Rept.Bk.No. 68/46
G.S. No. 4197

DEPARTMENT OF MINES
SOUTH AUSTRALIA

GEOLOGICAL SURVEY

MINERAL RESOURCES DIVISION

REPORT ON THE OODNAPANICKAN LEAD-SILVER PROSPECT

(M.C.5251, Mrs. G.L. Lehmann)

NORTH FLINDERS RANGES

by

K.R. WARNE
GEOLOGIST
METALLIC MINERALS SECTION

D.M.711/68

9th April, 1969

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ABSTRACT

The prospect is situated on the northern limb of a regionally faulted synclinal structure in calcareous siltstones of the Wonoka Formation

Lead-silver mineralisation is confined to narrow quartz veins within a 10 ft to 15ft wide shear zone, which traverses the bedding of the surrounding sediments. Because of the lenticular nature of the lodes and the patchy distribution of galena within the lodes the prospect would be of low economic value.

Further prospecting is required to test the availability of small tonnages of galena ore.

INTRODUCTION

Following a request, the Oodnapanickan lead-silver prospect was visited in company with the claimholder on 28th June 1968, when galena-ore was being extracted from a shallow trench in a narrow quartz vein. A bulldozer was in use stripping shallow rubble and soil overburden immediately to the south of the trench. The claimholder was advised to continue these operations to expose as much lode material along strike as possible.

In October, 1968, one day was spent in a geological and tacheometric survey with the assistance of Surveyor S. Wills over the area of the pegged claim. The purpose of the investigation was to outline the geology and limits of significant lead-silver mineralisation, to identify the origin and control of mineralisation, to advise on the prospects of locating ore-grade material at depth and to recommend what action the claim holder should take.

Samples collected during the investigation were submitted to AMDEL for petrological examination as well as chemical and spectrographic analysis; the reports are appended.

TITLE

Mineral claim No.5251 is located on Patsy Springs Station on land where mineral rights are reserved to the Crown. The claim is registered to cover an area of 20 acres and is held by Mr.s G.L. Lehmann. The pegged claim is of an irregular shape occupying an area of a little over 18 acres.

LOCATION AND ACCESS

The prospect is about 1½ miles east of Oodnapanickan Well and 28 road miles E.N.E. of the township of Copley. A track branching north from the Copley-Balcanoona graded road, about 22 miles from Copley provides good access to the claim area via Oodnapanickan Well. This track is in reasonable condition but could be impassable during wet weather.

GEOGRAPHY

The mineral claim is located in the northern Flinders Ranges where the low and unreliable rainfall averages less than 10 ins. per annum. In this locality topography is mature consisting of well rounded hills and ranges of moderate relief, which are dissected by shallow ephemeral streams. Burr Creek, which drains towards the west is the main stream in the region.

The prospect lies on the western slope of a steep rounded hill which is dissected by short streams that flow into a major tributary at Burr Creek to the north. Alluvium cover fringing the hills has been incised to a depth of 3 ft to 4 ft by the short streams.

For the purposes of the topographic survey an arbitary datum of 1000 ft. was taken for station A, and all contouring is based upon this datum.

GEOLOGICAL SETTING

Rocks underlying the claim are sediments of Upper Proterozoic age and are assigned to the Marinoan Wilpena Group. They comprise green-grey

calcareous siltstones which locally strike east-west and dip at 30° to 60° to the south.

Recent deposits are limited to piedmont slopes and narrow alluvial flats wherein brown gravelly and sandy clays flanking the creeks grade upwards into boulder and scree covered slopes which fringe most of the hills. Bedrock is generally well exposed except on the hill slopes where it may be obscurred by a thin development of grey residual soil.

The Oodnapanickan lead-silver prospect is located in a discontinuous north-south shear on the northern limb of a synclinal structure.

Cleavage in the siltstones is parallel to the bedding and is difficult to distinguish. Jointing is well developed and closely spaced with priminent joint directions being 005°-015°M and 055°-070°M.

A narrow shear zone 10 ft. to 15 ft. wide extends along the length of the claim with strike 015°M and dip 75°-85° to the east. The shear zone has been infilled with narrow lenticular quartz veins. Lincations along the shear pitch at 48° towards the south (198°M).

On the eastern side of the claim an east-west fault is suggested by dislocation of the quartz veins with offset of 5 ft to 10 ft and relative movement of north block to the east.

MINERALISATION

Lead-silver mineralisation is confined to narrow lenticular quartz veins within a 10ft to 15ft wide shear zone, striking along a bearing of 015°M over a distance in excess of 1200 ft. The dimensions of the quartz lenses vary up to 100 ft in length and up to 2 ft in width but generally the veins are of smaller dimensions with width less than 12 ins. The contacts of the quartz veins with the country rock are regular and well defined.

The veins are composed dominantly of white coarsely crystalline, massive quartz with scattered irregular clots and small veinlets of dolomite. In places the dolomite has been altered to orange and dark brown limonite. Isolated fragments of siltstone, now partially altered to green chloritic clays have been incorporated in the quartz veins.

In the larger veins, galena is distributed in the quartz matrix

as occasional large aggregates and irregular veinlets upto 1/16 ins thick and in a finely fibrous "steel" form, indicating post-mineralisation fracturing or shearing. Chalcopyrite occurs in isolated patches and has undergone alteration to malachite, limonite and covellite. Samples of lode material collected from an ore-pile near the centre of the claim were forwarded for mineragraphic examination (See appendix).

Several smaller barren quartz veins are found beyond the zone of north-south shearing, 5 ft to 10 ft in length and less than 4 ins in width. Although their orientation varies slightly, the majority of the veinlets trend in a north-easterly direction and are probably related to jointing.

PROSPECTING ACTIVITY

A disused shaft 25 feet deep on an underlie of 75° at the northern end of the claim within a quartz vein provides evidence of early prospecting activity. The width of the vein diminishes from 1ft.9ins. at the surface to 9 ins. at the bottom of the shaft. A sample collected from the north wall 15 ft below the surface, assayed 3.6 per cent lead and 27 per cent zinc over a width of 1ft.5ins.

Samples taken from an old pit at the southern end of the claim which exposes two adjoining quartz veinlets assayed less than 0.1 per cent lead.

Recent prospecting activity has been limited to the digging of short trenches along the quartz veins. The area of most promising economic interest is in the central portion of the claim where a trench 7 ft in depth has exposed rich galena ore in a 1ft. 6 ins. to 2ft wide quartz vein which dips at 75° towards the south. Although the northern limit of the quartz-galena lode has been defined in the trench further work is required to expose the lode to the south; this vein could have a maximum length of 50 ft. The galena has a patchy distribution within the quartz vein and hand-sorting is required to the ore from waste material before despatch. A grab sample from an ore-pile of perhaps 1½ tons assayed 55 per cent lead and 4.1 ozs/ton silver.

A shallow trench, about 200 ft further to the south has exposed

a 6 ins wide quartz vein which assayed 0.06 per cent lead. At the northern end of the claim a grab sample of ore material extracted from a short trench on an 8 ins wide quartz vein contained 5.65 per cent lead, 0.3 per cent zinc and 0.2 ozs/ton silver.

ORE RESERVES

Approximately 2 tons of hand sorted ore material lies at grass and is estimated to contain 40-45% lead.

Because of the narrow lenticular nature of the quartz-galena veins both in plan and depth, and the patchy distribution of galena within the veins, the estimation of ore reserves is difficult. Further prospecting is required to define at least the surface dimensions of the lodes.

Because of the nature of the veins open cut quarrying to any depth would be impracticable and to work the prospect it would be necessary to selectively mine each vein. Because the veins are narrow it will not be possible to mine lode material entirely; incorporation of unmineralised country rock results in dilution of grade. Minimum mining width is considered to be 3 feet when the estimated grade of stoped rock would be less than 5% lead, and considerable hand sorting would be required to obtain marketable ore.

CONCLUSIONS

The lead-silver mineralisation on Mineral Claim No. 5251 is of epigenetic origin and is confined to a few narrow quartz lenses within a 10ft to 15ft wide shear zone. The lenticular nature of the galena-quartz lodes and the patchy distribution of galena within the lodes suggest that no large tonnage of ore is available within the lease.

Samll tonnages of ore have been derived from a narrow quartz lens in the central portion of the claim. Further prospecting is required to expose the lens on the surface and to test the continuity of the lode with depth.

KRW:JB
9.4.1969

K.R. Warne

K.R. WARNE
GEOLOGIST
METALLIC MINERALS-SECTION

APPENDIX 1

ANALYSES

Location	Width of Vein	Sample Mark	Lead (Pb)%	Copper (Cu)%	Zinc (Zn)%	Silver (Ag) oz/long ton
Old pit, South wall	9 ins	A866/68	0.03	0.08	0.10	-
" " "	6 ins	A867/68	0.01	0.04	0.05	-
Trench No.1	1 ft	A868/68	0.06	0.22	0.16	-
Trench No.2	Ore pile	A869/68	55.0	0.28	0.01	4.1
Old Shaft, North Wall 15ft below surface	1'5"	A870/68	3.6	0.41	17.0	-
Trench No.3	Ore pile	A871/68	5.65	0.02	0.31	0.2

APPENDIX II

MINERAGRAPHIC AND PETROLOGICAL REPORT

AMDEL REPORTS M.P.1876 and 1878-69

by

M.J. WORT

ROCKS FROM OODNAPANICKAN LEAD-SILVER PROSPECT,

NORTH FLINDERS RANGES, S.A.

Sample: P741/68: PS12203

Location:

Trench No. 2.

Rock Name:

Copper-lead ore

Hand Specimens:

a. White quartz carrying irregular veins of galena ranging in thickness from 25mm to hair-line microveins, and also carrying ?ankeritic dolomite which has been altered almost completely to orange and dark brown limonite. The galena is in a finely fibrous, sheared, "steel" form. It contains bound up fragments of quartz, limonite, and quartz with limonite.

b. White quartz with galena and also abundant massive chalcopyrite. Dolomite is relatively fresh, yellow-white, in irregular clots and veins up to 4mm wide. A small amount of dark brown limonite after dolomite occurs, and weak green staining indicates the presence of malachite.

Polished Section:

Minerals present identified in polished section:-

Quartz	Abundant
Galena	Abundant
Chalcopyrite	Abundant
Dolomite	Common
Limonite	Common
Malachite	Minor
Covellite	Very minor
Pyrite	Rare
Neodigenite	Rare
?Anglesite	Trace
?Cerussite	Trace

a. Yellowish carbonate areas up to 3mm wide in quartz contain scattered fine blebs of galena, mainly 0.007 - 0.02mm in size, occurring mostly in streaks of ?cerussite up to 0.014mm wide which lie along the cleavage planes of the dolomite. Against the contact with dolomite and also with quartz, an alteration phase of similar reflectivity and internal reflection properties to anglesite occurs locally in the galena, and contains myriad fine, relict galena grains which range in

size to sub-microscopic.

The polished surfaces of galena have numerous cleavage pits which form a complex pattern of lines and curves indicating deformation. Locally the galena contains inclusions of chalcopyrite 0.014 - 0.035 mm in size, and also some idiomorphic grains of pyrite 0.014 - 0.07mm in size.

b. The chalcopyrite has been altered surficially and also internally along cracks by limonite, but covellite nearly everywhere forms an intervening alteration "skin". The covellite grains lie mainly perpendicular to the chalcopyrite boundary. In thickness the covellite "skin" ranges from 0.002 - 0.003mm and the limonite replacement veins themselves range up to 0.006mm in thickness. Various isolated relict chalcopyrite grains occur in the main limonitic areas - also rare grains of neodigenite up to 0.55x0.22mm in size, with fine relict chalcopyrite grains at the core.

Within limonite, a 0.5mm pyrite grain carries a surficial hematite "skin" formed by alteration and displaying weak banding, and up to 0.06mm in thickness.

Scattered spots of malachite have developed within the limonite.

In neither a. or b. were any zinc or silver minerals observed.

Paragenesis:

1. Quartz containing 4mm veins or crustified layers of dolomite was subjected to fracturing.

2. Fissures opened in the quartz were then filled by galena and in some places by chalcopyrite. Galena is observed to carry fragments of quartz and of dolomite (now altered to limonite). In most places, galens and chalcopyrite occur in discrete areas and do not mingle, but inclusions of chalcopyrite and minor pyrite in galena suggest that these sulphides were all contemporaneously deposited. Minor replacement of quartz by galena may also have occurred. Lead-bearing solutions penetrated the dolomite and deposited galena blebs in the cleavages.

3. Post-mineralisation fracturing formed cracks in chalcopyrite and deformed galena.

4. Hypergene alteration then led to formation of covellite and hematite with weathering processes leading to formation of limonite, malachite and ?anglesite. Dolomite has in many places been completely replaced by limonite.

COMPARISON OF P599/68 and P600/68

Even in thin section, these rocks are very similar.

Compared to P600/68, P599/68 has:-

a. More quartz;
b. Less carbonate;
c. More muscovite and opaques,
d. Finer lamination; and
e. Slightly finer grain size.

Sample 1/68: P599/68: TS22071

Location:

S.side of E-W shear in Sturtian sequence. From Survey Station A.

Rock Name:

Greenish-grey siltstone.

Hand Specimen:

Fine grained (finer than P600/68), with a weak but more noticeable lamination. Barely detectable carbonate reaction with 5N HCl after several minutes.

Thin Section:

An optical estimate of the constituents gives the following:

	%
Quartz	59
Carbonate	30
Muscovite	7
Opaques	3
Chlorite	0.5-1
?Albitic plagioclase	Trace

In thin section this rock is very similar to P600/68 but the lamination is more distinct with a greater number of quartzose layers. Fine silty bands are more prominent, not only for their markedly finer grain size but also for the evenness of their texture. Muscovite laths are more concordant than in P600/68 and range in size from 0.025 to 0.1 mm. Some of the muscovite shows layer-alteration to chlorite.

Feldspars up to 0.07mm in size, showing weak albite-twinning and small extinction angles, occur in trace amounts. Opaques are locally concentrated into marked trains, especially in the coarsest quartzose bands, which also contain coarser-grained carbonate, a small percentage of which is calcite. (Red staining test). The field occurrence suggests that most of the carbonate should be dolomitic. Tabular, detrital quartz grains lie concordantly. In the coarser bands quartz grains range from 0.02mm to 0.05mm in size. Layer widths commonly fall in the range 0.05 - 0.12mm.

Sample: 2/68: P600/68: TS22072

Location:

N.side of E-W shear in "Marinoan" sequence in Creek near Survey Station G.

Rock Name:

Grey siltstone

Hand specimen:

Grey, fine grained. Lamination not apparent in the hand specimen. Weak effervescence of carbonate noted after one minute's contact with 5N HCl.

Thin Section:

An optical estimate of the constituents gives the following:

	%
Quartz	46
Carbonate	47
Muscovite	4-5
Opaques	1-2
Chlorite	0.5
Biotite	0.5
? Albitic plagioclase	Trace

Under the microscope, this siltstone is well laminated, trains of coarser quartz grains alternating with more silty bands of finer material. Most grains in this rock are silt-size, but the coarsest quartz grains reach 0.07mm in size and fall into the fine-sand size category.

The matrix contains abundant evenly distributed carbonate grains- 0.007-0.016mm in the fine bands, and 0.026-0.04mm in the coarser grained bands. Red staining tests indicate that at least some of the carbonate is calcite.

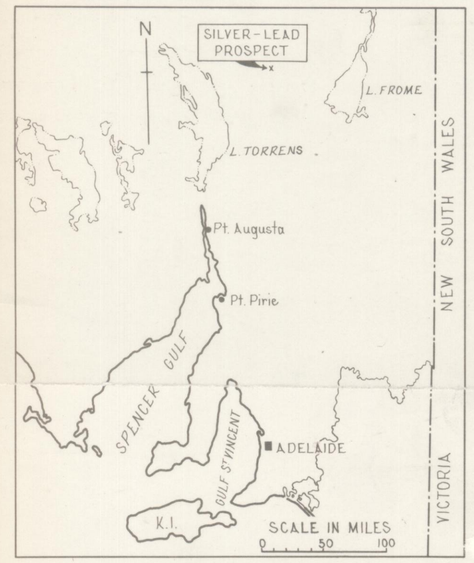
Opaques are sprinkled weakly through the matrix and range from 0.007 to 0.04mm in size.

Relatively coarse concordant muscovite laths, probably detrital, reach 0.1mm in length, and some grains show laminar alteration. Tabular detrital quartz grains lie concordantly with the lamination. The thickness of the alternating layers varies from 0.1mm to 0.5mm in general.

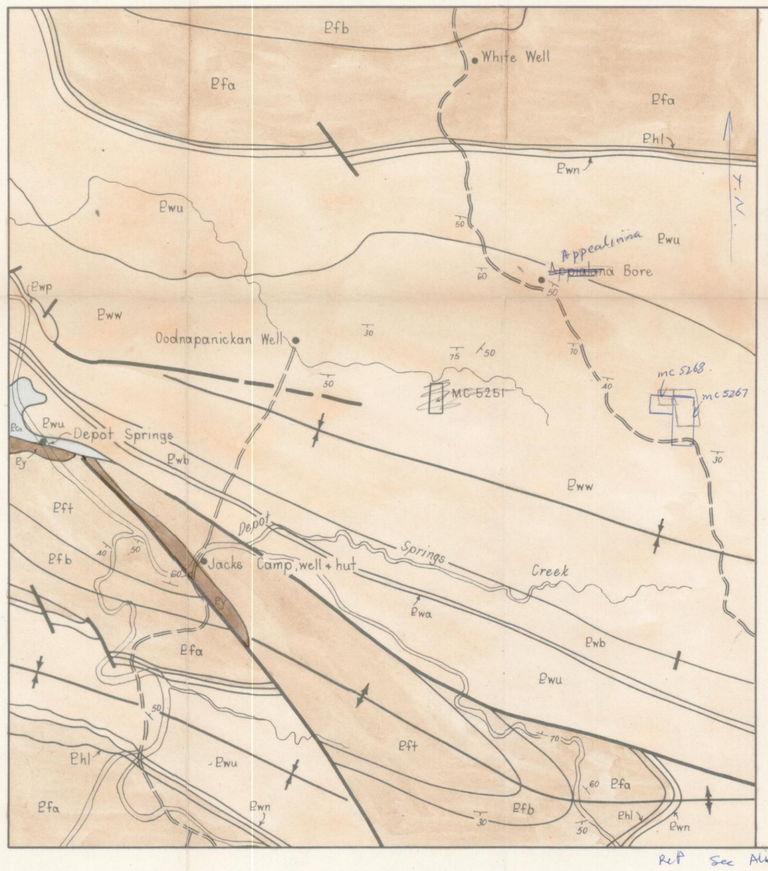
The texture is disturbed by incipient microshears which cut across the sedimentary lamination at an angle of 100°-120° and which are marked by fine grained recrystallisation and reorientation of muscovite and elongate carbonate. Tail ends of larger muscovite laths are bent over parallel to the newer induced orientation.

T.N.
M.N.

LOCALITY PLAN



REGIONAL GEOLOGICAL MAP



LEGEND

PROTEROZOIC — ADELAIDE SYSTEM

WILLOURAN ← STURTIAN → UMBERATANA GROUP

WILPENA GROUP — MARINOAN

Pwp	Pound Quartzite; well bedded sandstones & quartzites.
Pww	Wonoka Formation; green & grey-green calcareous siltstones, minor limestones
Pwb	Bunyeroo Formation; red-brown shales, minor dolomites.
Pwa	A.B.C. Range Quartzite, well bedded quartzite.
Pwu	Ulupa Siltstone; green siltstones & shales, minor purple siltstones & shales.
Pwn	Nuccaleena Formation; purple shales, yellow weathering dolomites.
Phl	Elatina Formation; granule and cobble bearing sandstones
Pfa	Amberoona Formation; finely laminated grey and grey-green siltstones.
Pfb	Balcanoona Formation; massive dolomite & blue-black limestones.
Pft	Tapley Hill Formation; finely laminated blue-grey silty shales, minor limestones.
Py	Yudnamutana Sub-Group; Massive boulder tillite, minor siltstones and quartzites
Pc₁	Callanna Beds; Diapiric breccia.

Geological boundary — Synclinal fold axis

Fault — Anticlinal fold axis

/60 Strike and dip of bedding — Creek

Track — Mineral claim M.C. 5251

SCALE

MILES 0 ½ 1 2 3 MILES

Geology after R.P. Coats

Ref See Also FIG 1 S 7327
FIG 3 69-474

① APPEALINNA WELL LEAD PROSPECT
② 6 miles N.W. MT SERLE
④ V. Large & T. Day)
③ REGIONAL GEOLOGICAL PLAN

FIG-2.

LEGEND

CAINOZOIC QUATERNARY	Creek bed and flood plain alluvium, talus and outwash.
PROTEROZOIC	Wilpena Group, Wonoka Formation. Green and greyish calcareous siltstones
qtz.	Quartz veins
	Probable fault or shear
	Trend of bedding
/60	Strike and dip of bedding
44	Strike and dip of jointing
	Vertical jointing
	Shaft
	Pit
	Trench
	Bulldozer cut
	Dump
	Ore pile
	Claim peg
	Creek
	Survey station
960	Contour (interval 20ft)
	Track
x P599/68	Location of petrological samples.
x A866/68	Location of analytical samples.

SCALE

FEET 100 0 100 200 300 400 500 FEET

METRES 50 0 50 100 150 METRES

DEPARTMENT OF MINES — SOUTH AUSTRALIA

OODNAPANICKAN LEAD-SILVER PROSPECT NORTHERN FLINDERS RANGES GEOLOGICAL PLAN OF M.C. 5251

METALLIC MINERALS SECTION	GEOLOGIST	Drn. K.R.W.	SCALE: As shown
		Tcd. R.H.	69-143 Ccd
		Ckd. L.V.W.	
Director of Mines	SUP. GEOLOGIST	Exd.	DATE: 18 Mar '69