting 2'2" pug zone striking 030° and dipping 70° east, 17' from portal. Adit intersects quartz veined and faulted sandstone and a few thin shale bands. Dump consists of sandstone and becciated quartz healed with gossanous Limonite. Gossanous limonite assays 0·5% lead and 2½ dwts of silver per ton. 2'2" pug zone assays 0·7% lead and 5 dwts per ton.
75 90° 78 75° 35° 70°
Broad region of abundant contorted quartz veins up to 8" in silicified partly iron oxide stained sandstone.
Wool Shed
DATUM 100' (ARBITARY.)
"SILVERSTREAM" FARMHOUSE.
Quartz, sandstone, and slate.
Massive Sandstone
Micaceous slate and sandstone quartz veined and closely jointed.
7'x5' Shaft, partly filled, in silicified quartz veined and contorted sandstone containing chalcopyrite galena, sphalerite and arsenopyrite.
Shaft. 1 90
80 60 60 65 30 85° 90 65
Sandstone

LEGEND

Ordovicion	Os.	Interbedded sandstones mudstones and slates.
Quaternary.?	Qa	Alluvium. (Swampy.)
Power Lines.		Creek with water-hole.
Geological boundary position approx.		Adit partly inaccessable.
30 Strike and dip of strata.		Costean.
Horizontal Strata		Dump.
20 Strike and dip of prominent joint.		Topographical contour.
70 Strike and dip of shear zone		Vehicle track.
60' Shaft with measured depth.		Fence
30° Strike and dip of cleavage.		

Scale
0' 100' 200' 300' 400' 500'
Feet.
100 feet = 1 inch

Geological Survey of N.S.W
Department of Mines.

CULLULLA SILVER-LEAD PROSPECT

Parishes; Cullulla & Nadgigomar. County Argyle.

To accompany report by D.W. Suppel & A.G. Loudon.

Drawn by J. Brewster.

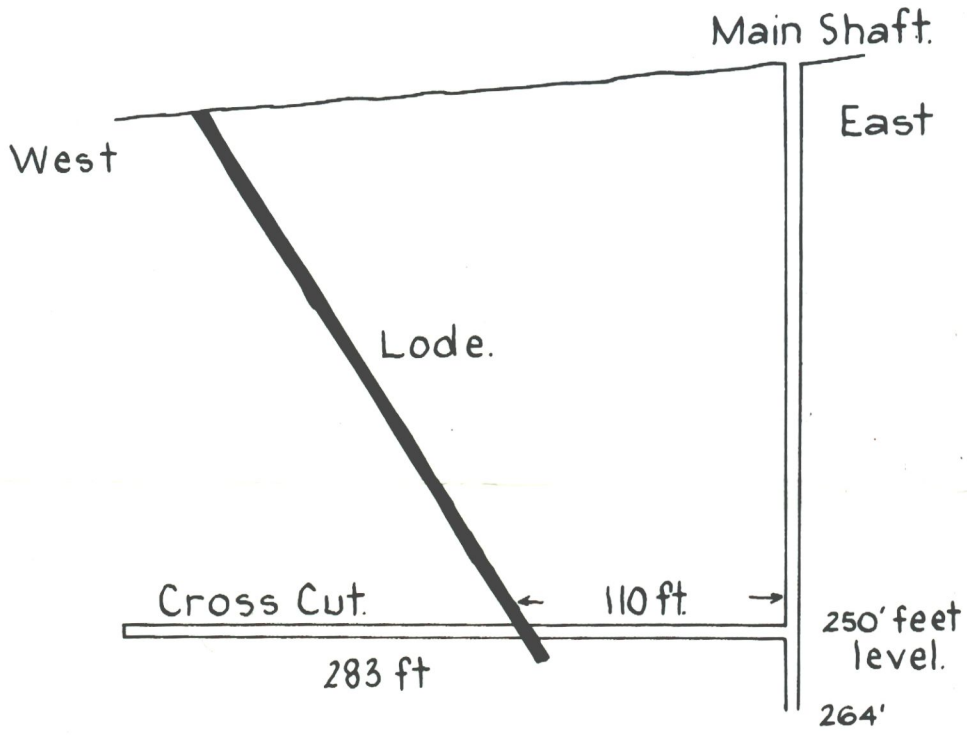
Date: 10th. June, 1965. — Ref. No. 3097.

C.567

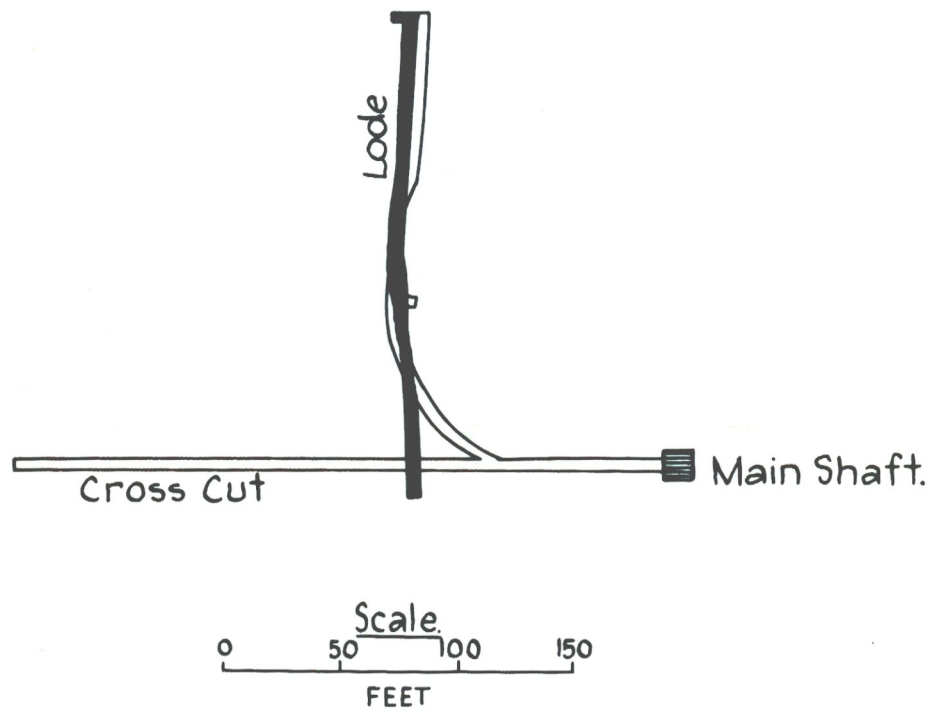
Plan and Section of Main Shaft

(After John.B. Jaquet 1896)

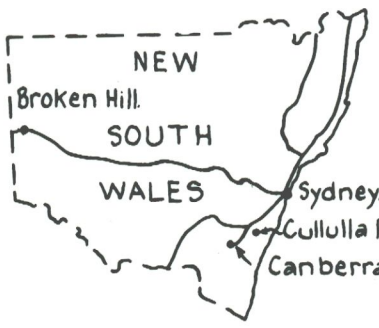
Section through Main Shaft.



Plan of 250 ft. Level.



Locality Map



Topographical base from Oallen North 1:25,000 Sheet.

Legend

Os	Ordovician. Interbedded sandstone, mudstone and slate.
	Anticlinal axis, position approximate.
30	Strike and dip of strata.
+	Horizontal strata.
28	Shaft, with measured depth.
30°	Strike and dip of cleavage.
	Adit.
100'	Costean showing length.
	Dump.
A, — A,	Cross Section.
	Waterhole.
	Road.
	Vehicular track.
1900	Topographical contour.
	Permanent building.

Observed Mineralization.

Cu.	Copper.
Pb.	lead.
Zn.	Zinc.
As.	Arsenic.
Ag	Silver

Geological Survey of New South Wales
Department of Mines.

Plan showing workings of

Cullulla Silver-Lead Prospect and Environs

Parishes Cullulla and Nadgigomar. County Argyle.

To accompany report by D.W. Suppel & A.G. Loudon.

Date: 1·6·65. Ref. No. 3098. | D 630