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KAPUNDA MINE

TECHNICAL AND PROGRESS REPORTS FOR THE PERIOD 1970-1971

Submitted by

Ausminco Services Pty Ltd
1971

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PRIMARY INDUSTRIES AND RESOURCES SA

AUSMINCO SERVICES PTY. LTD.

S U M M A R Y R E P O R T

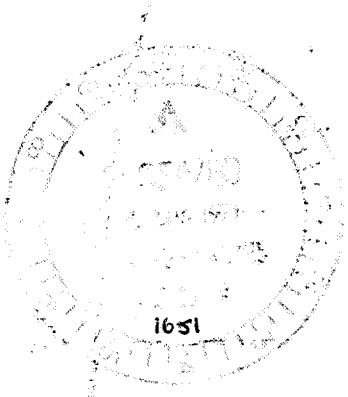
ON THE

COPPER DEPOSITS OF KAPUNDA MINES
(SOUTH AUSTRALIA)

BY

L. G. SZABO, Dip. Geol.

MELBOURNE, APRIL 1971.



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II. INTRODUCTION

The old Kapunda Mines remain today the fourth ranking copper production area in South Australia. From 1844 when production began, to 1912 when production ended, 68,000 tons of chiefly oxidised ore were mined at an average grade of 19.9% copper.

The ore was extracted from a large number of shafts to a maximum depth of 420 feet.

The high grade ore was mined from near vertical lodes measuring 18 to 24 inches in width and 150 to 200 feet in length.

Early reports suggested that large quantities of low grade ore remained unexploited and perhaps could be profitably extracted using modern mining and beneficiation methods. This possibility inspired the Department of Mines to undertake mapping and minor geophysical work in the mine area during the period 1961 to 1964.

In 1965 - 1969 Mines Exploration Pty. Ltd. conducted a detailed investigation of the area. This work delineated a large low grade copper orebody which was regarded as sub-economic.

This report is not based on any new information but re-assesses and re-interprets the field data obtained by Mines Exploration Pty. Ltd.

III. LOCATION AND ACCESS

The copper deposits occur in the Hundred of Kapunda, County of Light, about 50 miles north-east of Adelaide, South Australia.

The old copper mines are situated in the vicinity of Kapunda township (population 6,000).

Sealed roads and railway link Kapunda with Adelaide.

IV. TENEMENTS

The land on which the copper deposits lie is privately owned, and the mineral rights are alienated from the crown.

On the basis of private agreements between the land owners and Emerald Copper Industries Pty. Ltd., the latter controls the minerals rights over the area involved.

The survey revealed "the thickness of rippable material (kaolinised zone) exceeds 200 feet in the centre of the area shallowing at the rims of the basin".

ii) Induced Polarisation (I.P.)

A total of 62.2 miles of I.P. survey was completed over the area. This work recorded a large number of anomalies which follow a structure controlled stratiform pattern.

Three anomalies were drilled, but only one out of the three diamond drill holes was sited within the area of present interest.

iii) Magnetics

Short ground traverses were completed over the I.P. anomalies, but magnetic anomalies were not detected.

iv) Geochemistry

Geochemical soil samples were taken by means of a hand-auger at 100 foot intervals over the induced polarisation anomalies. The samples were analysed for Cu, Pb, Zn, Co, Mo and As, using emission spectrographic analytical techniques.

Although the survey encountered copper anomalies, the geochemistry did not prove to be useful because of the thick soil cover.

v) Diamond Drilling

One diamond drill hole (DDH-KP.1) was put down in the area now regarded to be of interest. This drill hole intersected a sequence of kaolinised rock and a fresh zone of a feldspathic siltstone underlain by dark grey slate. In the kaolinised rocks ore zones were intersected, but in the fresh rock uneconomic mineralisation was encountered (APPENDIX II.).

vi) Rotary Percussion Drilling

In order to test the potential of the kaolinised zone, forty-three rotary percussion drill holes totalling 10,572 feet, were drilled to a maximum depth of 300 feet. The holes were drilled on four widely spaced lines.

Sampling of drill hole cuttings was carried out over 10 foot intervals with total sample collection by air-blast and cycloning down to the water table.

Below this level, the drill cuttings were extracted by water circulation.

Many holes were terminated prematurely due to slow progress, circulation problems and cavities.

7. CONCLUSIONS

i) All ore intersections of the early drilling are below 50 foot depth. Since the ore was extracted only to a 50 foot depth, these intersections can be included in the present evaluation.

ii) Diamond drill hole KP.1 was designed to test a good I.P. anomaly, however, the siting of the drill hole was such that it did not fully test the main zone of interest. (APPENDIX VIII).

iii) Many percussion holes were terminated prematurely, for this reason, zones of considerable importance have remained untested.

iv) The host rocks are uniformly kaolinised, and the drill cuttings do not allow easy recognition of the fine lithological changes. For this reason, ore zones can only be interpreted on the basis of theoretical stratigraphic control when correlating copper intersections from the drilling.

VI. GEOLOGY

1. Stratigraphy

The area is comprised of low grade metamorphised sedimentary rocks of the Sturtian series.

The lower member of the series known in the Kapunda area is a finely laminated blue shale which is overlain by siltstone that grades into flaggy arkose.

Igneous intrusives which might have been responsible for the mineralisation are not knownin the vicinity of the Kapunda area. The nearest granitic intrusives, the Palmer Granite have been mapped at a distance of 20 miles south-southwest of the mineralisation.

The Kapunda mineralisation occurs in sulphide bearing feldspathic siltstones, the upper part of which is highly kaolinised. The kaolinised zone extends to a maximum depth of 200 feet, and is followed by an approximately 100 foot wide transitional zone comprising kaolin and short sections of fresher rocks. This zone grades into fresh feldspathic siltstone, the true width of which is about 400 to 500 feet (DDH-KP.1). This rock is followed by interbedded dark grey slate and feldspathic siltstone representing the transitional rock-facies towards finely laminated blue shale known as the oldest member of the Kapunda complex.

2. Structure

The Kapunda mineralisation is situated in the western limb of a domal structure. The beds of the mine rocks strike north-northwest and dip to the west at 30 to 50 degrees, but in places the dip varies from 15 to 25 degrees, (Reference 8). The rocks are intersected by a set of north-northeasterly striking fractures which dip to the west at a steep angle (70 to 80 degrees).

Faulting is not known in the mine area apart from a fault located between Kapunda and East Kapunda mines. The fault is regarded as post mineralisation.

3. Mineralisation

The Kapunda mineralisation occurs in a sequence of kaolinised, partly kaolinised and fresh feldspathic siltstone.

Three distinct types of copper occurrences are present in the area:

i) Vein deposits of secondary copper mineralisation controlled by fractures. These deposits form the high grade - low tonnage orebodies from which 68,000 tons of ore were extracted mainly from underground workings.

ii) Supergene enrichment in the kaolinised rocks as is shown to occur by the rotary percussion drilling of Mines Exploration Pty. Ltd. This extensive zone of mineralisation is considered to be potential ore.

iii) Disseminated sulphide mineralisation in the fresh feldspathic siltstone, represents a low grade - large tonnage deposit, parts of which may prove economic.

Most of the ore grade mineralisation has been located in the kaolinised and partly kaolinised rocks. The chief ore minerals are:

Malachite, azurite, covellite, chalcocite and subordinated quantities of chalcopyrite.

The most prominent sulphide minerals of the unweathered rocks are:

Pyrite, marcasite, chalcopyrite and minor sphalerite.

The pyrite quite frequently occurs as globular framboids which may indicate the sedimentary origin of the primary mineralisation.

Igneous rocks, which could have been the source of the copper mineralisation, are not known in close proximity to Kapunda. The author of this report inclines, therefore to accept Thompson's theory on the syngenetic origin and the stratigraphic control over the primary mineralisation.

The mobilisation and secondary enrichment of the copper mineralisation are regarded to be the result of descending oxygenated ground water in accordance with the classically documented systems. The kaolinisation of the feldspathic siltstone is due to the acidity of the descending water. This acidity came from the oxidation of the primary sulphides.

Three zones (TABLE 1.) of the copper mineralisation have been defined by the mineralogical and electron probe investigations (APPENDIX V.). This zoning confirms the above theory.

TABLE 1.

ZONES OF THE COPPER MINERALISATION

Depth		Copper Minerals	Iron Sulphides	Rock Type
From	To			
0	70	Malachite Azurite	Goethite and Limonite after Pyrite	Kaolin rock
70	300	Covellite, Chalcocite	Pyrite, Marcasite	Partly kaolinised feldspathic siltstone
300	700	Chalcopyrite	Pyrite, Marcasite	Fresh feldspathic siltstone

4. Conclusions

i) The sulphide mineralisation of the unweathered rocks is stratigraphically controlled and is of syngenetic origin.

ii) The ore of the kaolinised zone is a supergene enrichment controlled by the water table and the porosity and permeability of the host rocks.

iii) The kaolinisation of the host rocks is the side effect of the process of supergene enrichment.

iv) The stratigraphy, structure and large number of I.P. anomalies warrant regional exploration for further copper deposits.

The horizontal influence limits of the sections are situated half way between two section lines, and are the boundaries of the ore blocks.

The density factor used was 15 cubic feet per long ton. This figure was computed from the specific gravity of rock types involved.

3. Discussion

A previous ore reserve calculation was made by Mr. J. B. Roberts of Mines Exploration Pty. Ltd. in January 1969. This calculation is quite well documented, and although plans are not available, all calculation sheets are at our disposal. The calculation was carried out apparently on a sectional basis using a cut off grade of 0.30% copper. The method of averaging to determine ore intersections included many barren areas between higher grade ore zones. Mr. Roberts' calculations resulted in a reserve of 5.8 million tons of ore at 0.74% copper content.

In the present calculations, individual assays have been considered in determining the cut off, and barren lenses excluded. It is probable, however, that some of the barren lenses would have to be included as dilution, and some ore lenses would have to be excluded in considering an open cut design. But it is felt, that this aspect is outside the province of this report, as such planning is to be preceded by extensive drilling which is considered to be necessary in order to delineate the shape and to establish the grade and tonnage of the minable orebody.

VIII. DRILLING PROPOSAL

A diamond drilling program is proposed in order :

i) To obtain grade and geological information of the orebody at present indicated by rotary percussion drilling on widely spaced lines.

ii) To delineate the shape and to define the parameters of the minable orebody.

The drilling program consists of a preliminary and a detailed phase which amounts to a total of 26,000 feet of drilling. Using five drill rigs, the duration of the whole program would be about seven months.

Since the previous drilling faced poor core recovery, it is strongly recommended that drilling be carried out by using advanced techniques in order to obtain satisfactory core recovery.

1. Preliminary Phase

It is proposed that the area be drilled on a 200 foot by 200 foot grid. The drill holes be sited on the 200 foot grid junctions.

This program amounts to 49 vertical holes of average depth of 300 feet, for a total of 14,700 feet.

2. Detailed Phase

The area of interest defined by the previous phase is to be drilled on a closer grid.

It is recommended that each 100 foot junctions of the easterly co-ordinates be filled in with additional holes forming a 100 foot by 200 foot grid.

This program can amount to 38 vertical holes, of an average depth of 300 feet, totalling 11,400 feet.

IX. BUDGET PROPOSAL

1. Preliminary Phase

Diamond drilling	$147,000
Assaying	15,000
Geology and miscellaneous	17,000
TOTAL :	$179,000

2. Detailed Phase

Diamond drilling	$114,000
Assaying	11,000
Geology and miscellaneous	16,000
TOTAL :	$141,000

GRAND TOTAL :	$320,000

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A P P E N D I C E S

TO THE

SUMMARY REPORT

ON THE

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APPENDICES:

I. BOREHOLE LOGS OF THE EARLY DRILLING.

II. BOREHOLE LOGS OF DDH-KP.1.

III. ROTARY PERCUSSION DRILL LOGS.

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VIII. I.P. SECTION, LINE 1000 N.

APPENDIX I.

BOREHOLE LOGS OF THE EARLY DRILLING

(REFERENCE 3)

PERCUSSION HOLES

BORE NO.	TOTAL DEPTH	KAOLIN MASS			COPPER
		DEPTH FROM	DEPTH TO	THICKNESS	
	Feet	Feet	Feet	Feet	Per cent
PD. 1	217.3	50	120	70	0.5
PD. 2	120	60	107.5	47.5	1.25
PD. 3	185	102	170	68	1.18
PD. 7	187	40	70	30	0.6
PD. 8	231	153	170	23	0.5

DIAMOND DRILL HOLES

NO. 1. DIAMOND DRILL HOLE (VERTICAL)

DEPTH	DESCRIPTION
Surface - 500 ft.	Copper values averaging about 0.25 per cent Cu.
569 ft.- 750 ft.	Dark slate, carrying a little iron pyrites and a trace of copper. Total depth

NO. 2. DIAMOND DRILL HOLE (INCLINED 65 DEG.)

DEPTH	DESCRIPTION
Surface - 145 ft.	Copper values averaging about 0.25 per cent Cu.
145 ft.- 175 ft.	Kaolin carrying 1.5 per cent Cu.
175 ft.- 240 ft.	Kaolin carrying 0.5 per cent Cu.
330 ft.- 340 ft.	Copper values 3.5 per cent, possibly Tratton lode.
340 ft.- 371 ft.	Stiff clayey ground averaging 2.0 per cent Cu.
400 ft.- 405 ft.	Lode (?) siliceous material assaying 2.5 per centCu
405 ft.- 470 ft.	Hard siliceous rock carrying a trace of Cu.
471 ft.- 478 ft.	No core. Sludge and water lost. Hart lode (?)
478 ft.- 500 ft.	Samples returned 1.25 per cent Cu, and carried quartz and iron pyrites.
500 ft.- 575 ft.	Hard sandstone carrying no copper.
576 ft.	No samples. Dunstan lode (?)
576 ft.- 750 ft.	Soft blue slate. No copper

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NO. 3. DIAMOND DRILL HOLE (INCLINED 60 DEG.)

DEPTH	DESCRIPTION
200 ft. - 370 ft.	Copper values
405 ft.	Copper values
475 ft.	No core or return water. Lode (?)
489 ft.	Piece of ore consisting of vesicular quartz, carrying iron pyrites.
	Total depth, 500 ft.

APPENDIX II.

BOREHOLE NO. KP1

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A 1

STATE Sth.Australia AREA Kapunda

HOLE No. KP 1

GRID Geophysical CO-ORDS. 1,000N 250E

R.L. S.M.S.D. BEARING(Mag) 65° DIP: -45°

From	To	Recovery	CORE DESCRIPTION	C. to B. Angles°
0'	51'8"		12" of Quartz & fe stained rubble with scattered specks of Cu. carbs.	
51'8"	332'		This section comprises of uniform completely Kaolinised rock with no apparent lithological change and appears to correspond to the "Kaolin Ore Body" reported in earlier geological investigation. The material is chalky white in appearance and texture excepting for 20' at 200'-220' which is a dark grey colour There was numerous scattered specks of a dark min. possibly partly weatheres Py visible when the core was freshly drilled but not very apparent after the core dried out. Similar min. was also carried in numerous very narrow veins & veinlets of feldspar? up to 1/16" wide. 1" wide vein of massive Py-Cp & possibly other Cu. min. at 286'. 1" quartz veins at 216' & 311'.	
332'	391'		Kaolin with short sections of fresher rock in which indications of bedding with scattered min. is more evident. This is mainly specks & chains of what appears to be predominantly part weathered Py. 2" wide Quartz-Py vein at 352'.	
391'	444'6"		Predominantly fairly fresh feldspathic silt stone with occas. Kaolin sections up to 12" wide. Continuing minor min. on bedding plane and what appears to be minor Chlorite staining on occas. joints. 1" wide Quartz-Py veins at 395 '6", 438'.	
444'6"	530'		Feldspathic Silt Stone with a minor amount of part weathered Sulphide min. on bedding plane. Several Quartz-Py veins 1"-2" wide appear to carry the bulk of the min. These occur at 448', 458' 458'6", 459'6", 465',45[illegible]' 509', 515'. There are several other similar veins up to 1/8" wide.	

Continued next page

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A 2

STATE Sth.Australia AREA Kapunda

HOLE No. KP 1

GRID Geophysical CO-ORDS. 1,000N 250E

R.L. S.M.D. BEARING(Mag) 65° DIP: -45°

From'	To'	Recovery	CORE DESCRIPTION	C. to B. Angles°
530'	532'6"		Feldspathic Silt Stone with minor scattered specks Py-Cp min. ½" wide Quartz-Py-Cp veins at 533' & 534'6". These siliceous veins carry predominantly Py min. with Cp min. as blebs or veinlets and usually in lesser amounts. They appear brecciated and quite often part leeched. These veins at 533' mark the start of a more highly mineralised zone with mod. amounts of visible Cp. There is a mod. amount of (chloritic?) dark-green-black staining on joints and associated with min. veins, this was first noticed around 523'.	
532'6"	545'		Feldspathic Silt Stone with more apparent Py-Cp min. Several 1/8"-¼" wide quarts veins with splashes of Py-Cp. Numerous smaller veins and veinlets up to 1/16" wide with minor Py-Cp min. There are occas. specks of a dark min. possibly part weathered Py or a Cu min. These specks and chains are unually alligned with the cleavage plane and continue throughout the lode zone in either mod or minor amounts. No other direction has been noted. There is also scattered specks of Py & Cp. throughout. Mod. chloritic? staining on joints.	
545'	569'	&num.	Feldspathic Silt Stone with a further increase in apparent Py-Cp min. 15" wide brecciated and part leeched Quartz-Py-Cp, (formerly mined lode veins?) occur at 545'-546'3" and 566'-567'3". There are other v. veins & veinlets 1/32"-1/8" wide all with mod. amounts of sulphide. Only monor amounts of dark mineralised? specks. Some minor disseminated Py-Cp min. as scattered specks. Only minor chlor. up to 561'.	to ½"
569'	584'		Feldspathic Silt Stone Mod.-strong min. section with several Quartz-Py-Cp veins up to ¾" wide. Numerous others up to 1/8" wide Sulphides generally evenly distributed throughout. Noticeable increase in the amount of dark specks and chains, in places these have a dendritic appearance. Some minor disseminated Py-Cp specks throughout. No visible chlor.? staining.	
584'	593'		Feldspathic Silt Stone marked decrease in min. with only a few veins up to ¼" wide & occas. scattered veins & veinlets up to 1/16" wide. Some minor disseminated sulphides no apparent chlor?	
593'	639'		Feldspathic Silt Stone Mod. mineralised but with min. generally confined to larger lode vein intersections with only a few minor veins noted. Some minor disseminated specks of Py-Cp. Lode veins appear brecciated and mod. leeched and contain fairly even amounts of Quarts, Py, Cp. There is a vein of almost massive Py at 588'-589' & a more typical Quarts-Py-Cp lode at 613'-614' and 619'-619'6". Narrower veins of approx. 1" occur	

STATE Sth.Australia AREA Kapunda HOLE No. KP 1

GRID Geophysical CO-ORDS. 1,000N 250E

R.L. S.M.D. BEARING(Mag) 65° DIP -45°

From	To	Recovery	CORE DESCRIPTION	C. to B. Angles°
			at 607'-624' and 628'. Some minor chlor.? staining on joints towards end of section.	
639'	741'		Feldspathic silt stone There is an abundance of the dark disseminated specks and chains of min. in this section and is the more noticeable form of min. These specks - chains & veinlets usually appear to carry minor Py or Cp min. There is a decrease in this min. after 720'. There are several scattered veins of Quartz-Py-Cp min. up to ¾" wide scattered throughout and some larger somewhat brecciated and part leeched lode veins notably at 666'-666'9", 681'-681'9", 735'-735'3" and 739'-739'2". Strong chlor.? staining 649'-650' only minor elsewhere.	
741'	765'		Feldspathic Silt Stone with strong chlor.? staining on joints & mod. min. mainly confined to several wider lode veins. Some minor disseminated specks and chains of dark min. increasing towards end of section. Twoveins of massive chlor.? were intersected at 748'6"-748'8" and 750'-751'. The lode veins are similar to those described earlier The more important intersections being at 743'-743'6", 743'9"-744' and 748'9"-749'.	
765'	793'		Feldspathic Silt Stone Except for 6" from 768'6"-769' where there are 3 Quartz veins ¼"-½" wide withmod.-strong Py-Cp min. there is very little apparent min. in this section There are a few minor veins up to 1/8" wide and scattered dark specks and chains in minor amounts. There is an almost completely leeched lode vein at 774'6"-775' and similar narrower veins at 776' & 779', all have some remaining splashes of Py-Cp min. Occas. minor chlor.? on joints.	
793'	840'		Feldspathic Silt Stone This section is more highly mineralised with numerous Quartz-Py-Cp lode veins ½" -1" wide carrying the bulk of the mineralisation. Several narrower (up to 1/8" wide) veins and veinlets are scattered throughout and a minor amount of specks and chains of dark min. The more visible min. is carried in brecciated part leeched veins, intersected at 793', 794', 797'6", 798', 798'6", 803', 803'6", 817', 805'6" 820', 824', 826', 831', 833', 834', & 834'6' There is a minor amount of chlor.? staining becoming mod.-strong after 833'.	
840'	863'		Feldspathic Silt Stone with noticeably stronger chlor.? content and mod.-strong lode intersections. Dev's of disseminated specks splashes and veinlets of Py & Cp min. occur at 846'-847' & at 854'-855'. There is a 6" vein of massive Py with splashes of Cp at 851'3"-851'9" & a similar 4" wide vein at 857'6". There are fairly numerous veins & veinlets up to 1/32" wide scattered at random angles all carrying minor Py-Cp min. Part leeched and brecciated Quarts-Py-Cp lode veins up to 1½" wide occur at 843'-844 6"	

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STATE Sth. Australia AREA Kapunda HOLE No. KP 1

GRID Geophysical CO-ORDS. 1,000N 250E

R.L. S.M.D. BEARING(Mag) 65° DIP -45°

From	To	Recovery	CORE DESCRIPTION	C. to B. Angles°
			846', 851', 855', 859', 860', and 863'. The rock has a "slatey" cleavage from 841'-847', and again from 853'-858'. Very strong chlor.? is present on these fractures. Some minor specks and chains of dark min. scattered throughout.	
863'	892'		Feldspathic Silt Stone Mineralisation less abundant and confined to lode veins up to 1" wide scattered throughout. There is a 3" wide vein of massive Py with splashes of Cp at 886'9"-887' and a 9" wide brecciated Quartz-Py-Cp lode vein at 891'-891'9". There is minor scattered specks and veinlets throughout. Mod. Chlor.? staining on joints.	
892'	959'		Feldspathic Silt Stone Very weakly min. & only very minor Chlor.? at occas. joints ½" wide Quartz-Py-Cp vein at 907' only noteworthy min. occas. scattered disseminated specks & minor narrow veins & veinlets continue throughout but only in minor amounts.	
959'	1021'3"		Interbanded dark grey slate and Feld. Silt Stone tending to Quartz with very minor sulphide min. on bedding plane and an occas. very narrow Quartz vein, with blebs of Py-Cp min. 2" wide Quartz vein with mod. Py-Cp min. at 991'. Slate and Silt Stone generally evenly distributed and form section 4'-6" wide. Occas. barren Quartz veins 1/16"-1/8" wide.	
			END OF HOLE	

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B. 1

STATE Sth.Australia AREA Kapunda

HOLE No. KP 1

GRID Geophysical CO-ORDS.

R.L. BEARING(Mag) DIP:

S.McD.

From	To	Recovery	CORE DESCRIPTION	C. to B. Angles°

ASSAYS

KAOLIN ZONE

MACHINE _____ NX. _____ LOGGED BY _____

DRILLERS _____ BX. _____ FINAL CORE STORAGE _____

COMMENCED _____ AX. _____

COMPLETED _____ EX. _____

S.McD.

ASSAYS				AVERAGE ASSAYS				HOLE SURVEY			
From	To	Width	%Cu	From	To	Width		Depth	Mag. Az°	Trop Dip°	Etch Dip
156	161		0.18								
161	166		0.63								
166	171		0.13								
171	176		0.05								
176	181		0.18								
181	186		0.16								
186	191		0.06								
191	196		0.03								
196	201	No core recovered									
201	206		0.04								
206	211		0.11								
211	216		0.20								
216	221	No core recovered									
221	226		0.13								
226	231		0.13								
231	236		0.40								
236	241		0.56								
241	246		2.20								
246	251		0.88	156	367	211	0.36				
251	256		0.53								
256	261		1.30								
261	266		0.46	231	291	60	0.65				
266	271		0.30								
271	276		0.39								
276	281		0.25								
281	286		0.33								
286	291		0.29								
291	296		0.15								
296	301		0.04								
301	306		0.21								
306	311		0.33								
311	312	No core recovered									
312	317		0.19								
317	322		0.28								
322	327		0.30								
327	332		0.06								
332	337		0.05								
337	342		0.04								
342	347		0.10								
347	352		0.24								
352	357		1.30								
357	362		1.06								
362	367		0.13								

MINES EXPLORATION PTY. LTD.

B 2

STATE _____ AREA _____

HOLE No. KP 1

GRID _____ CO-ORDS. _____

R.L. _____ BEARING(Mag) _____ DIP _____

S.McD.

From	To	Recovery	CORE DESCRIPTION	C. to B. Angles°
			ASSAYS	
			Unweathered Zone	

MACHINE _____ NX. _____ LOGGED BY _____

DRILLERS _____ BX. _____ FINAL CORE STORAGE _____

COMMENCED _____ AX. _____

COMPLETED _____ EX. _____

S.McD.

ASSAYS			
From	To	Width	%Cu
530	535		0.16
535	540		0.94
540	545		0.61
545	550		0.30
550	555		0.04
555	560		0.35
560	565		0.41
565	570		0.76
570	575		0.14
575	580		0.29
580	585		0.17
585	590		0.09
590	595		0.13
595	600		0.19
600	605		0.11
605	610		0.31
610	615		1.10
615	620		0.39
620	625		0.23
625	630		0.25
630	635		0.12
635	640		0.12
640	645		0.20
645	650		0.14
650	655		0.06
655	660		0.04
660	665		0.59
665	670		0.35
670	675		0.16
675	680		0.05
680	685		0.52
685	690		0.25
690	695		0.06
695	700		0.19
700	705		0.24
705	710		0.07
710	715		0.04
715	720		0.03
720	725		0.04
725	730		0.17
730	735		0.05
735	740		0.44
740	745		0.14
745	750		0.80
750	755		0.08
755	760		0.04
760	765		0.04
765	770		0.21
770	775		0.15
775	780		0.10
780	785		0.03
785	790		0.07
790	795		0.05
795	800		0.14
800	805		0.04
805	810		0.06
810	815		0.05
815	820		0.19
820	825		0.18
825	830		0.12
830	835		0.39
835	840		0.07
840	845		0.34
845	850		0.15

AVERAGE ASSAYS			
From	To	Width	%Cu
850	855		0.40
855	860		0.18
860	865		0.18
865	870		0.08
870	875		0.30
875	880		0.31
880	885		0.49
885	890		0.27
890	895		1.20
895	900		0.04
900	905		0.09
905	910		0.10
910	915		0.12
915	920		0.04
920	925		0.13
925	930		0.18
930	935		0.07
530	580	50	0.4
580	605	25	0.14
605	690	85	0.28
690	720	30	0.10
720	735	15	0.08
735	750	15	0.44
750	870	120	0.13
870	895	25	0.51
895	935	40	0.09
530	930	400	0.22
530	720	190	0.26
720	935	215	0.19

HOLE SURVEY			
Depth	Mag. Az°	Trop Dip°	Etch Dip°

MINES EXPLORATION PTY. LTD.

C 2

STATE Sth.Australia AREA Kapunda HOLE No. KP 1

GRID Geophysical CO-ORDS.

R.L. BEARING(Mag) DIP:

S.McD.

From'	To'	Recovery	CORE DESCRIPTION	C A
592'	620'		B 60-70° Main min. trend is about 150° with some minor veins at 40-60°. Major lode vein at 599' appears at 40° and a similar vein at 614' at 150° only min. scattered specks of dark min. on bedding plane.	
620'	640'		Bedding not very distinct but appears to gradually steepen to about 80-85° min. appears to be more predominate at 140-150°. Minor veinlets at 30-50° and only very minor amount of Min. on bedding plane.	
640'	745'		B 70-80° Mod. distinct and variable. More distinct min. on bedding plane. Major min. appears carried in veins at 150-160° with minor veinlets at 30-50°, noted at 650-670' and 700'-715'.	
745'	770'		B 70° Mod. amount of min, on bedding plane with minor veins at 130-150°.	
770'	793'		B 70-75° Mod. amount of min. on bedding plane. Minor min. veins at both 50° and 120-150°.	
793'	825'		B 80-85° Less visible min. on bedding plane. Several lode veins at 70° and some minor min. at 110°. The section 795'-800' appears to have the lode veins developed on axis "B". This is the first time this trend is very apparet although there has been some slight offset in the axis of some earlier min. veins.	
825'	843'		B 75-80° Weakly mineralised with minor [illegible] specks on bedding plane and mon. min. in narrow veinlets at 110-120° and occas. veinlets at 70°.	
843'	883'		B 70-80° The mineralisation in this section again appears to be assoc. with axis "B" and makes an angle to the hole direction of 40-45°. The majority of the min, is in this direction with minor specks on bedding plane.	
883'	892'		B 75° Not very distinct after 885'. Several narrow veinlets at 45-60° and 2 major lode veins at 887' and 891' follow this trend. Minor min. on bedding plane.	
892'	958'		B 75-86° Weakly mineralised with minor scattered min. on bedding plane. Occas. minor veinlets at 120-160° and a more significant vein of min. at 60°.	
958'	1011'		B 70° Distinct and uniform with minor min. scattered narrow veins generally conforming with axis "B" and having angles of 30-45° to the hole bearing.	
1001'	1021'3"		B 30-35° Sharp flattening occuring at a lithological change from slate to siltstone Minor min. still occuring on bedding plane, one narrow veinlet on axis "B" at 35° to the hole bearing.	

END OF HOLE

MINES EXPLORATION PTY. LTD.

D 1

STATE Sth. Australia AREA Kapunda HOLE No. KP 1

GRID Geophysical CO-ORDS.

R.L. BEARING(Mag) DIP

S.M.D.

From	To	Recovery	%	CORE DESCRIPTION
0'	51'8"	6'	Nil	
51'8"	61'6"	8"	Nil	WHAT HAPPENED BETWEEN 61'6" AND 155'6"
61'6"	155'6"	2'9"	3%	
155'6"	161'	2'3"	45%	
161'	166'	2'6"	50%	
166'	171'	2'9"	55%	
171'	176'	2'9"	55%	
176'	181'	1'9"	35%	
181'	186'	2'0"	40%	
186'	191'	1'10"	37%	
191'	196'	1'6"	30%	
196'	201'	3"	5%	
201'	206'	2'3"	46%	
206'	211'	2'9"	55%	
211'	216'	1'9"	35%	
216'	221'	1"	<2%	
221'	226'	2'	40%	
226'	231'	1'9"	35%	
231'	236'	1'7"	32%	
236'	241'	1'10"	37%	
241'	246'	1'9"	35%	
246'	251'	1'3"	25%	
251'	256'	2'3"	45%	
256'	261'	2'	40%	
261'	266'	1'3"	25%	
266'	271'	1'8"	33%	
271'	276'	2'1"	42%	
276'	281'	8"	13%	
281'	286'	2'	40%	
286'	291'	1'10"	37%	
291'	296'	2'2"	45%	
296'	301'	1'6"	30%	
301'	306'	1'3"	25%	
306'	311'	1'6"	30%	
311'	312'	1"	8%	
312'	317'	1'6"	30%	
317'	322'	1'3"	24%	
322'	327'	1'	20%	
327'	332'	1'6"	30%	
332'	337'	1'10"	20%	
337'	342'	1'9"	35%	
342'	347'	1'9"	35%	
347'	352'	2'	40%	
352'	357'	1'4"	27%	
357'	362'	2'3"	45%	
362'	367'	2'9"	55%	
367'	372'	1'3"	25%	
372'	376'3"	2'	40%	
376'3"	381'	2'	40%	
381'	386'	3'9"	75%	
386'	391'	2'3"	45%	
391'	395'	2'	40%	
395'	415'	1'6"	7%	
415'	418'	1'9"	59%	
418'	422'4"	2'3"	60%	
422'4"	428'6"	5'3"	40%	of KAOLIN ZONE!
428'6"	437'	5'6"	63%	
437'	444'6"	6'	86%	END
444'6"	451'6"	6'9"		
451'6"	460'6"	9'		
460'6"	470'	9'		
470'	180'	7'3"		Recovery good from now on.
480'	487'3"	6'6"		
487'3"	493'6"	6'		
493'6"	502'9"	8'3"		
502'9"	513'	9'		

MINES EXPLORATION PTY. LTD.

D 2

STATE Sth.Australia AREA Kapunda HOLE No.

GRID Geophysical CO-ORDS.

R.L. BEARING(Mag) DIP:

S.McD.

From	To	Recovery	%	CORE DESCRIPTION	C A
513'	523'	10'	100		
523'	532'3"	4'6"	49		
532'3"	536'2"	3'3"	83		
536'2"	543'4"	7'2"	100		
543'4"	553'7"	10'3"	100		
553'7"	556'10"	3'3"	100		
556'10"	573'5"	16'6"	100		
573'5"	593'1"	19'8"	100		
593'1"	608'1"	15'	100		
608'1"	621'	7'9"	60		
621'	631'6"	10'6"	100		
631'6"	637'10"	5'4"	84		
637'10"	648'10"	9'10"	89		
648'10"	650'6"	1'4"	80		
650'6"	657'2"	6'2"	93		
657'2"	662'10"	5'8"	100		
662'10"	670'	4'4"	60		
670'	682'10"	12'10"	100		
682'10"	695'6"	12'6"	99		
695'6"	705'10"	10'3"	99		
705'10"	716'	9'6"	94		
716'	720'4"	3'1"	71		
720'4"	725'10"	4'6"	100		
725'10"	728'8"	2'9"	98		
728'8"	731'2"	2'1"	83		
731'2"	740'10"	9'4"	97		
740'10"	741'8"	10"	100		
741'8"	751'4"	7'4"	76		
751'4"	753'1"	1'10"	100		
753'1"	754'7"	1'3"	83		
754'7"	757'2"	2'4"	93		
757'2"	763'10"	6'8"	100		
763'10"	768'3"	4'3"	96		
768'3"	773'5"	5'2"	100		
773'5"	779'	5'	90		
779'	783'6"	4'2"	93		
783'6"	786'7"	3'2"	100		
786'7"	806'	19'5"	100		
806'	811'	4'10"	97		
811'	818'5"	7'5"	100		
818'5"	838'3"	19'6"	98		
838'3"	842'4"	3'10"	94		
842'4"	852'8"	10'2"	98		
852'8"	861'5"	8'6"	97		
861'5"	875'	9'9"	72		
875'	883'9"	8'6"	97		
883'9"	890'3"	6'2"	95		
890'3"	894'9"	3'10"	85		
894'9"	901'	4'9"	76		
901'	902'3"	1'2"	93		
902'3"	910'7"	7'11"	95		
910'7"	915'2"	4'6"	98		
915'2"	918'	2'5"	85		
918'	921'4"	3'2"	95		
921'4"	928'5"	3'11"	55		
928'5"	932'10"	3'5"	77		
932'10"	933'8"	8"	80		
933'8"	935'4"	2'	100+		
935'4"	937'	4"			
937'	943'6"	6'6"			
943'6"	952'6"	8'			
952'6"	961'	7'10"			
961'	964'9"	3'9"			
964'9"	973'9"	8'9"			
972'9"	983'9"	9'6"			
983'9"	992'	8'4"			

MINES EXPLORATION PTY. LTD.

D 3

STATE Sth.Australia AREA Kapunda

HOLE No. KP

GRID Geophysics CO-ORDS.

R.L. BEARING(Mag) DIP:

S.M.D.

From	To	Recovery	CORE DESCRIPTION
992'	1001'9	9'9"	
1001'9	1011'6	9'	
1011'6	1021'3	8'6"	

END OF HOLE

APPENDIX III.

Rotary/Percussion Drill Logs KV Series Holes

Colour Classification used in Logs

Colour

1. Red and chocolate brown, iron stained sands and clays - SOIL.
2. Mid to dark brown as above but more sandy. SOIL.
3. Yellow to light brown and fawn. Weakly ferruginised weathered, kaolinised feldspathic siltstone.
4. Grey, white and pink. Weathered, bleached, kaolinised feldspathic siltstone.
5. Kahki to green-brown. Fine grained more slaty rock of fine-grain size and with quartz, feldspar and sericite - disintegrated bedrock.
6. Mid to dark grey. Reasonably fresh feldspathic siltstone.
7. White to very light grey. Bleached, kaolinised feldspathic siltstone.
8. Very dark grey to black. Fresh feldspathic siltstone.

MINES EXPLORATION PROPRIETARY LIMITED

PERCUSSION & ROTARY DRILL LOG

KAPUNDA S.A.

CO-ORDS LINE 10N, 125E MACHINE BOYLES HOLE Nº KV1

COMMENCED 27.2.66 DRILLER Foundation Eng.

COMPLETED 10.3.66 SAMPLER _____ R.L. 100'

DEPTH		RECOVERY			COLOUR	Recovery	Remarks	ASSAYS	
From'	To'	Weight lbs.	Moisture	% Rec				% Cu	Total Carb
0	5'6"	82			2	Air Blast	Composite sample	0.97	
5'6"	10'	84			1	"			
10'	20	102			1	"	0-7% 40'	0.09	
20	30	104			2	"		0.12	
30	40	70			1	"		0.70	
40	50	81			2	"		0.04	
50	60	20			2	"		0.03	
60	70	16			2	"		0.04	
70	80	27			2	water circultn.	sample collected from settling tanks	0.02	
80	85	15			2	"		0.02	
85	98	36			2	"	"	0.02	
98	110	8			2	"	"	0.02	
110	120	21			2	"	"	0.02	
120	130	20			2	"	"	0.03	
130	140	16			2	"	"	0.02	
140	150	19			2	"	"	0.02	
150	160	33			2	"	"	0.02	
160	170	24			6	"	"	0.15	
170	180	42			6	"	"	0.19	
180	190	38			6	"	"	0.04	
190	200				6	2" diam. core	5' triple tube barrel	0.02	
200	210				6			0.01	
210	220				6			0.01	
220	230				6			0.01	
230	240				6			0.01	
240	250				6			0.01	
250	260				6			0.01	
260	270				6			0.01	
270	280				6			0.01	
280	290				6			0.01	
290	300				6			0.01	
0'	190'	2 15/16" DIA BIT							

MINES EXPLORATION PROPRIETARY LIMITED

PERCUSSION & ROTARY DRILL LOG

KAPUNDA S.A.

CO-ORDS LINE 10N,00 MACHINE BOYLES

COMMENCED 11.3.66 DRILLER Foundation Eng.

COMPLETED 22.3.66 SAMPLER _____

HOLE Nº KV2

R.L. 100.00'

DEPTH		RECOVERY			COLOUR	Recovery	Remarks	ASSAYS	
From'	To'	Weight lbs	Moisture	% Rec				% Cu	Total Carb
0	10	145			1	Air blast	0.41 / 10'	0.41	
10	20	64			3&4	"		0.12	
20	30	63			4	"		0.02	
30	40	71			4	"		0.05	
40	50	64			5	"		0.07	
50	60	56			"	"		0.06	
60	70	46			"	"		0.27	
70	80	88			"	"		0.06	
80	85	46			"	"		0.05	
85	90				6	2" diam core.	5' triple tube barrel	0.04	
90	100				"	"		0.08	
100	110				"	"		0.60	
110	120				"	"		0.12	
120	130				"	"		0.13	
130	140				"	"		0.25	
140	150				"	"		0.07	
150	160				"	"		0.10	
160	170				"	"		0.13	
170	180				"	"		0.03	
180	190				"	"		0.27	
190	199				"	"		0.02	
199	204	4			"	water circultn.	1/16" split	0.10	
204	210				"	2" diam core		0.57	
210	220				"	"		0.11	
220	230				"	"		0.03	
230	240				"	"		0.01	
240	250				"	"		0.01	
250	260	13			"	water circultn	1/16" split	0.03	
260	270	12			"	"	"	0.03	
270	280	12			"	"	"	0.02	
280	290	14			"	"	"	0.03	
290	300	8½			"	"	"	0.03	

2 15/16" DIA BIT EXCEPT WHERE CORE DRILLED

...PROPRIETARY LIMITED

PERCUSSION & ROTARY DRILL LOG

KAPUNDA S.A.

CO-ORDS LINE 10N, 100E MACHINE BOYLES

COMMENCED 23.3.66 DRILLER Foundation Eng. HOLE No KV3

COMPLETED 30.3.66 SAMPLER _____ R.L. 100.35'

DEPTH		RECOVERY			COLOUR	Recovery	Remarks	ASSAYS	
From'	To'	Weight lbs	Moisture	% Rec				% Cu	Total Carb
0	4	18			1	Air blast water circultn	composite sample	0.12	
4	10	3			2			-	
10	20	2			2	1/16" split		0.04	
20	30	5			3	"		0.16	
30	40	5½			3	"		0.10	
40	50	5½			6	"		0.06	
50	60	5½			3	"		0.03	
60	70	5½			3	"		0.02	
70	80	7			6	"		0.02	
80	90	7½			3	"		0.02	
90	100	10			2	"		0.03	
100	110	18			"	"		0.03	
110	120	13			"	"		0.02	
120	125	7			"	"		0.02	
125	130	4			"	"			
130	140	4			"	"		0.01	
140	150	4½			"	"		0.02	
150	160	3½			"	"		0.04	
160	170	3¼			"	"		0.01	
170	180	4¼			"	"		0.01	
180	190	6½			"	"	180'	0.52	
190	200	6			6	"	0.43 / 40'	0.65	
200	210	6			"	"		0.26	
210	220	5½			"	"	220'	0.30	
220	230	4¾			"	"		0.03	
230	240	5½			"	"		0.12	
240	250	5½			"	"		0.02	
250	260	6			"	"		0.03	
260	270	14			"	"		0.04	
270	280	6½			"	"		0.03	
280	290	7			"	"		0.01	
290	300	7			"	"		0.03	
		2 15/16" DIA BIT							

MINES EXPLORATION PROPRIETARY LIMITED

PERCUSSION & ROTARY DRILL LOG

KAPUNDA S.A.

CO-ORDS LINE 10N, 200E MACHINE BOYLES

COMMENCED 30.3.66 DRILLER Foundation Eng.

COMPLETED 4.4.66 SAMPLER _____ R.L. 101.05'

HOLE No KV4

DEPTH		RECOVERY			COLOUR	Recovery	Remarks	ASSAYS	
From'	To'	Weight lbs	Moisture	% Rec				% Cu	Total Carb
0	10	150			1	Air blast		0.16	
10	20	7			2	water circultn. 1/16" split		0.17	
20	30	9			"	"		0.06	
30	40	4½			"	"		0.06	
40	50	3			"	"		0.01	
50	60	3½			"	"		0.01	
60	70	4			"	"		0.02	
70	80	5½			"	"		0.01	
80	90	5			"	"		0.01	
90	100	5			"	"		0.01	
100	110	4½			"	"		0.01	
110	120	4½			3	"		0.03	
120	130	5½			2	"		0.01	
130	140	11			"	"		0.18	
140	150	18			"	"		0.12	
150	160	6			5	"	150'	0.35	
160	170	6½			"	"	0.65	0.35	
170	180	6			"	"	40'	0.56	
180	190	6			"	"		0.33	
190	200	7½			6	"	190'	0.14	
200	210	7½			"	"		0.11	
210	220	8			"	"		0.10	
220	230	9			"	"		0.09	
230	240	9			"	"		0.10	
240	250	11			"	"		0.11	
250	260	10			"	"		0.10	
260	270	15			"	"		0.10	
270	280	21			"	"		0.18	
280	290	16			"	"		0.12	
290	300	16			"	"		0.18	

2 15/16" DIA BIT

PERCUSSION & ROTARY DRILL LOG

KAPUNDA S.A.

CO-ORDS LINE 10N, 300E MACHINE BOYLES

COMMENCED 4.4.66 DRILLER Foundation Eng. HOLE No KV5

COMPLETED 7.4.66 SAMPLER _____ R.L. 99.77'

DEPTH		RECOVERY			COLOUR	Recovery	Remarks	ASSAYS	
From'	To'	Weight lbs	Moisture	% Rec				% Cu	Total Carb
0	10	150			1	Air blast		0.13	
10	20	162			1	"	10'	0.47	
20	30	110			4	"		0.84	
30	40	92			"	"		0.95	
40	50	46			"	"	1.0 11%	1.02	
50	60	3			7	water circultn. 1/16" split	80'	1.73	
60	70	3			7			2.42	
70	80	3½			6 & 7			0.86	
80	90	3½			6			0.57	
90	100	3½			"		90'	0.05	
100	110	4			"			0.03	
110	120	4½			5			0.05	
120	130	4½			5			0.08	
130	140	4½			6			0.13	
140	150	4			6			0.08	
150	160	4			5			0.08	
160	170	4			6			0.04	
170	180	3½			7			0.10	
180	190	3½			"			0.13	
190	200	4			"			0.16	
200	210	5			8			0.01	
210	220	6			"			0.01	
220	230	8½			"			0.04	
230	240	7			"			0.03	
240	250	5½			"			0.01	
250	260	7½			"			0.01	
260	270	8			"			0.05	
270	280	7			"			0.08	
280	290	16			"			0.06	
290	300	14			"			0.03	
0	50	4½" DIA BIT							
50	30	2 15/16" DIA BIT							

PERCUSSION & ROTARY DRILL LOG

KAPUNDA S.A.

CO-ORDS LINE 10N, 500E MACHINE BOYLES

COMMENCED 27.4.66 DRILLER Foundation Eng. HOLE NO KV7

COMPLETED 2.5.66 SAMPLER R.L. 105.32'

DEPTH From'	DEPTH To'	RECOVERY Weight lbs	RECOVERY Moisture	RECOVERY % Rec	COLOUR	Recovery	Remarks	ASSAYS % Cu	ASSAYS Total Carb
0	10	72			3 & 4	Air blast		0.08	
10	20	54			3 & 4	"		0.10	
20	30	50			4	"		0.07	
30	35	40			4	"		0.05	
35	40	2½			3	water circultn. 1/16" split		0.04	
40	50	3			4	"		0.03	
50	60	No recovery				"	cavity	NS	
60	70	"	"			"	"	NS	
70	80	4			3 & 4	"	70	0.29	
80	90	5½			7	"		2.82	
90	100	4			"	"		1.90	
100	110	4			"	"		0.54	
110	120	4			"	"		0.56	
120	130	5			"	"	4pc 110'	0.66	
130	140	5			"	"		0.74	
140	150	5½			"	"		1.92	
150	160	4½			"	"		0.38	
160	170	5			"	"		0.45	
170	180	1			"	"	180	0.38	
180	207	No recovery			"	cavities		Lost core	
		Hole abandoned due to cavities							
0	35	4½" DIA BIT							
35	207	2 15/16" DIA BIT							

...PROPRIETARY LIMITED

PERCUSSION & ROTARY DRILL LOG

KAPUNDA S.A.

CO-ORDS LINE 10N, 600E MACHINE BOYLES HOLE Nº KV8

COMMENCED 23.4.66 DRILLER Foundation Eng.

COMPLETED 26.4.66 SAMPLER R.L. 113.18'

DEPTH From'	DEPTH To'	RECOVERY Weight lbs	RECOVERY Moisture	RECOVERY % Rec	COLOUR	Recovery	Remarks	ASSAYS % Cu	ASSAYS Total Carb
0	10	91			2	Air blast	0	0.49	
10	20	116			"	"	0.48	0.38	
20	30	118			"	"	30'	0.57	
30	40	108			3	"	30	0.13	
40	50	120			3	"		0.18	
50	60	95			2	"		0.08	
60	70	70			"	"		0.03	
70	80	8			"	water circultn. 1/16" split	70	0.92	
80	90	7			6	"	part fresh rock chips noted in samples	1.13	
90	100	7			"	"	"	0.59	
100	110	7			"	"	"	1.03	
110	120	7			"	"	"	0.36	
120	130	7			"	"	"	0.45	
130	140	7			"	"	" 0.62	0.31	
140	150	8			"	"	" 110'	0.46	
150	160	7			"	"	"	0.21	
160	170	7			"	"	"	0.35	
170	180	7			"	"	"	0.99	
							190		
		Hole stopped due to slow drilling							
		in moderately fresh siltstone							
0	70	4½" DIA BIT							
70	180	2 15/16" DIA BIT							

PERCUSSION & ROTARY DRILL LOG

KAPUNDA S.A.

CO-ORDS LINE 10N, 700E MACHINE BOYLES

HOLE Nº KV9

COMMENCED 20.4.66 DRILLER Foundation Eng.

COMPLETED 23.4.66 SAMPLER _____ R.L. 114.82'

DEPTH		RECOVERY			COLOUR	Re covery	Remarks	ASSAYS	
From'	To'	Weight lbs	Moisture	% Rec				% Cu	Total Carb
0	10	107			2	Air blast		0.55	
10	20	113			3	"		0.32	
20	25	56			3	"		0.51	
25	30	No recovery				"	cavity	No sample	
30	40	20			3	"		0.88	
40	45	No recovery				"	cavity	No sample	
45	50	3½			2	water circultn. 1/16" split	partly fresh rock chips noted in sample	1.20	
50	60	3			3		"	0.58	
60	70	6			5		"	1.36	
70	80	6			6		"	0.37	
80	90	4½			"		" 0.99	1.04	
90	100	4½			"		" 150'	1.20	
100	110	4			"		"	0.17	
110	120	5			"		"	0.22	
120	130	5			"		"	0.19	
130	140	4			"		"	check 5.7 5.8	
140	150	4½			"		" 150	1.36	
150	160	3½			"		"	0.13	
160	170	3½			"		"	0.21	

Hole stopped due to slow progress in moderately fresh siltstone.

0 45 4½" DIA BIT

45 170 2 15/16" DIA BIT

MINES EXPLORATION PROPRIETARY LIMITED

PERCUSSION & ROTARY DRILL LOG

KAPUNDA S.A.

CO-ORDS LINE 10N, 1000E MACHINE BOYLES

COMMENCED 19.4.66 DRILLER Foundation Eng. HOLE No KV12

COMPLETED 20.4.66 SAMPLER _____ R.L. 111.66'

DEPTH		RECOVERY			COLOUR	Recovery	Remarks	ASSAYS	
From'	To'	Weight lbs	Moisture	% Rec				% Cu	Total Carb
0	10	94			1	Air blast		0.01	
10	20	104			1 & 2	"		0.01	
20	30	114			2 & 3	"		0.14	
30	40	125			5	"		0.04	
40	50	105			"	"		0.04	
50	60	123			"	"		0.02	
60	70	104			6	"		0.01	
70	80	125			"	"		0.01	
80	90	44			"	"		0.01	
90	100	5½			"	water . part fresh circultn. rock noted		0.01	
100	110	5			"	1/16" split in sample "	0.32	0.32	
0	90	4½" DIA BIT							
90	110	2 15/16" DIA BIT							

MINES EXPLORATION PROPRIETARY LIMITED

PERCUSSION & ROTARY DRILL LOG

KAPUNDA S.A.

CO-ORDS LINE 20N, 450E MACHINE DRILLMASTER

COMMENCED 19.4.66 DRILLER Daynit Drill. Co

COMPLETED 20.4.66 SAMPLER _____ R.L. 126.00'

HOLE Nº KV13

DEPTH From'	DEPTH To'	RECOVERY Weight lbs	RECOVERY Moisture	RECOVERY % Rec	COLOUR	Recovery	Remarks	ASSAYS % Cu	ASSAYS Total Carb
0	10	95			2	Air blast		0.01	
10	20	112			2	"		0.04	
20	30	144			4	"		0.12	
30	40	130			"	"		0.07	
40	50	102			"	"		0.05	
50	60	103			"	"		0.07	
60	70	214			5	"		0.09	
70	80	226			6	"	70	0.35	
80	90	226			"	"		0.61	
90	100	193			"	"		0.78	
100	110	200			"	"	107	1.12	
110	120	185			3	"	100'	1.12	
120	130	171			"	"		2.71	
130	140	124			"	" water circultn. from 135'		1.04	
140	150	20			"	water ciculatn. 1/16" split		0.61	
150	160	24			"	"		1.40	
160	170	50			6	"	170	0.97	
		Hole stopped due to intersecting							
		excessive ground water flow in							
		old workings							
0	170	4½" DIA BIT							

...SECRETARY LIMITED

PERCUSSION & ROTARY DRILL LOG

KAPUNDA S.A.

CO-ORDS LINE 20N. 550E MACHINE DRILLMASTER

COMMENCED 20.4.66 DRILLER Daynit Drilling Co.

COMPLETED 21.4.66 SAMPLER _____ R.L. 131.00'

HOLE Nº KV14

DEPTH		RECOVERY			COLOUR	Recovery	Remarks	ASSAYS	
From'	To'	Weight Lbs	Moisture	% Rec				% Cu	Total Carb
0	10	85			2	Air blast		0.05	
10	20	110			"	"		0.06	
20	30	135			"	"		0.08	
30	40	152			"	"		0.05	
40	50	137			"	"		0.04	
50	60	80			8	"		0.02	
60	70	143			6	"		0.03	
70	80	100			6	"		0.02	
80	90	32			2	water circuitn.		0.08	
90	100	30			2	1/16" split "		0.25	
100	110	40			6	"	100	1.64	
110	120	27			"	"	0.98	1.46	
120	130	35			"	"	4'	0.51	
130	140	19			2	"	140	0.33	
		HOLE STOPPED DUE TO INTERSECTING							
		EXCESSIVE GROUND WATER FLOW IN							
		OLD WORKINGS.							
0	140	4½" DIA BIT							

MINES EXPLORATION PROPRIETARY LIMITED

PERCUSSION & ROTARY DRILL LOG

KAPUNDA S.A.

CO-ORDS LINE 20N. 250E MACHINE SCHRAMM (B.H.S)

COMMENCED 28.4.66 DRILLER C.GOOD

COMPLETED 30.4.66 SAMPLER _____

HOLE Nº KV15

R.L. 126.00'

DEPTH		RECOVERY			COLOUR	Recovery	Remarks	ASSAYS	
From'	To'	Weight lbs	Moisture	% Rec				% Cu	Total Carb
0	4	NO RECOVERY							
4	10	77			2	Air blast	0.57 4	0.86	
10	20	85			2	"	18 20	0.40	
20	30	83			4	"		0.14	
30	40	131			"	"		0.16	
40	50	100			"	"		0.17	
50	58	87			"	"		0.12	
58	70	4½			"	water circultn. 1/16" split		0.03	
70	30	4			"	"		0.01	
80	90	3½			3	"		0.13	
90	100	2			7	"		0.01	
100	110	3½			"	"		0.08	
110	120	3½			"	"		0.35	
120	130	3			"	"		0.36	
130	140	3			"	"		0.22	
140	150	3			"	"		0.19	
150	160	3½			"	"		0.14	
160	170	4			"	"		0.36	
170	180	3½			"	"		0.36	
180	190	3½			"	"		0.34	
190	200	3			"	"		0.18	
200	210	4½			"	"	200	0.40	
210	220	3½			"	"		0.60	
220	230	4			"	"		0.47	
230	240	4½			"	"	0.58	0.46	
240	250	3½			"	"	20'	0.61	
250	260	3½			"	"		0.24	
260	270	3½			"	"		0.20	
270	280	3½			"	"	280	1.70	
280	290	5½			"	"		0.16	
290	300	6½			"	"		0.20	
0	58	4½" DIA BIT							
58	30	2 15/16" DIA BIT							

MINES EXPLORATION PROPRIETARY LIMITED

PERCUSSION & ROTARY DRILL LOG

KAPUNDA S.A.

CO-ORDS LINE 20N, 00 MACHINE SCHRAMM (B.H.S.)

COMMENCED 6.5.66 DRILLER C. GOOD

COMPLETED 10.5.66 SAMPLER

HOLE Nº KV16

R.L. 125.31'

DEPTH		RECOVERY			COLOUR	Recovery	Remarks	ASSAYS	
From'	To'	Weight lbs	Moisture	% Rec				% Cu	Total Carb
0	4	No recovery				Air blast			
4	10	76			2	"		0.06	
10	20	106			"	"		0.03	
20	30	130			"	"		0.04	
30	40	130			2 & 4	"		0.06	
40	50	126			4 & 5	"		0.05	
50	60	70			1, 2, & 8	"		0.07	
60	67'6"	No recovery				water circultn. 1/16" split.cavity		-	
67'6"	70	½			3	"		0.07	
70	80	2			"	"		0.07	
80	90	2½			"	"		0.03	
90	100	2			"	"		0.14	
100	110	2½			"	"		0.13	
110	120	3			"	"		0.07	
120	130	2½			"	"		0.06	
130	140	2½			"	"		0.09	
140	150	2½			"	"		0.04	
150	160	2½			"	"		0.04	
160	170	3			"	"		0.05	
170	180	4			"	"		0.04	
180	190	3½			6	"		0.65	
190	200	4			7	"		0.87	
200	210	4			"	"		0.34	
210	220	3½			"	"		0.36	
220	230	3			"	"		0.30	
230	240	4			6	"		0.11	
240	250	4			7	"		0.11	
250	260	3½			7	"		0.09	
260	270	5½			3, 6, & 7	"		0.23	
270	280	5			6	"		0.07	
280	290	5½			6	"		0.09	
290	300	3½			7	"		0.09	
8	60	4½" DIA BIT							
60	300	2 15/16" DIA BIT							

180
0.50
50'
230

EXPLORATION PROPRIETARY LIMITED

PERCUSSION & ROTARY DRILL LOG

KAPUNDA S.A.

CO-ORDS LINE 20N, 100E MACHINE SCHRAMM (B.H.S.) HOLE No KV17

COMMENCED 3.5.66 DRILLER C. GOOD

COMPLETED 5.5.66 SAMPLER _____ R.L. 123.01'

DEPTH		RECOVERY			COLOUR	Recovery	Remarks	ASSAYS	
From'	To'	Weight lbs	Moisture	% Rec				% Cu	Total Carb
0	4	No recovery							
4	10	60			2	Air blast		0.06	
10	20	102			3	"		0.09	
20	30	131			2& 4	"		0.24	
30	40	106			2& 4	"		0.09	
40	50	118			4	"		0.06	
50	60	110			3	"		0.05	
60	65	2			3	water circultn 1/16" split		0.07	
65	87	No recovery					cavity	N.S.	
87	90	½			3	"		0.23	
90	94'6"	No recovery				"	cavity	N.S.	
94'6"	100	2½			3	"	5.5 → 0.58	0.58	
100	110	No recovery				"	cavity	N.S.	
110	115	4			3	"		0.15	
		Hole abandoned due to cavities							
0	60	4½" DIA BIT							
60	115	2 15/16" DIA BIT							

PERCUSSION & ROTARY DRILL LOG

KAPUNDA S.A.

CO-ORDS LINE 20N, 200E MACHINE SCHRAMM (B.H.S.)

COMMENCED 1.5.66 DRILLER C. GOOD

COMPLETED 3.5.66 SAMPLER _____

HOLE No KV18

R.L. 123.38'

DEPTH		RECOVERY			COLOUR	Recovery	Remarks	ASSAYS	
From'	To'	Weight lbs	Moisture	% Rec				% Cu	Total Carb
0	8	No recovery				Air Blast			
8	10	8			4	"		0.16	
10	20	88			3 & 4	"		0.17	
20	30	102			"	"		0.04	
30	40	94			"	"		0.02	
40	50	102			"	"		0.01	
50	57	60			"	"	No recov. 61'-67'	0.01	
57	70	½			"	WATER 1/16" SPLIT		0.01	
70	80	2			"			0.01	
80	90	2½			"			0.01	
90	100	1½			3		No recov. 98'-102'	0.04	
100	110	1½			3			0.04	
110	120	2½			3 & 7			0.09	
120	130	2½			7			0.28	
130	140	2			6		0.45 130 / 10' 140	0.45	
140	150	2½			7			0.20	
150	160	2			6			0.34	
160	170	3			7			0.09	
170	180	3			"			0.21	
180	190	3			"			0.28	
190	200	3½			"			0.13	
200	210	3½			"			0.13	
210	220	2½			"			0.20	
220	230	4½			"			0.24	
230	240	4			"			0.07	
240	250	3½			"			0.09	
250	260	3			"			0.07	
260	270	3			"			0.24	
270	280	3			"		0.99 270 / 10' 280	0.44	
280	290	4			"			0.07	
290	300	5			6			0.07	
0	57	4½" DIA BIT							
57	300	2 15/16" DIA BIT							

MINES EXPLORATION PROPRIETARY LIMITED

PERCUSSION & ROTARY DRILL LOG

KAPUNDA S.A.

CO-ORDS 20N 300E MACHINE Conrad

COMMENCED 18.6.66 DRILLER C. Good

COMPLETED 21.6.66 SAMPLER

HOLE Nº KV19

R.L. 123.01'

DEPTH From'	DEPTH To'	RECOVERY Weight lbs	RECOVERY Moisture	RECOVERY % Rec	COLOUR			ASSAYS % Cu	ASSAYS Total Carb
0	3	No Recovery				Air 4½" Dia bit.			
3	10	90			2	"	0.86 3	0.52	
10	20	94			2	"	17' 10	1.1	
20	30	86			4	"		0.23	
30	40	100			4	"		0.085	
40	50	96			2 & 4	"		0.085	
50	60	80			" "	"		0.04	
60	70	50			" "	Air	0.6 70	0.03	
70	80	3½			7	Water 2 15/16" dia Bit.	10' 80	0.60	
80	90	2¾			7	"		0.29	
90	100	4			7	"		0.05	
100	110	3½			7	"		0.26	
110	120	4½			7	"		0.22	
120	130	4			7	"	130	0.31	
130	140	4			6	"		0.59	
140	150	3½			7	"		0.39	
150	160	6½			7	"		0.83	
160	170	6½			6	"		0.68	
170	180	3½			7	"		0.31	
180	190	2¾			7	"	0.69 100'	0.58	
190	200	3			7	"		1.32	
200	210	2¾			7	"		0.52	
210	220	2¾			7	"		1.24	
220	230	2¼			7	"	220	0.46	
230	240	3½			7	"		0.28	
240	250	5½			7	"		0.40	
250	260	3½			7	"		0.26	
260	270	10			7	"	V. Slow drilling	0.16	
270	280	4½			7	"		0.18	
280	290	4½			7	"		0.35	
290	300	3½			7	"		0.28	

MINES EXPLORATION PROPRIETARY LIMITED

PERCUSSION & ROTARY DRILL LOG

KAPUNDA S.A.

T.D. 225

CO-ORDS 20N 500E MACHINE Conrad

COMMENCED 11.7.66 DRILLER C. Good

COMPLETED 29.7.66 SAMPLER

HOLE No KV21

R.L. 126.26'

DEPTH From'	DEPTH To'	RECOVERY Weight lbs	RECOVERY Moisture	RECOVERY % Rec	COLOUR	Recovery	ASSAYS % Cu	ASSAYS Total Carb
0	3	No recovery						
3	10	7½			2	Water circ. 1/16" split		KP
10	20	9			3	"	0.03	679
20	30	9½			6	"	0.24	
30	40	10			4	"	0.06	
40	50	12½			2	"	0.04	
50	60	11½			4	"	0.04	
60	70	9			4	"	0.06	
70	80	11			3	"	0.10	
80	90	13			3	"	0.31	
90	100	9			3	"	0.31	
100	110	10½			3	"	0.36	
110	120	11			3	"	0.20	
120	130	12			3	"	0.21	
130	140	11½			3	"	0.21	
140	150	11½			3	"	0.13	
150	160	12			3	"	0.22	
160	170	13			4	"	0.30	
170	180	14			4	"	0.28	
180	190	20			2	"	0.20	
190	200	5			7	" Fresh siltstone at 200'	0.11	
200	210	4½			7	"	0.23	
210	220	4			3	"	0.13	
220	225	3			6	"	0.23	KP70C
						8'	2.6	701
		2 15/16" DIA BIT						

MINES EXPLORATION PROPRIETARY LIMITED

PERCUSSION & ROTARY DRILL LOG

KAPUNDA S.A.

CO-ORDS 20N , 600E MACHINE Conrad

COMMENCED 30.7.66 DRILLER C. Good

COMPLETED 2.8.66 SAMPLER

HOLE NO KV22

R.L. 130.93'

DEPTH From'	DEPTH To'	RECOVERY Weight No	RECOVERY Moisture lbs	RECOVERY % Rec Recovery	COLOUR	Recovery		ASSAYS % Cu	ASSAYS Total Carb
0	3								
3	10	8			1	Water circ 1/16" split		0.03	KP 702
10	20	7			8	"		0.07	
20	30	6½			2	"		0.06	
30	40	5½			2	"		0.34	
40	50	7½			2	"		0.19	
50	60	9			2	"		0.12	
60	70	4			2	"		0.23	
70	80	1			6	"		0.26	
80	90	3			6	"		0.06	
90	100	5½			7	"	90	0.34	100'
100	110	4			6	"		1.6	
110	120	1			6	"		1.3	
120	125	No sample			-		120		
		2 15/16" DIA BIT							

[illegible] EXPLORATION PROPRIETARY LIMITED

PERCUSSION & ROTARY DRILL LOG

KAPUNDA S.A.

CO-ORDS LINE 20N, 710E MACHINE BOYLES HOLE No KV23

COMMENCED 3.5.66 DRILLER Foundation Eng.

COMPLETED 7.5.66 SAMPLER _____ R.L. 137.74'

DEPTH		RECOVERY			COLOUR	Recovery	Remarks	ASSAYS	
From'	To'	Weight lbs	Moisture	% Rec				% Cu	Total Carb
0	10	106			4 & 5	Air blast		0.01	
10	20	108			2 & 3	"		0.005	
20	30	103			6	"		0.005	
30	40	116			3 & 7	"		0.005	
40	50	125			3	"		0.01	
50	60	117			4	"		0.005	
60	70	115			4 & 6	"		0.005	
70	80	120			4 & 8	"		0.005	
80	90	122			8	"		0.005	
90	95	32			"	"	))	) 90'-100'	
95	100	2½			"	water circultn. 1/16" split	) comp-) osite) sample	0.01	
100	110	3			"	"		0.005	
110	120	3½			"	"		0.005	
120	130	2½			"	"		0.005	
130	140	¼			5	"		0.01	
140	150	3			8	"		0.005	
150	160	3			"	"		0.005	
160	170	3½			"	"		0.01	
170	180	4			"	"		0.005	
180	190	5			"	"		0.005	
190	200	4½			"	"		0.005	
200	210	7			"	"		0.01	
210	220	6			"	"		0.01	
220	230	6			"	"		0.02	
230	240	13			"	"		0.01	
240	250	23			"	"		0.04	
						Hole stopped by contractor			
0	95	4½" DIA BIT							
95	250	2 15/16" DIA BIT							

MINES EXPLORATION PROPRIETARY LIMITED

PERCUSSION & ROTARY DRILL LOG

KAPUNDA S.A.

CO-ORDS LINE 10N, 400+50E MACHINE CONRAD

HOLE Nº KV 27

COMMENCED 26.1.67 DRILLER Rotary Drilling Co.

COMPLETED 26.1.67 SAMPLER _____ R.L. 100'

DEPTH From'	DEPTH To'	RECOVERY lbs Weight	RECOVERY Moisture	RECOVERY % Rec	COLOUR	Recovery	Remarks	ASSAYS % Cu	ASSAYS Total Carb
		0-6	12		1	Water			
0	10	6-10	3		2	1/16 split		0.31	
10	20	5			3	"		0.37	
20	30	5½			3	"		0.06	
30	40	4			3	"		0.04	
40	50	4½			3	"		0.06	
50	60	5½			3	"		0.03	
60	70	6			3 & 7	"		0.36	60
70	80	5½			7	"	70'	1.33	
80	90	5			7	"		0.75	
90	100	6			7	"		0.36	
100	110	4½			7	"	1/8	0.58	
110	120	6			7	"	120	0.35	
120	130	6			7	"		0.24	
130	140	5			7	"		0.43	
140	150	6			7	"		0.28	
150	160	6			7	"	150	0.39	
160	170	7			7	"	1/16	0.41	
170	180	7			6	"		0.99	
180	190	7			6	"		1.57	
190	200	6½			7	"		0.99	
200	210	6½			7	"		1.04	
210	220	6			7	"		0.62	
220	230	6			7	"		0.58	
230	240	8			7	"	230	0.29	
240	250	7			7	"		0.34	
250	260	7½			7	"		0.36	
260	270	5½			7	"		0.36	
270	280	5			7	"		0.50	
280	290	11			7	"		0.38	
290	300	14			7	"		0.34	
0	6	4¼" DIA BIT							
6	300	2 15/16" DIA BIT							

PERCUSSION & ROTARY DRILL LOG

KAPUNDA S.A.

CO-ORDS LINE 10N, 300+50E MACHINE CONRAD

HOLE No KV 28

COMMENCED 25.1.67 DRILLER Rotary Drilling Co.

COMPLETED 26.1.67 SAMPLER R.L. 98'

DEPTH From'	DEPTH To'	RECOVERY lbs Weight	RECOVERY Moisture	RECOVERY % Rec	COLOUR	Recovery		ASSAYS % Cu	ASSAYS Total Carb
		0-6 -18				Water			
0	10	6-10-1½			2	1/16 split	0.56	0.47	
10	20	3			2	"	20	0.66	
20	30	5			2	"	20	0.22	
30	40	4			2	"		0.02	
40	50	4½			5	"		0.03	
50	60	3½			6	"		0.01	
60	70	3½			6	"		0.01	
70	80	3			6	"		0.01	
80	90	3½			6	"		0.01	
90	100	3			6	"		0.04	
100	110	3½			6	"		0.08	
110	120	4			6	"		0.05	
120	130	2½			6	"		0.08	
130	140	3½			7	"		0.43	
140	150	3			7	"		0.18	
150	160	2½			7	"		0.13	
160	170	4½			6	"		0.03	
170	180	4½			6	"		0.04	
180	190	4			6	"		0.05	
190	200	4½			6	"		0.03	
200	210	5			6	"		0.07	
210	220	4			6	"		0.13	
220	230	10			6	"		0.30	
230	240	7			6	"		0.09	
240	250	8			6	"		0.09	
250	260	5			7	"		0.14	
260	270	4			7	"		0.18	
270	280	6			6	"		0.09	
280	290	15			6	"		0.14	
290	300	7			6	"		0.20	
0	6	4¼" DIA BIT							
6	300	2 15/16" DIA BIT							

PERCUSSION & ROTARY DRILL LOG

KAPUNDA S.A.

CO-ORDS LINE 10N, 300+50E MACHINE CONRAD

HOLE No KV 28

COMMENCED 25.1.67 DRILLER Rotary Drilling Co.

COMPLETED 26.1.67 SAMPLER _____ R.L. 98'

DEPTH From'	DEPTH To'	RECOVERY lbs Weight	RECOVERY Moisture	RECOVERY % Rec	COLOUR	Recovery		ASSAYS % Cu	ASSAYS Total Carb
		0-6 -18				Water			
0	10	6-10-1½			2	1/16 split	0-10	0.47	
10	20	3			2	"	10-20	0.66	
20	30	5			2	"		0.22	
30	40	4			2	"		0.02	
40	50	4½			5	"		0.03	
50	60	3½			6	"		0.01	
60	70	3½			6	"		0.01	
70	80	3			6	"		0.01	
80	90	3½			6	"		0.01	
90	100	3			6	"		0.04	
100	110	3½			6	"		0.08	
110	120	4			6	"		0.05	
120	130	2½			6	"		0.08	
130	140	3½			7	"		0.43	
140	150	3			7	"		0.18	
150	160	2½			7	"		0.13	
160	170	4½			6	"		0.03	
170	180	4½			6	"		0.04	
180	190	4			6	"		0.05	
190	200	4½			6	"		0.03	
200	210	5			6	"		0.07	
210	220	4			6	"		0.13	
220	230	10			6	"		0.30	
230	240	7			6	"		0.09	
240	250	8			6	"		0.09	
250	260	5			7	"		0.14	
260	270	4			7	"		0.18	
270	280	6			6	"		0.09	
280	290	15			6	"		0.14	
290	300	7			6	"		0.20	
0	6	4¼" DIA BIT							
6	300	2 15/16" DIA BIT							

...EXPLORATION PROPRIETARY LIMITED

PERCUSSION & ROTARY DRILL LOG

KAPUNDA S.A.

CO-ORDS LINE 10N, 200+50E MACHINE CONRAD

HOLE No KV 29

COMMENCED 24.1.67 DRILLER Rotary Drilling Co.

COMPLETED 25.1.67 SAMPLER _____ R.L. 100'

DEPTH From'	DEPTH To'	lbs RECOVERY Weight	Moisture	% Rec	COLOUR	Recovery		ASSAYS % Cu	Total Carb
0	10	18			1	Air & water	2.88/10	0.88	
10	20	2			2	Water 1/16 split		0.07	
20	30	5			2	"		0.16	
30	40	3½			3 & 4	"		0.04	
40	50	3			3 & 4	"		0.02	
50	60	4			4	"		0.01	
60	70	4			3	"		0.01	
70	80	4			3	"		0.02	
80	90	4			5	"		0.02	
90	100	4			6	"	90	0.40	
100	110	4			6	"		0.49	
110	120	3½			6	"		0.31	
120	130	4			6	"	60'	1.45	
130	140	5½			6	"		0.83	
140	150	8			6	"	150	0.34	
150	160	3½			6	"		0.05	
160	170	4			6	"		0.03	
170	180	4½			6	"		0.06	
180	190	4½			6	"		0.07	
190	200	4½			6	"		0.05	
200	210	4			6	"		0.06	
210	220	5			6	"		0.29	
220	230	5			6	"		0.05	
230	240	6			6	"		0.24	
240	250	6½			6	"		0.28	
250	260	5			6	"		0.06	
260	270	5			6	"		0.03	
270	280	6½			6	"		0.06	
280	290	5½			6	"		0.03	
290	300	5½			6	"		0.06	
0	10	4¼" DIA BIT							
10	300	2 15/16" DIABIT							

MINES EXPLORATION PROPRIETARY LIMITED

PERCUSSION & ROTARY DRILL LOG

KAPUNDA S.A.

CO-ORDS LINE 5N, 300E MACHINE SCHRAMM

HOLE No KV 30

COMMENCED 15.12.66 DRILLER Rotary Drilling Co.

COMPLETED 20.12.66 SAMPLER R.L. 88'

DEPTH From'	DEPTH To'	RECOVERY Weight lbs	RECOVERY Moisture	RECOVERY % Rec	COLOUR	Recovery	Remarks	ASSAYS % Cu	ASSAYS Total Carb
0	5	4	Grab sample.		1			0.10	
5	10	2			2	Water 1/16 split		0.06	
10	20	3½			3	"		0.04	
20	30	3			3	"		0.04	
30	40	2			3	"		0.07	
40	50	2			3	"		0.07	
50	60	1½			3	"		0.05	
60	70	2¼			3	"		0.08	
70	80	3			6	"		0.10	
80	90	2¼			6	"		0.09	
90	100	4¼			6	"		0.07	
100	110	4¼			6	"		0.06	
110	120	5			6	"		0.06	
120	130	4			6	"		0.07	
130	140	7½			8	"		0.10	
140	150	7½			8	"		0.25	
150	160	16			8	"		0.13	
160	170	15			8	"		0.14	
170	180	8			8	"		0.11	
180	190	8½			8	"		0.13	
190	200	9			8	"		0.11	
200	210	8½			8	"		0.09	
210	220	8			8	"		0.11	
220	230	12			8	"		0.13	
230	240	10			8	"		0.09	
240	250	10½			8	"		0.11	
250	260	8			8	"		0.09	
260	270	9			8	"		0.09	
270	280	8			8	"		0.08	
280	290	9			8	"		0.11	
290	300	9			8	"		0.09	
		2 15/16" DIABIT							

... EXPLORATION PROPRIETARY LIMITED

PERCUSSION & ROTARY DRILL LOG

KAPUNDA S.A.

CO-ORDS LINE 5N 400E MACHINE SCHRAMM

HOLE No KV 31

COMMENCED 20.12.66 DRILLER Rotary Drilling Co.

COMPLETED 23.12.66 SAMPLER _____ R.L. 87'

DEPTH From'	DEPTH To'	RECOVERY Weight lbs	RECOVERY Moisture	RECOVERY % Rec	COLOUR	Recovery		ASSAYS % Cu	ASSAYS Total Carb
0	10	15			3	Air		0.08	
10	20	11			3	"		0.04	
20	30	9			3	"		0.06	
30	40	2½			3	Water 1/16 split		0.04	
40	50	1½			3	"		0.07	
50	60	2			3	"		0.06	
60	70	1½			2	"		0.23	
70	80	2			5	"		0.10	
80	90	3			5	"		0.07	
90	100	2			5 & 6	"		0.12	
100	110	2½			5 & 6	"		0.10	
110	120	3			6	"		0.07	
120	130	3			3	"		0.05	
130	140	4			3	"		0.05	
140	150	3			3	"	140	0.31	
150	160	4			6	"		0.62	
160	170	5			6	"		0.54	
170	180	5			6	"		0.17	
180	190	7			6	"	0.5° / 90'	0.44	
190	200	4½			3	"		0.59	
200	210	3			3	"		0.39	
210	220	4			7	"		0.85	
220	230	3			6	"		0.61	
230	240	4½			6	"	230	0.27	
240	250	3			6	"		0.12	
250	260	4½			6	"		0.10	
260	270	5½			6	"		0.20	
270	280	4			6	"		0.09	
280	290	4			6	"		0.10	
290	300	7			6	"		0.09	
0	30	4½" DIA BIT							
30	300	2 15/16" DIA BIT							

MINES EXPLORATION PROPRIETARY LIMITED

PERCUSSION & ROTARY DRILL LOG

KAPUNDA S.A.

LINE 5N + 10'

CO-ORDS 400 + 85E MACHINE SCHRAMM

HOLE No KV 32

COMMENCED 23.12.66 DRILLER Rotary Drilling Co.

COMPLETED 3. 1.66 SAMPLER R.L. 88'

DEPTH From'	DEPTH To'	RECOVERY Weight lbs	RECOVERY Moisture	RECOVERY % Rec	COLOUR	Recovery	Remarks	ASSAYS % Cu	ASSAYS Total Carb
0	10	6			2	0-5 Air 5-10Water	0.45	0.45	
10	20	1½			2	Water 1/16 split		0.08	
20	30	1½			2	"		0.26	
30	40	2			2	"		0.04	
40	50	1½			2	"	No sample 56'-60'	0.07	
50	60	1½			2	"		0.20	
60	70	2			3	"		0.10	
70	80	2½			3	"		0.08	
80	90	3			3	"		0.16	
90	100	3½			3	"	90	1.14	
100	110	3			3	"		1.20	
110	120	4			7	"		0.70	
120	130	3			7	"	2.53	0.37	
130	140	4			7	"	90	0.26	
140	150	3½			7	"		0.39	
150	160	1½			7	"	No sample 157'-165'	0.29	
160	170	3			7	"		0.79	
170	180	2			7	"	180	0.43	
180	190	3			7	"		0.09	
190	200	2½			7	"		0.10	
200	210	4			7	"		0.13	
210	220	2½			7	"		0.10	
220	230	3			7	"		0.07	
230	240	3½			7	"		0.05	
240	250	3			7	"		0.08	
250	260	3			7	"		0.08	
260	270	½			7	"		0.06	
270	280	2			7	"		0.06	
280	290	3			7	"		0.10	
290	300	1			7	"		0.13	
0	5	4½" DIA BIT							
5	300	2 15/16" DIA BIT							

MINES EXPLORATION PROPRIETARY LIMITED

PERCUSSION & ROTARY DRILL LOG

KAPUNDA S.A.

CO-ORDS LINE 5N, 700E MACHINE SCHRAMM

HOLE No KV 34

COMMENCED 4.1.67 DRILLER Rotary Drilling Co.

COMPLETED 5.1.67 SAMPLER _____ R.L. 90'

DEPTH		RECOVERY			COLOUR	Recovery		ASSAYS	
From'	To'	Weight lbs	Moisture	% Rec				% Cu	Total Carb
0	10	10			2	0-5 Air 5-10Water		0.38	
10	20	3½			3	Water 1/16 split		0.15	
20	30	2½			3 & 4	"		0.08	
30	40	3			3 & 4	"		0.10	
40	50	3			3 & 4	"		0.18	
50	60	3			3 & 4	"	50	0.34	
60	70	2½			2	"		0.49	
70	80	2½			3	"		0.51	
80	90	2			7	"		1.04	
90	100	2½			7	"		0.56	
100	110	2½			7	"		1.07	
110	120	2½			7	"		0.74	
120	130	3			7	"		0.56	
130	140	4			7	"		0.50	
140	150	5			7	"	185	0.55	
150	160	6			7	"		0.56	
160	170	6			7	"		0.38	
170	180	6			7	"		0.44	
180	190	10			7	"		0.53	
190	200	5½			7	"		0.32	
200	210	9			7	"		0.33	
210	220	16			7	"		0.35	
220	230	4½			7	"	230	0.49	
0	5	4½" DIA BIT							
5	230	2 15/16" DIA BIT							

...EXPLORATION PROPRIETARY LIMITED

PERCUSSION & ROTARY DRILL LOG

KAPUNDA S.A.

CO-ORDS LINE 5N, 900E MACHINE SCHRAMM

HOLE NO KV 36

COMMENCED 10.1.67 DRILLER Rotary Drilling Co.

COMPLETED 16.1.67 SAMPLER R.L. 91'

DEPTH From'	DEPTH To'	RECOVERY Weight lbs	RECOVERY Moisture	RECOVERY % Rec	COLOUR	Recovery	Remarks	ASSAYS % Cu	ASSAYS Total Carb
		0-5-11lbs				0-5 Air			
0	10	17 5-10 6 lbs			1	5-10Water		0.08	
						1/16 split			
10	20	6½			2	"		0.21	
20	30	8½			3	"		0.19	
30	40	2			3	"	No sample 35'-41'	0.16	
40	50	3			7 & 3	"		0.21	
50	60	4			3 & 7	"		0.10	
60	70	4			6	"		0.05	
70	80	5½			6	"		0.02	
80	90	5			6	"		0.06	
90	100	5			7	"		0.10	
100	110	5½			6	"		0.10	
110	120	6½			6	"		0.17	
120	130	6½			7	"	120	0.58	
130	140	12			7	"	0.73	0.29	
140	150	13			7	"	60'	0.61	
150	160	13			6	"		0.54	
160	170	1½			6	"	No sample 165'-170'	1.42	
170	180	4½			7	"		0.85	
180	190	4½			7	"	180	0.13	
190	200	5			7	"		0.30	
200	210	5½			3 & 6	"		0.30	
210	220	1½			3	204' - Hammer		0.17	
220	230	2½			6	1/16 split		0.37	
230	240	2			6	"		0.17	
240	250	2			6	"		0.14	
250	260	3½			6	"		0.30	
260	270	25 ?			6	"	Very slow	0.33	
270	280	7			6	"	drilling	0.29	
280	290	9			6	"	Bag not marked	0.18	
290	292	1			6	"	Hole stopped	0.23	
0	5	4½" DIA BIT							
5	292	2 15/16" DIA BIT							

MINES EXPLORATION PROPRIETARY LIMITED

PERCUSSION & ROTARY DRILL LOG

KAPUNDA S.A.

CO-ORDS LINE 00, 200E MACHINE CONRAD

COMMENCED 17.1.67 DRILLER Rotary Drilling Co.

COMPLETED 18.1.67 SAMPLER _____ R.L. 77'

HOLE NO KV 38

DEPTH From'	DEPTH To'	lbs RECOVERY Weight	Moisture	% Rec	COLOUR	Recovery	ASSAYS % Cu	ASSAYS Total Carb
		0-6 - 30lbs				0-6 water		
0	10	6-10 - 21lbs			1	6-10 water 1/16 split	0.02	
10	20	5			2	"	0.14	
20	30	3			2	"	0.08	
30	40	3			2	"	0.10	
40	50	2½			2	"	0.04	
50	60	3½			5	"	0.04	
60	70	3			5	"	0.05	
70	80	2½			5	"	0.05	
80	90	6			5	"	0.07	
90	100	6			5	"	0.07	
100	110	7			5	"	0.04	
110	120	4			3 & 5	"	0.04	
120	130	5			3 & 4	"	0.05	
130	140	5			3 & 4	"	0.04	
140	150	5			3 & 5	"	0.04	
150	160	5½			3	"	0.04	
160	170	7			3	"	0.06	
170	180	9			3	"	0.04	
180	190	13			3	"	0.04	
190	200	5			3	"	0.04	
200	210	11			3	"	0.06	
210	220	6			3	"	0.08	
220	230	14			3	"	0.04	
230	240	8			3	"	0.04	
240	250	9			3	"	0.04	
250	260	7			3	"	0.04	
260	270	8			3	"	0.04	
270	280	4			3	"	0.04	
280	290	11			3	"	0.04	
290	300	9			3	"	0.06	
0	6	4¼" DIA BIT						
6	300	2 15/16" DIA BIT						

MINES EXPLORATION PROPRIETARY LIMITED

PERCUSSION & ROTARY DRILL LOG

KAPUNDA S.A.

CO-ORDS Line 00, 300E MACHINE CONRAD

COMMENCED 12.1.67 DRILLER Rotary Drilling

COMPLETED 13.1.67 SAMPLER

HOLE Nº KV 39

R.L. 77'

DEPTH From'	DEPTH To'	lbs RECOVERY Weight	Moisture	% Rec	COLOUR	RECOVERY		ASSAYS % Cu	Total Carb
0	10	0-5 2 5-10 1½			2	0-5 Air 1/16 Split Water		0.16	
	20	4			2	"		0.06	
	30	3½			2	"		0.09	
	40	4			3	"		0.07	
	50	5			3	"		0.05	
	60	4			3	"		0.03	
	70	3½			3	"		0.02	
	80	2½			3	"		0.03	
	40	2½			3	"		0.03	
	100	1½			3	"		0.03	
	110	3			3	"		0.03	
	120	2			3	"		0.06	
	130	3			3	"		0.05	
	140	3			3	"		0.07	
	150	1½			3	"		0.03	
	160	1½			3	"		0.03	
	170	1½			3	"	Part sample lost	0.03	
	180	2			3	"		0.03	
	190	2½			3	"		0.04	
	200	3			3	"		0.18	
	210	3			3	"		0.07	
	220	2½			3	"		0.03	
	230	2½			3	"		0.03	
	240	1½			3	"		0.07	
	250	2½			3	"		0.05	
	260	2½			3	"		0.11	
	270	3½			3	"		0.23	
	280	3			6	"		0.24	
	290	3½			6	"		0.11	
	300	3			7	"		0.04	
0	5	⌀ 4¼" DIA BIT							
5	⌀ 300	2 15/16" DIA BIT							

MINES EXPLORATION PROPRIETARY LIMITED

PERCUSSION & ROTARY DRILL LOG

KAPUNDA S.A.

CO-ORDS LINE 00, 400E MACHINE CONRAD

COMMENCED 18.1.67 DRILLER Rotary Drilling

COMPLETED 19.1.67 SAMPLER _____ R.L. 78'

HOLE No KV 40

DEPTH From'	DEPTH To'	lbs RECOVERY Weight	Moisture	% Rec	COLOUR	RECOVERY		ASSAYS % Cu	Total Carb
0	10	0-6 12 6-10 3			2	Air 0-6 1/16 Split Water		0.13	
10	20	2½			2	"		0.07	
20	30	3			3	"		0.07	
30	40	3½			3	"		0.02	
40	50	2			3	"		0.02	
50	60	2			3	"		0.02	
60	70	4			3	"		0.01	
70	80	2			3	"		0.02	
80	90	3½			3	"		0.27	
90	100	2			7	"	90	0.53	
100	110	2½			6	"		1.37	
110	120	2½			6	"	120	0.38	
120	130	4			7	"		0.33	
130	140	2½			7	"		0.29	
140	150	2½			7	"		0.17	
150	160	3½			7	"	150	1.75	
160	170	2½			7	"	0.95 30'	0.79	
170	180	2½			7	"	180	0.33	
180	190	3½			7	"		0.19	
190	200	3			7	"		0.20	
200	210	2			7	"		0.25	
210	220	3			7	"		0.18	
220	230	2			7	"		0.53	
230	240	3½			7	"		0.17	
240	250	3½			7	"		0.15	
250	260	7½			7	"		0.24	
260	270	7½			7	"		0.23	
270	280	5½			7	"		0.20	
280	290	9			7	"		0.30	
290	300	4½			7	"		0.09	
0	6	4¼" DIA BIT							
6	300	2 15/16" DIA BIT							

MINES EXPLORATION PROPRIETARY LIMITED

PERCUSSION & ROTARY DRILL LOG

KAPUNDA S.A.

CO-ORDS Line 00, 500E MACHINE CONRAD

COMMENCED 20.1.67 DRILLER Rotary Drilling

COMPLETED 21.1.67 SAMPLER _____ R.L. 771'

HOLE NO KV 41

DEPTH From'	DEPTH To'	lbs RECOVERY Weight	Moisture	% Rec	COLOUR	RECOVERY		ASSAYS % Cu	ASSAYS Total Carb
		0-6 6							
0	10	6-10 1½			1	Air 0-6 1/16 Split Water		0.15	
10	20	7			2	"		0.14	
20	30	4			2	"		0.07	
30	401½	1½			2	"		0.08	
40	50	6			2	"		0.27	
50	60	4			3	"	50	0.79	
60	70	3½			3	"		0.34	
70	80	1			7	"	Part sample lost.	0.39	
80	90	4½			7	"	0.48 / 50'	0.55	
90	100	4			7	"	100	0.35	
100	110	3½			7	"		0.20	
110	120	5			7	"		0.20	
120	130	5			7	"		0,18	
130	140	4			7	"		0.31	
140	150	4			7	"		0.12	
150	160	5			7	"		0.11	
160	170	5½			7	"		0.21	
170	180	3			7	"		0.34	
180	190	5½			7	"		0.20	
190	200	5			7	"		0.28	
200	210	5			7	"		0.33	
210	220	4			7	"	210	0.53	
220	230	5			7	"	0.5 / 30'	0.38	
230	240	5			7	"	240	0.61	
240	250	4½			7	"		0.28	
250	260	4			7	"		0.28	
260	270	5			7	"		0.23	
270	280	3½			7	"		0.22	
280	290	5			7	"		0.25	
290	300	6			7	"		0.21	
0	6	4¼" DIA BIT							
6	300	2 15/16" DIA BIT							

PERCUSSION & ROTARY DRILL LOG

KAPUNDA S.A.

CO-ORDS Line 00, 600E MACHINE Schramm

COMMENCED 22.1.67 DRILLER Rotary Drilling

COMPLETED 23.1.67 SAMPLER

HOLE No KV 42

R.L. 75'

DEPTH		RECOVERY			COLOUR	RECOVERY		ASSAYS	
From'	To'	Weight lbs	Moisture	% Rec				% Cu	Total Carb
0	10	22			2	1/16 split water		0.03	
10	20	3½			3	"		0.03	
20	30	3½			7	"		0.05	
30	40	5			7	"		0.02	
40	50	3½			7	"		0.07	
50	60	4			7	"		0.04	
60	70	3			6	"		0.04	
70	80	4½			6	"		0.02	
80	90	4½			6	"		0.13	
90	100	3½			6	"		0.17	
100	110	4½			6	"		0.21	
110	120	7			6	"		0.13	
120	130	5			6	"		0.07	
130	140	5½			6	"		0.03	
140	150	5½			6	"		0.02	
150	160	7			6	"		0.03	
160	170	7			6	"		0.03	
170	180	8			7	"		0.15	
180	190	12			7	"		0.15	
190	200	10			7	"		0.12	
200	210	9			7	"		0.07	
210	220	10			7	"		0.19	
220	230	9			7	"		0.08	
230	240	10			7	"		0.10	
240	250	17			7	"		0.09	
250	260	11			7	"		0.09	
260	270	14			7	"		0.08	
270	280	15			7	"		0.09	
280	290	19			7	"		0.07	
290	300	22			7	"		0.04	
0	10	4½" DIA BIT							
10	300	2 15/16" DIA BIT							

...EXPLORATION PROPRIETARY LIMITED

PERCUSSION & ROTARY DRILL LOG

KAPUNDA S.A.

CO-ORDS Line 00, 700E MACHINE Schramm HOLE No KV 43

COMMENCED 16.1.67 DRILLER Rotary Drilling

COMPLETED 18.1,67 SAMPLER _____ R.L. 78'

DEPTH		lbs RECOVERY			COLOUR	RECOVERY		ASSAYS	
From'	To'	Weight	Moisture	% Rec				% Cu	Total Carb
		0-3 4				Air			
0	10	3-10 6			1	1/16 Split Water		0.02	
10	20	7			1	"		0.02	
20	30	5½			3	"		0.12	
30	40	3½			7 & 3	"		0.04	
40	50	4½			7	"		0.03	
50	60	4			7	"		0.04	
50	70	4			7	"		0.08	
70	80	1			6	"		0.22	
80	90	1			6	"		0.07	
90	100	1½			6	"		0.04	
100	110	1			6	"		0.02	
110	120	1			6	"		0.02	
120	130	1½			6	"		0.07	
130	140	3½			6	"		0.02	
140	150	2			6	"		0.02	
150	160	3½			6	"		0.02	
160	170	4			7	"		0.04	
170	180	3½			7	"		0.07	
180	190	4½			6	"		0.11	
190	200	3½			7	"		0.13	
200	210	4			6	"		0.13	
210	220	6			6	"		0.07	
220	230	12			6	"	Caving hole	0.07	
230	240	4			6	"	"	0.04	
240	250	10			6	"	"	0.04	
250	260	15			6	"	"	0.03	

Hole Stopped - Caving 230'-260'.

0	3	4½" DIA BIT
3	260	2 15/16" DIA BIT

MINES EXPLORATION PROPRIETARY LIMITED

PERCUSSION & ROTARY DRILL LOG

KAPUNDA S.A.

CO-ORDS Line 5N, 1000E MACHINE SCHRAMM

COMMENCED 18.1.67 DRILLER Rotary Drilling

COMPLETED 19.1.67 SAMPLER _____ R.L. 89'

HOLE No KV 44

DEPTH		lbs RECOVERY			COLOUR	RECOVERY		ASSAYS	
From'	To'	Weight	Moisture	% Rec				% Cu	Total Carb
		0-4 7							
0	10	4-10 2			2	Air 1/16 Split	Water	0.01	
10	20	4			2	"		0.01	
20	30	1			3	"		0.01	
30	40	3			3	"		0.04	
40	50	4½			6	"		0.02	
50	60	1½			6	"		0.04	
60	70	1			6	"		0.03	
70	80	1½			6	"		0.01	
80	90	1½			6	"		0.01	
90	100	1			6	"		0.01	
100	110	1			6	"		0.05	
110	120	1			6	"		0.04	
120	130	1½			6	"		0.03	
130	140	3½			6	"		0.02	
140	150	5			6	"		0.01	
150	160	6			6	"		0.02	
160	170	4			6	"		0.01	
170	180	4			6	"		0.01	
180	190	7			6	Hammer?		0.01	
190	200	5			6	"		0.01	
200	210	5			6	"		0.01	
0	4	4½" DIA BIT							
4	210	2 15/16" DIAABIT							

PERCUSSION & ROTARY DRILL LOG

KAPUNDA S.A.

CO-ORDS Line 00, 800E MACHINE SCHRAMM

COMMENCED 29.1.67 DRILLER Rotary Drilling

COMPLETED 31.1.67 SAMPLER _____

HOLE Nº KV 45

R.L. 74'

DEPTH		RECOVERY			COLOUR	RECOVERY		ASSAYS	
From'	To'	Weight lbs	Moisture	% Rec				% Cu	Total Carb
0	10	12			1	1/16 split water		0.02	
10	20	2			2	"		0.02	
20	30	1½			3	"		0.02	
30	40	3½			3	"		0.02	
40	50	3			7	"		0.03	
50	60	3			7	"		0.03	
60	70	2			6	"		0.02	
70	80	2			6	"		0.03	
80	90	3			6	"		0.03	
90	100	3			6	"		0.02	
100	110	3			6	"		0.02	
110	120	3½			6	"		0.03	
120	130	3½			6	"		0.09	
130	140	3½			7	"		0.03	
140	150	4			6	"		0.02	
150	160	4			7	"		0.03	
160	170	3½			7	"		0.10	
170	180	4			7	"		0.20	
180	190	7			6	"		0.30	
190	200	13			7	"	V.slow Drilling	0.09	
200	210	22			7	"	Hammer	0.06	
210	220	15			7	"	"	0.11	
0	10	4½" DIA BIT							
10	220	2 15/16" DIA BIT							

APPENDIX IV.

AMDEL REPORTS NO'S MP 2686-65 and MP 415-66;
Petrological Reports of 4 drill core samples
from diamond drill hole No. KP1.

RESEARCH FOR INDUSTRY

C437

THE AUSTRALIAN MINERAL DEVELOPMENT LABORATORIES

CONYNGHAM STREET · PARKSIDE · SOUTH AUSTRALIA
TELEPHONE 791662 · TELEGRAMS 'AMDEL' ADELAIDE

Please quote this reference in your reply:
MP 3/6/2/0

13th July, 1965

Your reference:

√ INFORM X ACTION CIRCULATION	
14 JUL 1965	
BRL	
PSF	
JBR	
COH	
RTR	
RE	
DJL	
FILE	

Please return

The Manager,
Mines Exploration Pty. Ltd.,
PO Box 11,
CLOVELLY PARK, S.A.

REPORT MP2686-65

YOUR REFERENCE: Order No.530

MATERIAL: Drill cores (3)

IDENTIFICATION: KP1-240 ft 6 in, KP1-381 ft 6 in, KP1-394 ft.

DATE RECEIVED: 29/6/65

WORK REQUIRED: Petrological description

Kalgoorlie

Investigation and Report by: R. Townend

Officer in Charge, Mineralogy Section: H.W. Fander

H.W. Fander

P. Dixon
Acting Director.

PETROLOGY OF FOUR DRILL CORE SAMPLES

KP1 - 240 ft 6 in: TS16102: PS8824

This highly kaolinised sample was thin sectioned by impregnating with Araldite. The polished briquette was made from solids prepared by puddling off slimes, decanting and weighing solids (19.76% by weight).

The sample consists of a fine-grained sandstone, of silt grade (0.03-0.06 mm) with some feldspar, that has been extensively replaced by an 'isotropic' clay mineral, ?kaolin. The clastics form about 50% of the rock. A band of coarser quartz material (0.1 mm) is associated with a highly irregular opaque layer, 0.1 to 0.2 mm thick.

The polished briquette reveals considerable quantities of pyrite and neodigenite, with lesser amounts of chalcopyrite, and trace quantities of pyrrhotite and bornite. Pyrite form large (often 1.0 mm) subhedral to euhedral crystals, either free or in simple intergrowths with the mottled blue isotropic neodigenite. Blebs of pyrrhotite, bornite and chalcopyrite/neodigenite also occur as inclusions in the pyrite. Neodigenite is common as highly irregular grains, either monomineralic or containing chalcopyrite in all proportions up to 50/50. Chalcopyrite as fresh material is rare.

The Kaolinization associated with primary copper ores is typical of the inner zones of wall rock alteration, surrounding an igneous ore-body, especially the copper porphyry type.

KP1 - 381 ft 6 in: TS16103: PS8825

This is a fine-grained impure sandstone or clay lacking siltstone, with quartz and alkali feldspar as its primary clastic constituents, averaging between 0.01 and 0.03 mm. Opaque aggregates are scattered throughout the rock. Spherical coarse quartz aggregates are common, with ubiquitous rims of prismatic rutile (0.02 x 0.005 mm), and these may be of ?xenolithic origin. This rock is particularly rich in accessory minerals, particularly pale tourmaline, rutile, apatite and red biotite.

In the polished briquette a thick but irregular band of pyrite is present, which locally passes into chalcopyrite with alteration rims of neodigenite. Otherwise pyrite occurs as small anhedral grains scattered sparingly through the rock.

KP1 - 394 ft: TS16103: PS8826

This is a quartzose siltstone of very similar character to the previous specimen. It lacks the coarse quartz patches, and has more extensive opaques. These are associated with some slightly coarser quartz grains, and flakes of muscovite.

In polished section, pyrite is present in rough bands, up to 0.5 mm wide with associated finer grained pyrite in the adjacent siltstone. There is some minor intergrowth, of a simple nature, with chalcopyrite. Rutile is present in minor quantities.

nb:2

THE AUSTRALIAN MINERAL DEVELOPMENT LABORATORIES

CONYNGHAM STREET · PARKSIDE · SOUTH AUSTRALIA
TELEPHONE 791662 · TELEGRAMS 'AMDEL' ADELAIDE

C437

Please quote this reference in your reply:
MP 3/6/2/0

Your reference:

3rd September, 1965

The Manager,
Mines Exploration Pty. Ltd.,
PO Box 11,
CLOVELLY PARK, S.A.

Kapunda Metallics

REPORT MP415-66

YOUR REFERENCE:	Order No.549
MATERIAL:	Drill Core
IDENTIFICATION:	KP1, 789 feet
DATE RECEIVED:	6/8/65
WORK REQUIRED:	Petrological examination

Investigation and Report by: R. Townend.

Officer in Charge, Mineralogy Section: H.W. Fander

for H.W. Fander
P. Dixon
Acting Director.

PETROLOGY OF ONE DRILL CORE SPECIMEN

KP1: 789 ft: TS16412: PS8917

This is a dolomitic quartzite, with a fine-grained (<0.025 mm) closely packed granular texture, with the result that the primary constituents, dolomite (40%) and quartz, have mutually interfering boundaries. Plagioclase of sodic-calcic composition is a minor constituent, with sericite and accessory rutile. Pyrrhotite, and chalcopyrite are prominent in irregular discontinuous bands. The two sulphides occur as discrete crystals or in simple intergrowths, with individuals ranging between 0.1 and 0.2 mm. Some pyrrhotite has a finely mottled appearance due to alteration to ?pyrite. Allanite showing the usual brown-yellow colour zoning is commonly associated with the opaques.

nb:1

6

APPENDIX V.

AMDEL REPORTS NO'S MP 2352/67 and ADDENDUM TO REPORT NO. MP 2352/67

Mineralogical examination of rotary drilling samples from vertical drill holes No's:-

KV 27
KV 34
KV 35
KV 41
KV 19

RESEARCH FOR INDUSTRY

R.S.
Kapunda

THE AUSTRALIAN MINERAL DEVELOPMENT LABORATORIES

CONYNGHAM STREET · PARKSIDE · SOUTH AUSTRALIA
TELEPHONE 791662 · TELEGRAMS 'AMDEL' ADELAIDE

Please quote this reference in your reply:
MP 3/6/2/0
Your reference:

8th May, 1967

The Secretary,
Mines Exploration Pty Ltd,
PO Box 57,
CLOVELLY PARK, S.A.

REPORT MP 2352/67

YOUR REFERENCE:	Order No. 2352 dated 13/3/67
MATERIAL:	Rotary Drill Samples (73)
LOCALITY:	Kapunda, S.A.
IDENTIFICATION:	As listed.
DATE RECEIVED:	14/3/67
WORK REQUIRED:	Mineralogical examination for copper minerals

Investigation and Report by: R. Townend

Officer in Charge, Mineralogy Section: H.W. Fander

for H.W. Fander
P.A. Young
Director.

DETERMINATION OF COPPER MINERALIZATION IN ROTARY DRILL MATERIAL FROM KAPUNDA

Seventy-three rotary drilling samples were received. These were split into two, and half of each was deslimed. The deslimed material was examined by means of polished sections and grain mounts. The polished sections are numbered as follows:

KV 27 (130-140)-(290-300')	PS 10735-10751
KV 34 (0-10)-(220-230')	PS 10674-10733
KV 35 (230-240)-(290-300')	PS 10762-10768
KV 41 (40-50)-(290-300')	PS 10771-10796

Throughout the whole of the four suites, oxidised copper mineralization was found to be negligible. The sulphide distributions are shown below.

KV 34

No sulphides were detected in the first 70 ft. In view of the not inconsiderable copper assays in some of the samples, a concentration of the 60-70 ft level was carried out using TBE liquid. The heavy fraction produced negligible quantities of pyrite and no copper sulphide. The two fractions are now being assayed to confirm that the material as supplied conforms to the assays supplied. From 70 ft to 170 ft, chalcocite is the main copper mineral, with lesser quantities of chalcopyrite. Pyrite and marcasite are major sulphide constituents. From 170 ft to 210 ft, chalcopyrite and chalcocite are the main copper minerals, with some covellite. The last two samples (210-230 ft) contain minor quantities of chalcocite and chalcopyrite.

KV 27

For the first 40 ft, chalcopyrite is subsidiary to the secondary sulphides, chalcocite, covellite and digenite, also bornite. Pyrite is again the predominant sulphide. From 170 ft to 230 ft, chalcopyrite becomes the major copper mineral, with chalcocite. Digenite and covellite are also present. At the 230 ft level the chalcocite content falls off, and chalcopyrite is the only important copper sulphide. Digenite appears to be the main secondary sulphide, with some covellite and bornite. From 180 ft to 300 ft, marcasite is as common as pyrite.

KV 35

Chalcopyrite is a major copper mineral throughout, associated with digenite, covellite and bornite. At lower levels, chalcocite becomes as plentiful. In this suite, pyrite quite frequently occurs as globular framboids, and secondary copper sulphides appear to have partially or wholly replaced many of these pyrite spheres. The tiny (1 micron) pyrite crystal assemblages that make up these framboids are unusual, in that they are often quite euhedral, possibly due to recrystallization. To concentrate these pyrites, a minus 100-mesh screen fraction was separated into heavy and light fractions with TBE, and the heavy fraction polished. This shows an abundance of these particles. From the mineral dressing point of view, the partially replaced pyrites would require special technique such as bug leaching to remove the copper.

RESEARCH FOR INDUSTRY

THE AUSTRALIAN MINERAL DEVELOPMENT LABORATORIES

CONYNGHAM STREET • FREWVILLE • SOUTH AUSTRALIA
TELEPHONE 791662 • TELEGRAMS 'AMDEL' ADELAIDE

Please quote this reference in your reply:
MP 3/6/2/0

Your reference:

2nd June, 1967

The Secretary,
Mines Exploration Pty Ltd,
PO Box 11,
CLOVELLY PARK, S.A. .

ADDENDUM TO REPORT MP 2352/67

YOUR REFERENCE:	Order No. 2352
MATERIAL:	Rotary drill samples (25)
LOCALITY:	Kapunda, S.A.
IDENTIFICATION:	As listed
DATE RECEIVED:	May, 1967
WORK REQUIRED:	Mineralogical examination for copper minerals

Electron Probe Analysis by: P.K. Schultz

Investigation and Report by: R. Townend

Officer in Charge, Mineralogy Section: H.W. Fander

for H.W. Fander
P.A. Young
Director.

MINERALOGICAL EXAMINATION OF COPPER-BEARING ROTARY DRILL MATERIAL FROM KAPUNDA

KV19 (0-)-(290-300'): PS 10932-10956

Twenty-five samples were deslimed, and the residues examined by means of polished and oil grain mounts. Examination using the binocular microscope was found necessary, as it appeared that some of the copper occurred as malachite coating quartz grains. Examination of earlier material from KV41 showed that this material was common from 40-90 ft, and typical grains are presented in Figures 1 and 2.

In KV19 malachite-quartz composites represent the copper values for the 0-30 ft level, and are also present from 70-90 ft. An acid test on a hand-picked concentrate of green particles showed about a 1:1 ratio by weight for malachite and silica. Unfortunately, the material from KV19 is often rather fine, and desliming tends to remove a large portion of this. Material from the 240-250 ft and 290-300 ft level was deslimed and representative portions analysed for copper. The weight of deslimed material was in excess of 50% in each, and represented 32% of the total copper in 240-250 ft and 34% in 290-300 ft. This shows that some bias may be present when examining the residue, as the lower density material, such as chrysocolla, would be concentrated in the slime.

Covellite is the main copper mineral from 70-160 ft and 170-180 ft, with traces of chalcopyrite, digenite and chalcocite. Chalcocite becomes predominent in the 160-170 ft section. From 180-300 ft chalcopyrite is the major copper mineral, with some covellite and lesser amounts of bornite and digenite. Pyrite plus or minus marcasite is the most important sulphide from 70-300 ft. Generally the copper mineralization is not composite with pyrite or marcasite, but occasionally complex grains of marcasite, pyrite, chalcopyrite and digenite are present (Fig. 3).

In the three samples from 190-220 ft, colourless aggregates measuring up to 500 microns across were occasionally noted. These are sphalerite, with very low concentration of iron, as shown by electronprobe analysis ($< 0.1\%$). In the 200-210 ft level, a composite of chalcopyrite and sphalerite was found and is illustrated in Figure 4.

A heavy fraction in the 0-10 ft level and 60-70 ft level in KV 34 was produced with TBE. These had negligible contents of visible oxidised copper mineral, and were predominantly limonitic. Electronprobe analysis of polished material from each heavy fraction found that copper occurred rather consistently in the goethite grains. It appeared to be uniformly spread through many of the particles, with values up to 2% Cu. Whether this copper occurs within the goethite structure as a lattice constituent, or whether it forms minute discrete copper mineral inclusions, is not clear. Crushing of a goethite concentrate, followed by infrasizing and chemical analysis, could be used to elucidate this problem.

Figure 5 represents a pyrite grain from the minus 100-mesh heavy fraction of the 270-280 ft level from drill hole KV35. Within the particle is an inclusion of pyrrhotite. Inclusions of this size are only observed by examining the polished material under very high magnification.

APPENDIX VI.

AMDEL REPORTS NO'S MP 2345/67 and AN 1950/66

Specific gravity determinations on 4 drilling and 2 surface samples.

RESEARCH FOR INDUSTRY

THE AUSTRALIAN MINERAL DEVELOPMENT LABORATORIES

CONYNGHAM STREET - FREWVILLE - SOUTH AUSTRALIA
TELEPHONE 791662 · TELEGRAMS 'AMDEL' ADELAIDE

R5

Please quote this reference in your reply:

MP 3/6/2/0

Your reference:

21st March, 1967

Messrs Wiseman and Roberts,
Mines Exploration Pty Ltd,
PO Box 57,
CLOVELLY PARK, S.A.

REPORT MP2345/67

YOUR REFERENCE:	Application dated 14/3/67
MATERIAL:	5 rock samples
LOCALITY:	Kapunda
IDENTIFICATION:	As listed
DATE RECEIVED:	14/3/67
WORK REQUIRED:	Specific gravity determination

Specific Gravity Determination by: J.H. Byfield

Investigation and Report by: A.R. Turner

Officer in Charge, Mineralogy Section: H.W. Fander

for P.A. Young
Director.

SPECIFIC GRAVITY [illegible]

Five drill hole samples were submitted to Amdel for specific gravity determinations. Various techniques were employed and measurements made according to the state of the submitted material. The details of the techniques used and the results obtained are outlined below.

Stockyard Open Cut Sample

This sample is a pink clayey material that contains a considerable amount of moisture. A weighed amount of the sample was dried in an oven for 10 hours and reweighed to give an indication of the moisture content.

Original weight of sample	-	32.36
Weight of sample after drying	-	24.97
Weight of moisture content	-	7.49

Therefore the sample contains $\frac{7.49}{32.36} \times \frac{100}{1}$ = 23.1% moisture by weight.

An aggregate of the material (natural state) was selected for an apparent specific gravity measurement by the wax immersion method. This technique gave a specific gravity of 1.73. This result may be unreliable because of the small amount of the sample used and because of the possibility of air being entrapped in the sample by wax coating.

Main Open Cut Sample

This sample was treated in a similar fashion to the Stockyard Open Cut Sample to determine the moisture content.

Original weight of sample	-	32.64
Dried weight of sample	-	25.46
Weight of moisture content	-	7.18

Therefore the sample contains $\frac{7.18}{32.64} \times \frac{100}{1}$ = 21.6% moisture by weight.

The submitted sample was too fine-grained to allow an apparent specific gravity to be determined by the wax immersion method. A true specific gravity was determined on the dry sample crushed to less than 36 mesh.

KV2 - 250 ft

This sample is a fine-grained silty rock. One piece of the rock was taken and an apparent specific gravity determined by the wax immersion method. The remainder of the sample was crushed to less than 36 mesh and used for a true specific gravity determination using a specific gravity bottle.

KP1 - 161 ft - 166 ft

This specimen is a fine-grained, massive ?kaolin rock. One of the rock samples is traversed by a veinlet of quartz. A piece of the pure kaolin rock and a second piece traversed by the quartz veinlet were used to determine the apparent specific gravity by the wax immersion method. The remainder of the sample was crushed to less than 36 mesh and used for a true specific gravity determination using a specific gravity bottle.

KP1 - 246 ft - 251 ft

This specimen is a fine-grained, powdery ?kaolin clay. The sample was too disseminated to allow an apparent specific gravity determination by the wax immersion method. The sample was ground to less than 36 mesh and a true specific gravity was determined using a specific gravity bottle.

The results of the apparent specific gravity determinations are recorded in Table 1. The results of the true specific gravity determinations are recorded in Table 2.

TABLE 1: APPARENT SPECIFIC GRAVITY

Sample	Sp Gr
Stockyard Open Cut Sample	1.73
KV2 : 250 ft	2.15
KP1 : 161-166 ft (with quartz veinlet)	1.34
(pure ?kaolin rock)	1.30

TABLE 2: TRUE SPECIFIC GRAVITY

Sample	Sp Gr
Stockyard Open Cut Sample	2.66
Main Open Cut Sample	2.26
KV2 : 250 ft	2.67
KP1 : 161-166 ft	2.48
KP1 : 246-251 ft	2.03

Note: The true specific gravity was carried out on dry powdered samples using toluene to ensure the complete wetting of each rock particle and to prevent the absorbtion of water by the sample.

Reference: MILNER, H.B., (1962), "Sedimentary Petrography", George Allen & Unwin Ltd., London, pp 283-287.

jsv:2

C437

THE AUSTRALIAN MINERAL DEVELOPMENT LABORATORIES

CONYNGHAM STREET · PARKSIDE · SOUTH AUSTRALIA
TELEPHONE 79 1662 · TELEGRAMS ANDEC ADELAIDE

Please quote this reference in your reply:
AN 3/6/2/0

Your reference:

25th February, 1966

The Manager,
Mines Exploration Pty Ltd.,
PO Box 11,
CLOVELLY PARK, S.A.

Kapunda Mutah

REPORT AN1950/66

YOUR REFERENCE: Order No.1292, dated 23/2/66

IDENTIFICATION: 1 sample or drill core

DATE RECEIVED: 23/2/66

ANALYSIS

	SG g/cc
1 sample of Drill Core	2.58

Please quote report number (AN1950/66) in any enquiries.

Analysis by: W. Cole

Officer in Charge, Analytical Section: A.B. Timms

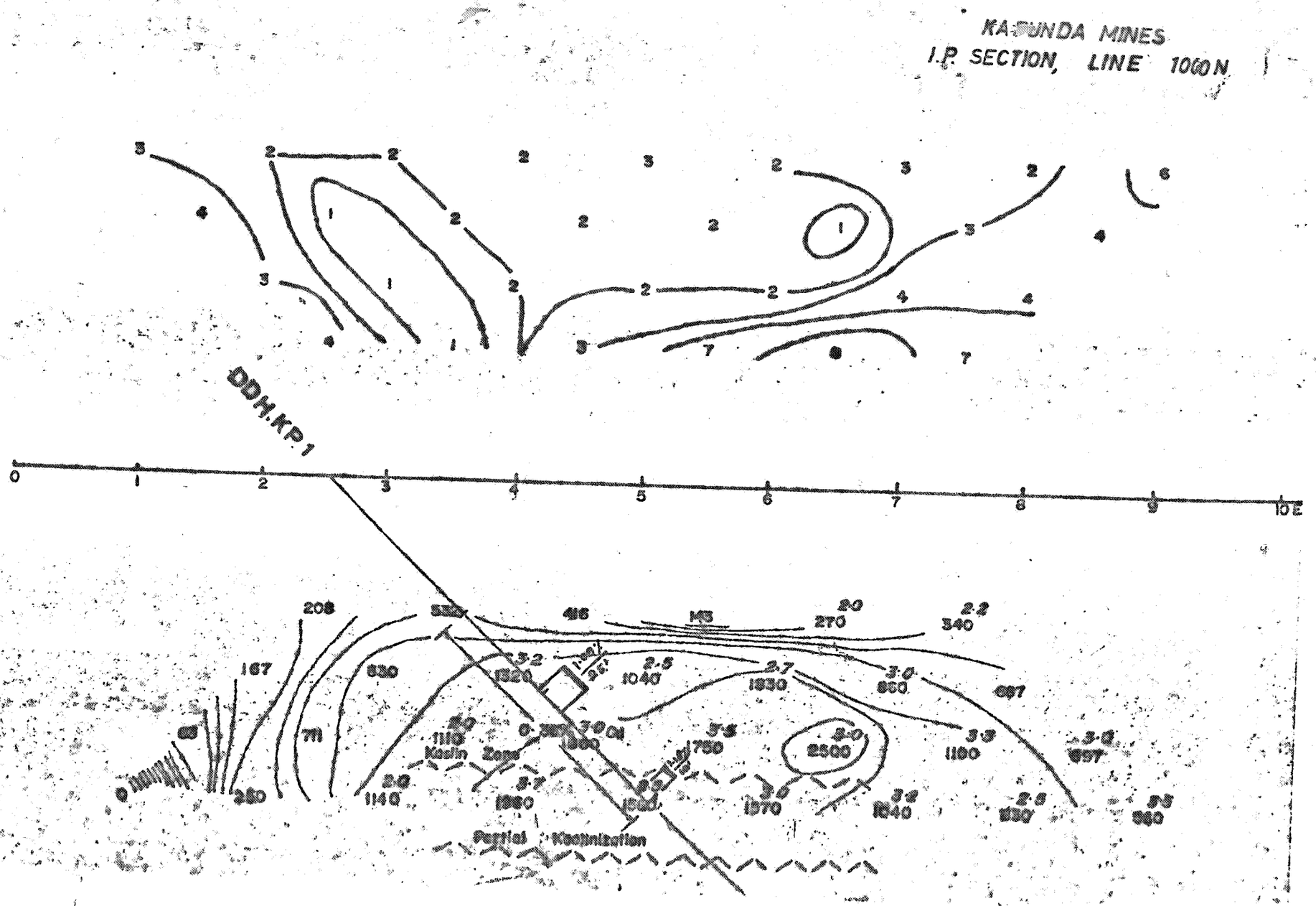
A B Timms

ig:1

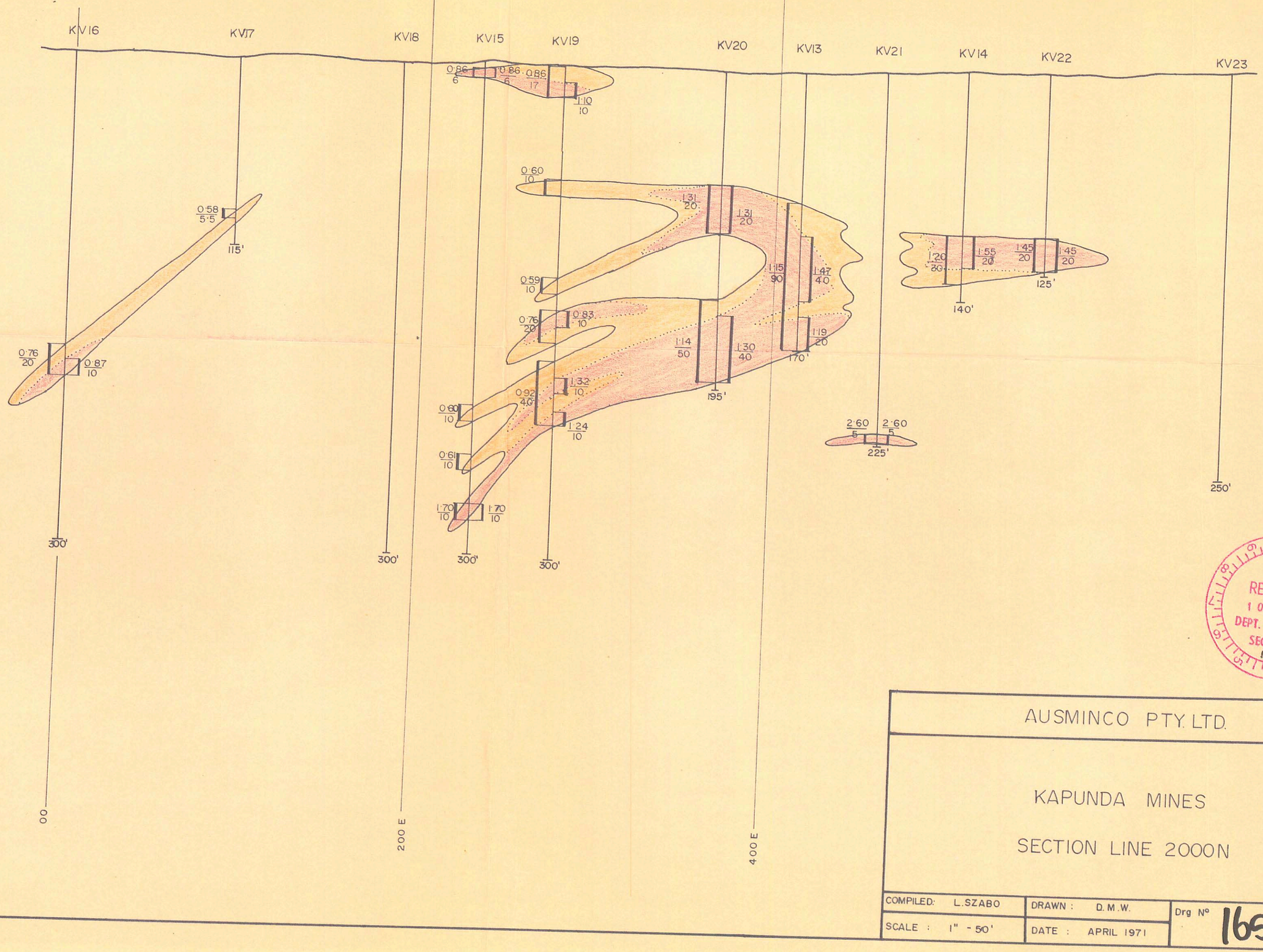
P.A. Young
Director.

APPENDIX VII.

Shallow Refraction Seismic Survey Report by J. Webb of Austral Exploration Services dated 24th July, 1967.



APPENDIX VIII.

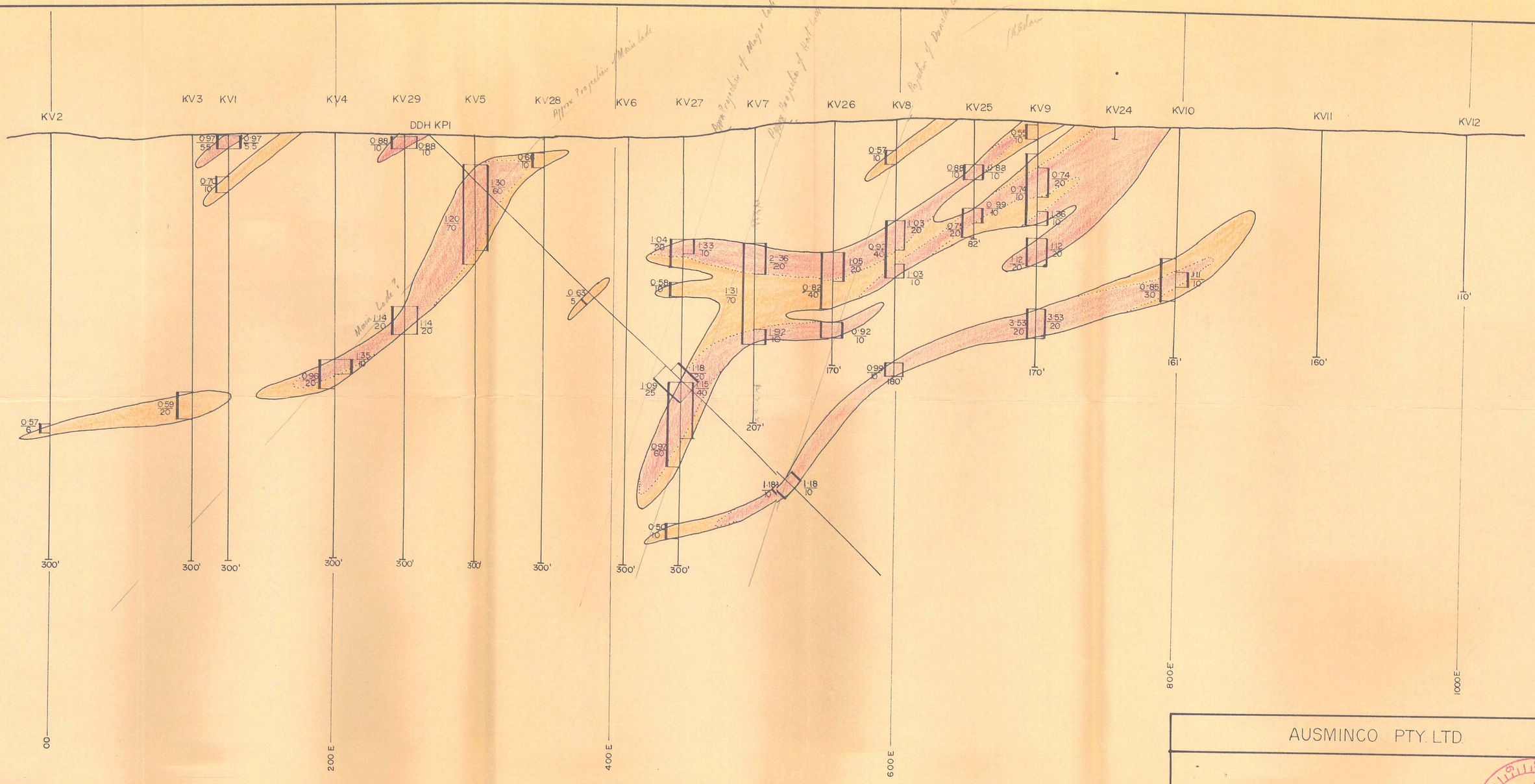


AUSMINCO PTY. LTD.

KAPUNDA MINES

SECTION LINE 2000N

COMPILED: L. SZABO	DRAWN : D. M. W.	Drg N° 1651-4
SCALE : 1" - 50'	DATE : APRIL 1971	



AUSMINCO PTY. LTD.

KAPUNDA MINES

SECTION LINE 10OON

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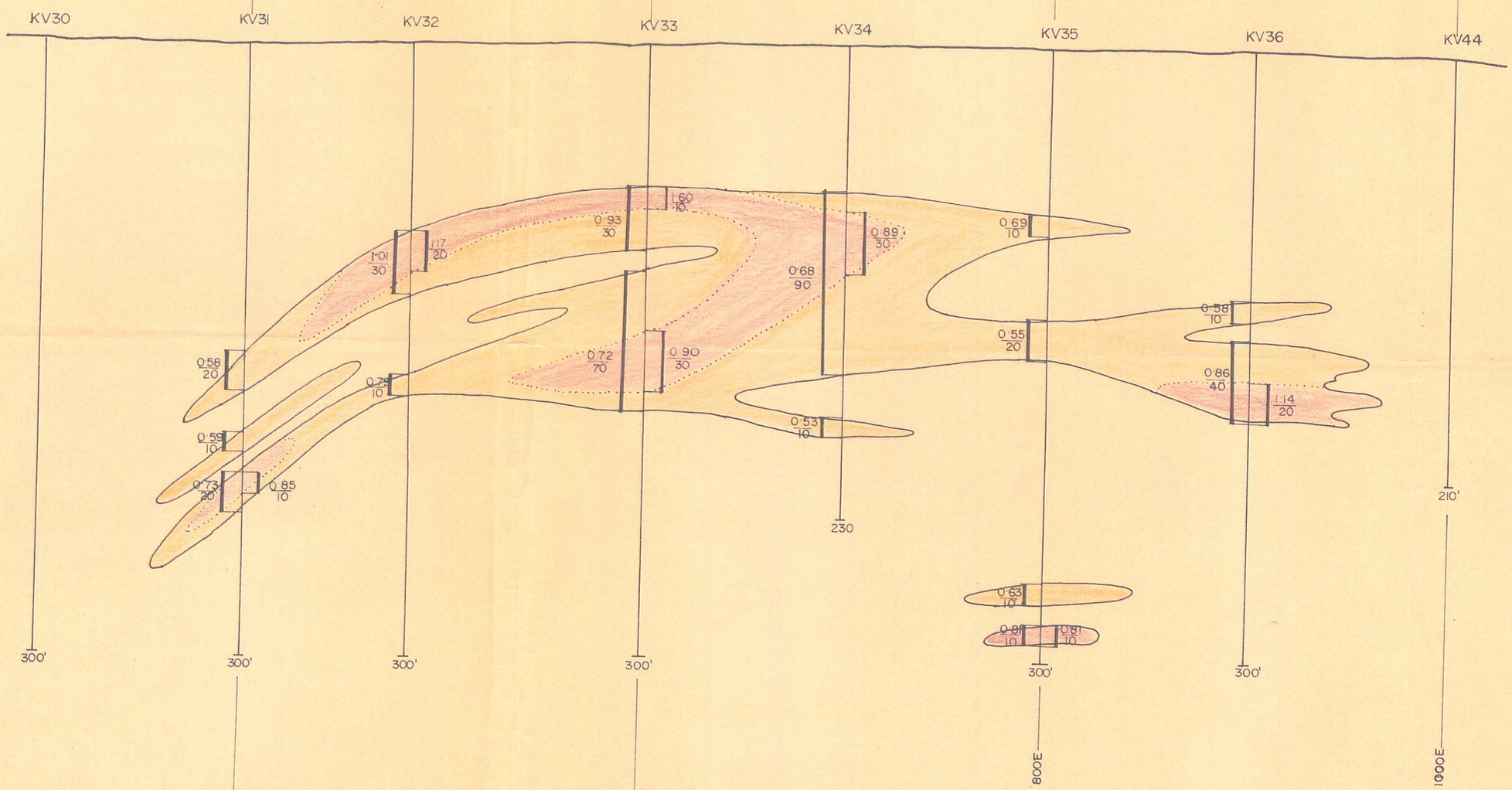
SCALE : 1" - 50'	DATE : APRIL 1971	



AUSMINCO PTY. LTD.

KAPUNDA MINES

SECTION LINE 500N

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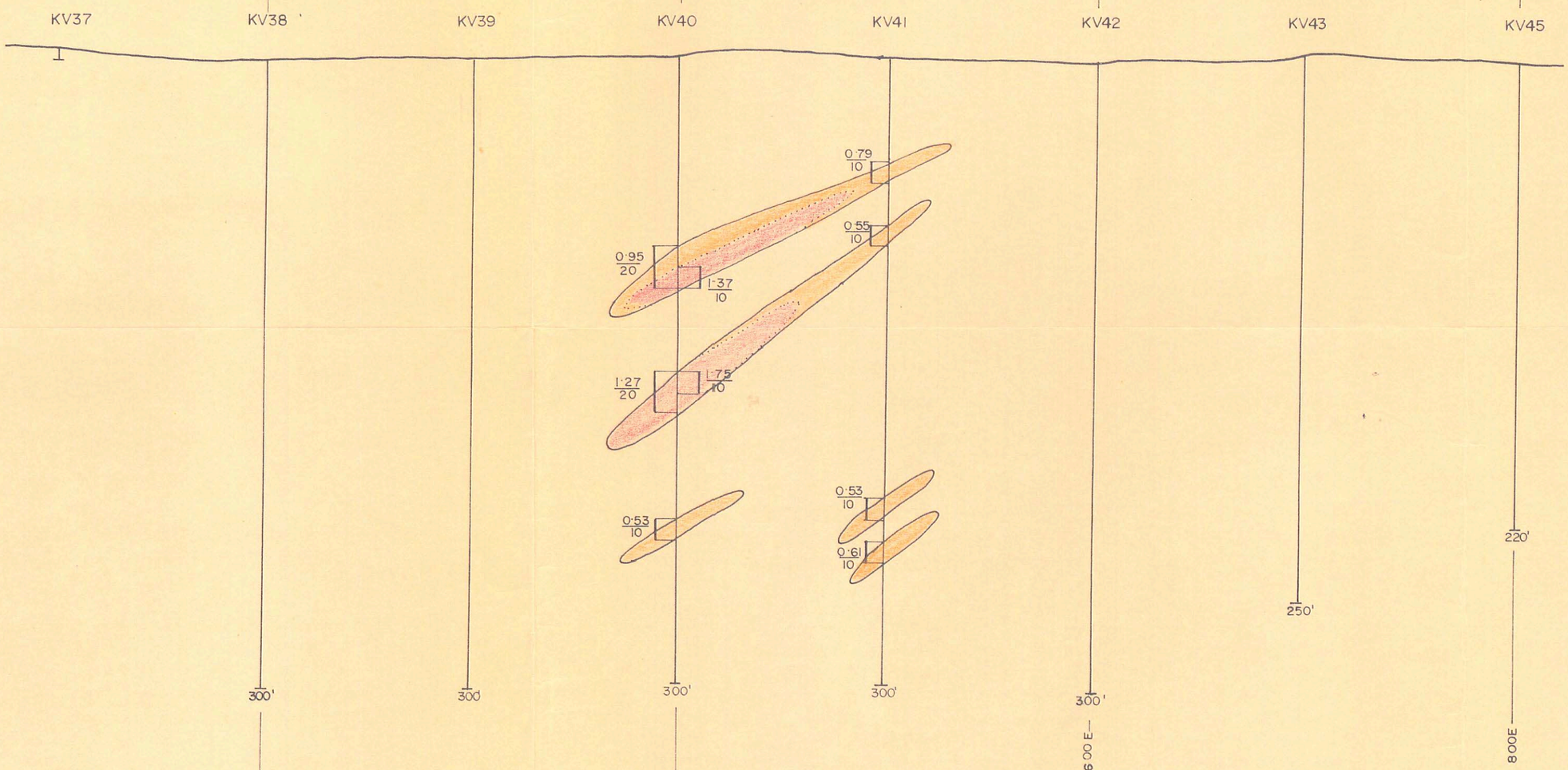
SCALE : 1" - 50'	DATE : APRIL 1971	



AUSMINCO PTY. LTD.

KAPUNDA MINES

SECTION LINE OON

COMPILED : L.SZABO	DRAWN : D.M.W.	Drg. N° 1651-7
SCALE : 1" - 50'	DATE : APRIL 1971	

BLOCK "B"

BLOCK "A"

BLOCK "C"

BLOCK "D"

SECTION LINE 2000N

SECTION LINE 1000N

SECTION LINE 500N

SECTION LINE 00N

KV23

KV22 KV14 KV21 KV13 KV20 KV19 KV18 KV17 KV16

KV1 KV2 KV3 KV4 KV5 KV6 KV7 KV8 KV9 KV10 KV11 KV12

KV25 KV26 KV27 KV28 KV29

KV30 KV31 KV32 KV33 KV34 KV35 KV36

KV38 KV39 KV40 KV41 KV42 KV43 KV45

PD1 PD2 PD3 PD4 PD5 PD6 PD7 PD8 PD9 PD10

DD1 DD2 DD3

KP1

Coyle Lode

Richard Lode

Tugsort Lode

Kyar Shaft

Bagot Shaft

Mystic Lode

Iratton Lode

Magor Lode

Hart Lode

Dunstan Lode

Magor Shaft

Harris Shaft

Kaolin Shaft

Double Whip Shaft

Trounce Lode

Mitchell Lode

Central Lode

Eastern Lode

Western Lode

Boundary Lode

Stockyard Shaft

East Kapunda Shaft

Boundary Shaft

Triplett Shaft

Hillside Shaft

U.D.P. Shaft

Thomas Shaft

LP SPACING 100'
IP 200' SPACING

I.P. 150' SPACING

I.P. 150' SPACING
I.P. 300' SPACING

I.P. 200' SPACING
I.P. 300' SPACING

I.P. 150' SPACING

I.P. 150' SPACING
I.P. 200' SPACING
I.P. 300' SPACING

I.P. 200' SPACING

I.P. 200' SPACING

AUSMINCO PTY. LTD.

KAPUNDA MINES

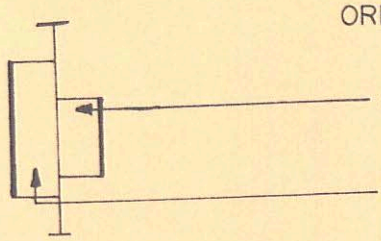
PLAN SHOWING DRILL HOLES AND ORE OUTLINE

RECEIVED
10 AUG 1971
DEPT. OF MINES
SECTION
1651

COMPILED : L.SZABO	DRAWN : D.M.W.	Drg. No.
SCALE : 1" - 100'	DATE : APRIL 1971	

1651-1

LEGEND



ORE INTERSECTION, GRADE ABOVE :-

0·80% CUT OFF

0·50% CUT OFF

OREBODY, CUT OFF : 0·80% Cu

OREBODY, CUT OFF : 0·50% Cu

ORE OUTLINE

ORE BLOCK BOUNDARY

I.P. ANOMALY

WEAK I.P. ANOMALY

1651-8

NORTHLAND MINERALS LIMITED

P R O G R E S S R E P O R T N O. 1.

GOLD MINERALISATION OF KAPUNDA MINES
(SOUTH AUSTRALIA)

BY

L. G. SZABO

AUSMINCO SERVICES PTY. LTD.

MELBOURNE, JULY 1971.

CONTENTS

TABLES

.../

APPENDICES

ACCOMPANYING PLANS

I. SUMMARY

Gold and silver have been discovered in the rocks of Kapunda Mines.

28 surface and drill core samples yielded average values of noble metals as follows :

gold	2.5 dwts/ton
silver	3.5 dwts/ton

The gold values range from 0.6 to 10 dwts/ton. The persistence of gold values has been established to a depth of 600 ft. by chip sampling the diamond drill cores available. Preliminary studies indicate that the gold is associated with pyrite and to a lesser extent, with gangue.

An exploration programme has been set out to obtain further information about the gold potential of Kapunda.

A budget of approximately $8500 has been drawn up for the work proposed.

L. G. SZABO
CHIEF GEOLOGIST

Melbourne
22nd July, 1971

II. INTRODUCTION

Copper was the prime target of the previous exploration conducted in the Kapunda area from 1844 to 1969. This work has been reviewed and evaluated elsewhere (Reference 7). The present report has been prepared in order to summarize the previous work in connection with noble metals, to record the present work which resulted in the discovery of gold in the mine rocks and to re-assess the economic aspects of the copper - gold ore. Finally, the report sets out certain conclusions and recommendations.

III. PREVIOUS EXPLORATION

1. From 1844 to 1912, 68,000 tons of high grade copper ore were extracted from Kapunda mines.

The early miners had remarkable experience in detecting gold by naked eye, in crushed and panned samples. If they missed the gold in the mine rocks, it could well be due to the fact that the gold was very fine.

It is relevant to note that not even specks of gold are visible in the ore of Carlin gold mines (Nevada, U.S.A.), the ore reserve of which is 11 million tons of ore at an average grade of 6.4 dwts/ton, and ranging from 0.5 to 50 dwts (Reference 5).

The Kapunda ore was shipped to, and smelted in the United Kingdom. The overseas buyers could well have detected and perhaps recovered the gold. It was, however, against their interest to draw the miners attention to this fact.

2. In 1965/69 Mines Exploration Pty. Ltd. conducted diamond drilling and extensive percussion drilling programmes in the Kapunda area. Their exploration was copper oriented, as only one sample, the composite of 540 feet of drill cuttings, was analysed for gold plus silver and molybdenum (Reference 6).

Table I sets out the results.

TABLE I.

Assay results of the composite sample

Section Line 1000N

Composite of		% Cu	Au + Ag	Mo
Hole No	Interval (ft)	(Computed)	dwts/ton	
KV - 5	10 - 90	0.85	2.4	not detected
KV - 7	70 - 180			
KV - 8	0 - 30			
	70 - 180			
KV - 9	0 - 150			
KV - 10	80 - 140			

The gold was not determined separately. Follow up work was not completed either to investigate the noble metal indication and its economic aspects.

3. In 1969 metallurgical tests were conducted by A.M.D.E.L. on Kapunda ores (Reference Nos. 9 and 10).

(i) The mineralogical examination of samples, in connection with the metallurgical tests, encountered "trace amounts of an exceedingly high reflectivity white mineral (?silver) of very fine grain size" , "finer than 1.6 micron" (DDH-KP-1, 479 feet). The mineralogical report states that the "streaky loose aggregates" of the unidentified mineral occur in the pyritic rim and adjacent gauge around part of the chalcopyrite (Appendix V.)

"Most of the white grains are finer than 1.6 micron and they form streaky loose aggregates."

An opaque mineral, like gold, can be safely identified down to 1 micron diameter, using an optical microscope. The distinguishing features of the mineral grains of this size are, however, poorly resolved. It is thought, therefore, that the unidentified mineral might have been gold, or an alloy of gold and silver, as the optical features mentioned in the report, are quite similar for both gold and silver (Table II.)

TABLE II.

Distinguishing features of gold and silver in polished section

Mineral	Habit	Reflectivity	Colour
Gold	Parts of chrystal skelets, plates (streaky)	Very high	light yellow, yellow-white
Silver	Plates	Very high	white, yellow-white

(ii) The sulphide concentrate of the flotation test consisted of

53.2% of pyrite, and

46.8% of primary and secondary copper sulphides (Appendix V.)

Assuming that the unidentified mineral inclussions in the pyrite rims were of gold and/or silver, considerably enriched gold should have been present in the pyrite tailings.

4. On 29th April 1971, Dr. H. J. Harrington of University of New England, Armidale, N.S.W., inspected Kapunda mines, and collected three grab samples.

The samples yielded gold values from 0.8 dwts/ton to 3 dwts/ton. Dr. Harrington concluded that Kapunda is potentially a gold mine if the samples were representative of a large body of ore, and the gold assay is also representative (Reference 2.)

The assay results of Dr. Harrington's samples have been included in the present evaluation, and are shown by Table III.

TABLE III.

Gold and copper assays of grab samples

Sample No.	Sample location and description	% Cu	Au dwts/ton
H - 1	Dump material from shaft on floor of main open cut.	0.65	3.0
H - 2	Main open cut, east side, quartz vein.	0.63	2.0
H - 3	West side of north end of main open cut, dump material	0.66	0.08

5. Conclusions

(i) Gold and silver mineralisation was detected by the previous explorers of Kapunda mines, but the indications were not followed up until the present exploration.

(ii) The gold and silver occur probably as small inclusions in the pyrite and in the gangue.

(iii) The grain size of gold is very fine, finer than 1.6 microns.

(iv) The gold and silver are unevenly distributed in the small samples, as noteworthy quantities of the unidentified mineral (probably gold) were encountered only in one out of a large number of samples examined by optical and electron microscopes.

The "noteworthy quantity" may mean gold values up to several ounces per ton.

(v) The gold and silver distribution is however quite consistent in the kaolinised zone, as the composite of 540 ft of drill cuttings and surface grab samples yielded silver and/or gold values from 0.8 to 3.0 dwts/ton.

IV. PRESENT WORK

1. Surface sampling

On 20th May 1971, fourteen samples were taken from the mineralised zone exposed by old workings. The samples included quartz vein material, mineralised kaolin rocks and composites of dump material from the old workings.

The samples were analysed by Daniel C. Griffiths (Aust.) Pty. Ltd. for gold and silver using atomic absorption spectrophotometry (A.A.S.) and fire assay, respectively.

Two composite samples were prepared from the fourteen original samples by Daniel C. Griffith (Aust.) Pty. Ltd. and Sharp and Howells Pty. Ltd. Both samples were analysed for gold by Daniel C. Griffith (Aust.) Pty. Ltd.

Check assays were made for copper by Sharp and Howells Pty. Ltd. who sub-contracted the Royal Melbourne Institute of Technology, (R.M.I.T.) to carry out the check assays for gold. The copper results were confirmed by Sharp and Howells Pty.Ltd., but the R.M.I.T. provided two sets of conflicting gold results, one of which agreed with Daniel C. Griffith (Aust.) Pty.Ltd.'s results, the other set contradicting them.

Due to the grave discrepancies between the two sets of gold results, the reliability of Daniel C. Griffiths (Aust.) Pty. Ltd.'s results have been checked and have been found to be satisfactory. The R.M.I.T.'s results have consequently been excluded from the further evaluation.

The samples were further analysed by Daniel C. Griffith (Aust.) Pty. Ltd. for silver and bismuth. The composite of the fourteen samples was analysed for silver and platinum. The samples yielded

gold values	from 1.6 to 3.6 dwts/ton
silver values	from 2.4 to 5.0 dwts/ton
platinum	0.02 dwts/ton
bismuth	in the p.p.m. range only

The composite sample was scanned using x-ray fluorescence techniques which revealed trace amounts of yttrium, zirconium, molybdenum and cobalt.

The sample localities are shown on Plan 1, the assay results are set out in Table IV. The description of the samples has been appended (Appendix 1.).

TABLE IV.

Assay results of 14 surface samples

Sample No.	% Cu Daniel C. Griffith	% Cu Sharp & Howell	Au dwts/ton	Ag dwts/ton	Pt dwts/ton	Bi ppm	Note
1	0.72	0.3	3.6	3.2	-	40	
2	0.15	0.1	2.6	4.6	-	5	
3	0.74	0.6	2.2	3.8	-	35	
4	0.14	0.1	2.8	3.0	-	30	
5	1.87	1.9	2.6	5.0	-	25	
6	1.83	1.7	2.0	4.0	-	25	
7	0.99	0.7	2.4	3.8	-	25	
8	1.82	1.4	2.6	3.2	-	10	
9	0.57	0.4	3.0	2.6	-	30	
10	3.12	1.9	2.2	2.4	-	10	
11	1.49	1.6	1.6	2.4	-	45	
12	2.76	2.6	2.0	3.8	-	40	
13	3.26	3.5	2.4	2.4	-	5	
14	0.55	0.3	2.4	4.4	-	10	
Composite 1 - 14	1.57	1.2	3.0	3.4	0.02	-	Prepared by D.C. Griffith (Aust.) P/L
Composite 1 - 14	1.37	-	2.6	-	-		Prepared by Sharp & Howell P/L

2. Chip sampling of DDH-KP-1

(i) On 7th June, 1971, eight intersections of the drill cores were chip sampled, with the permission of the Department of Mines, South Australia, in order to check the consistency of the gold values in depth.

The samples included pyrite zones, quartz zones, chalcopyrite and pyrite, as well as composites of the kaolinised and unweathered rocks.

The samples were analysed by Daniel C. Griffiths (Aust.) Pty. Ltd. The gold results were triple - checked by Spectrum Analytical Laboratories using fire assay and Aqua Regia - A.A.S. methods. The gold values have been adequately confirmed by the two independant laboratories.

It should be noted that Daniel C. Griffith (Aust.) Pty.Ltd.'s results were in the ounces/long ton range, while Spectrum Analytical Laboratories reported in ounces per short ton. In order to make the results comparable, the latter results should have been converted to the long ton range.

The samples yielded gold values from 0.6 to 10 dwts/ton (Appendix II.). The results are shown on Table V, and Section 1000N.

(ii) A check sample was taken under No. K-9-2 from a drill core intersection previously sampled under No. K-6.

The check sampling was carried out by Mr. A. J. Weil Regional Geologist of Melinga Mining and Finance Coy. Pty. Ltd., and was witnessed by Mr. Bob Adam Deputy Director of Mines of South Australia and by the author of this report. Mr. Weil forwarded the sample direct to Daniel C. Griffith (Aust.) Pty.Ltd., for gold assay.

Sample No. K-6 yielded 4 dwts of gold per ton while 3.6 dwts/ton was encountered in K-9-2.

TABLE V.

Assay results of 9 drill core samples DDH-KP1

Sample No.	D.C.Griffiths (Aust.)P/L		Spectrum Analytical Laboratories		
	% Cu	Fire Assay Au dwts/ton	Fire Assays Au dwts/ton		A A S Au dwts/ton
			Au	Au	Au
K - 1	2.38	2.2	1.4	-	-
K - 2	0.13	5.2	3.0	-	-
K - 3	1.02	2.6	1.6	1.0	2.0
K - 4	0.09	2.0	0.6	1.0	1.0
K - 5	0.53	5.6	1.6	-	4.0
K - 6	4.48	4.0	1.6	-	-
K - 7	1.80	2.4	1.8	0.6	3.4
K - 8	1.24	2.0	1.2	1.4	10.0
K-9-2	-	3.6	-	-	-

3. Critical evaluation of the assay reports

(i) Report by Daniel C. Griffith (Aust.) Pty.Ltd.

This company analysed fourteen surface samples, nine drill core samples, two composite and two "blank" samples.

Due to conflicting results by R.M.I.T. the reliability of the results supplied by Daniel C. Griffiths (Australia) Pty.Ltd. have been checked. Table VI sets out the results.

TABLE VI.

Check assays by Daniel C. Griffith (Aust.) Pty. Ltd.

Sample description	% Cu	Au dwts/ton
Composite 1 - 14 (Prepared by D.C.Griffith (Aust.) Pty. Ltd.)	-	3.0
Composite 1 - 14 (Prepared by Sharp and Howells Pty. Ltd.)	1.37	2.6
Computed average of samples Nos. 1 to 14	1.43	2.4
No. K-6	4.48	4.0
No. K-9-2 taken from K-6 locality	-	3.6
No. H-1	0.65	3.0
No. 9 taken from H-1 locality	0.57	3.0

Since many results were uniformly between 2 and 3 dwts, and low gold values were not reported, a check assay of blank samples was considered to be necessary. The blank samples were taken from an entirely different geological and geographical environment. These samples could have carried some gold values, but these values should have been entirely different. The results are set out in Table VII.

TABLE VII.

Assay results of blank samples

Sample No.	Description	Au dwts/ton
K1 - 1	Tin bearing alluvium	0.6
K1 - 2	Spotted shale from the contact aureole of a granite intrusion	0.4

From the results presented in Table Nos VI. and VII, it has been concluded that the disparities between the original results and cross-checks are minor and neglibible at this stage of the exploration. The reliability of the results reported by this company, is therefore accepted.

(ii) Reports by Spectrum Analytical Laboratories

The conflicting results by R.M.I.T. made desirable a further check by an independent laboratory. After careful consideration, Spectrum Analytical Laboratories were chosen to carry out the check assays of the eight drill core samples previously analysed by Daniel C. Griffiths (Aust.) Pty. Ltd.

Two sets of samples were analysed by fire assay and the third was checked by Aqua Regia - A.A.S. method. The results were slightly lower than those reported by Daniel C. Griffiths (Aust.) Pty. Ltd., but the presence of gold has been definitely confirmed. The results are set out in Table V. The disparities have been interpreted to be due to the uneven distribution of gold in the samples analysed.

The assay results produced by Spectrum Analytical Laboratories have been accepted and included in the further evaluation.

(iii) Reports by the Royal Melbourne Institute of Technology.

The R.M.I.T. supplied two sets of conflicting gold results (Appendix III). Since then the R.M.I.T. have admitted that they are not equipped for fire assay. The results provided by R.M.I.T. have therefore been excluded from the evaluation.

4. Evaluation of the Results

Table VIII. sets out the gold content of the different rock types analysed. The results have been allocated in the groups of ascending copper values as well. The table clearly shows that:

(i) There is no direct relationship between the gold and copper content, since high gold values have been encountered in association with different copper values.

(ii) The highest gold values have been encountered in the pyrite rich specimens (K-2 and K-5) which yielded low and sub-economic values of copper.

The average gold contents of the samples are 3.9 dwts/ton and range from 1.6 to 5.6 dwts/ton.

(iii) The second highest gold value, averaging 2.7 dwts/ton, was detected in the kaolin ore zone. The gold is, however, unevenly distributed, as the assays range from 1.2 to 10 dwts/ton.

(iv) The quartz and kaolin-quartz rocks yield the most consistent gold values which range from 1.6 to 3.6 dwts/ton and average at 2.4 dwts/ton.

These specimens contain ore grade values of copper as well.

(v) The dump materials from the old workings contain gold at an average grade of 2.3 dwts/ton, ranging from 0.8 to 3 dwts/ton. All samples analysed in this category, yield ore grade copper values.

(vi) The quartz-sulphide veins of the unweathered zone yield gold values similar to those of the kaolin zone.

Quartz-sulphide veins of the

(a) Unweathered zone: average 2.5 dwts/ton
range 0.6 to 4 dwts/ton

(b) Kaolin zone: average 2.5 dwts/ton
range 1.6 to 3.6 dwts/ton

(vii) The unweathered rock richer in sulphide contains more gold than rocks containing little sulphide.

K-4 (disseminated sulphide) 1.2 dwts/ton

K-5 (disseminated + vein sulphide) 1.8 dwts/ton

5. Conclusions

(i) Gold, silver and platinum are definitely present in the mine rocks of Kapunda.

(ii) The gold is persistently present throughout the exposed zone of copper mineralisation.

(iii) The gold values persist to a vertical depth of 600 feet in the only deep drill hole within the mine area.

(iv) The average gold content of the rocks represented by 28 samples and 44 assays, is 2.5 dwts/ton, ranging from 0.6 to 10.0 dwts/ton.

(v) The gold is associated with pyrite and to a lesser extent with quartz.

(vii) The accuracy and reliability of the analytical and mineralogical work recorded in this report, are sufficient for routine work. The samples of the next, most crucial phase of exploration should however, be analysed and microscopically examined by scientists with wide experience of noble metal determination.

TABLE VIII.

GOLD CONTENT OF THE

% Cu INTERVAL	SAMPLE NO.	% Cu	KAOLIN ZONE						FRESH ZONE							
			KAOLIN		QUARTZ, KAOLIN-QUARTZ		DUMP MATERIAL		FELDSPATHIC SILTSTONE & DISSEMINATED PYRITE		FELDSPATHIC SILTSTONE & DISSEMINATED + VEIN PYRITE		QUARTZ SULPHIDE VEINS		PYRITE	
			A	B	A	B	A	B	A	B	A	B	A	B	A	B
	Coyle Lode 2	0.15			2.6	2.6										
	Main Lode 4	0.14			2.8	2.8										
<0.3	K-2	0.13													4.1	5.2
																3.0
	K-4	0.09							1.2	2.0						
										0.6						
										1.0						
										(1.0) AAS						
0.3-0.5	-	-														
	Richard Lode 1	0.72			3.6	3.6										
	Side of N. Cut 3	0.74			2.2	2.2										
	Veins H-2	0.63			2.0	2.0										
	Horse Shaft Dump 9	0.57					3.0	3.0								
0.5-0.8	14	0.55					2.4	2.4								
	Surface Dumps H-1	0.65					3.0	3.0								
	Dump H-3	0.66					0.8	0.8								
	K-5	0.53													3.7	5.6
																1.6
																(4.0) AAS
	Main Lode ? 7	0.99			2.4	2.4										
	Vein 11 m	1.49			1.6	1.6										
	K-3	1.02									1.8 Veins					
0.8-1.5												2.6				
												1.4 1.6				
												1.0				
	K-8	1.24	3.7 1.1	2.0 1.2 1.4								(2.0) AAS				
				(10.0) AAS												
	Main Lode ? 5 m	1.87	2.6	2.6												
	Dumps 6 m	1.83					2.0	2.0								
	Dumps near Main Lode 8 m	1.82					2.6	2.6								
	Stockyard Dump 12 m	2.76	Veins				2.0	2.0								
1.5-3.0	K-1	2.38	1.8	2.2												
				1.4												
	K-7	1.80											2.1 Veins	2.4		
														1.6		
														0.6		
														(3.4) AAS		
	Vein 10 m	3.12	2.6	2.6												
	Stockyard Dumps surface 13 m	3.26					2.4	2.4								
>3.0	K-6 (k-9-2)	4.48											3.1 Veins	4.0		
														3.6		
														1.6		
AVERAGE			2.7		2.5		2.3		1.2		1.8		2.5		3.9	
RANGE			1.2-10.0		1.6-3.6		0.8 - 3.0		0.6 - 2.0		1.0 - 2.6		0.6 - 4		1.6 - 5.6	
NUMBER OF ASSAYS			8 (12%)		7 (7%)		8 (15%)		4 (.09%)		4		7		5 (35%)	
NUMBER OF SAMPLES			4		7		8		1		1 (1.0%)		2 (2%)		2	

As comp 25 samples

LEGEND: A = Average, dwts/ton B = Assay, dwts/ton.

V. ECONOMIC CONSIDERATIONS

The Kapunda mineralisation is a good exploration target, since the presence of economic grade and tonnage of copper ore has already been indicated by widely spaced rotary percussion drilling. The economics of the indicated copper ore reserves have been discussed elsewhere and have been found to be satisfactory (Reference Nos. 3 and 4).

The discovery of gold has, however, radically increased the value of the Kapunda prospect. Assuming that

(i) the gold and silver assays are representative of the copper orebody and the overburden,

(ii) the gold and silver can be recovered at the usual cost level,

and assuming total recovery

then Kapunda is potentially a gold mine with copper as a by product. In this case the profit on the gold is tax free under present legislation.

"In situ" values of the gold-copper ore have been assessed on the basis of the above assumptions. The results are set out in Table Nos. IX and X.

TABLE IX.

in situ value of gold in ore

Postulated "in situ" value of the gold-copper ore

Cut off grade: 0.50% Cu

ORE	VALUE
4.33 million tons of ore (0.95%Cu) containing:	
92.0 million lbs of copper, @ $ 0:45	$ 41.0 million
10.8 0.54 million ounces of gold, @ $ 36:00	$ 19.0 million
15.2 0.76 million ounces of - silver @ $ 1.50	$ 1.1 million
Total value of ore	$ 61.1 million
@ 2% Cu at 4% = 3% other ore	
6 million tons of overburden containing:	
15.0 0.75 million ounces of gold, @ $ 36:00	$ 27.0 million
21.0 1.05 million ounces of - silver @ $ 1.50	$ 1.6 million
Total value of overburden	$ 28.6 million
GRAND TOTAL	$ 89.7 million

TABLE X.

Postulated "in situ" value of the gold-copper ore

Cut off grade: 0.80% Cu

ORE	VALUE
2.17 million tons of ore (1.32% Cu) containing:	
64.0 million lbs of copper, @ $ 0.45	$ 29.0 million
0.27 million ounces of gold, @ $ 36:00	$ 9.7 million
0.38 million ounces of silver, @ $ 1.50	$ 0.6 million
Total value of ore	$ 39.3 million
8 million tons of overburden containing:	
1.0 million ounces of gold, @ $ 36:00	$ 36.0 million
1.4 million ounces of silver, @ $ 1.50	$ 2.1 million
Total value of overburden	$ 38.1 million
GRAND TOTAL	$ 77.4 million

It should be emphasised that the figures above have been based on a set of assumptions, which may or may not be valid. But the results do indicate that further exploration is warranted to follow up the very good noble metal indications.

VI. PROPOSAL

1. Surface sampling

It is anticipated that the gold has been enriched in the fine soil fractions over the mineralised rocks, and in the fine fractions of stream sediment within and adjacent to the mineralised area.

It is probable that the gold is associated with pyrite the oxidation of which could have resulted in kaolinitic alteration of the host rocks. It is recommended, therefore, that the kaolinised rocks be covered by reconnaissance geochemical lines spaced 1000 ft. apart and sampled at 100 ft intervals.

The programme amounts to 300 samples which will be analysed for gold by Aqua Regia - A.A.S. method, and for copper by geochemical A.A.S.

2. Drilling

It is proposed that initially the first ten drill holes of the drilling programme recommended elsewhere (Reference Nos. 7 and 8) be put down in such an order that the kaolin zone be broadly tested for noble metals as well. In order to provide sufficient sample material, "N" size holes should be drilled. Besides copper, the samples should be analysed for gold and silver, and composite samples of certain horizons should be analysed for platinum, bismuth and rare earth metals.

3. Mineralogy and metallurgy

If the results are encouraging, Dr. A. M. Asklund of Sweden should be requested to carry out check assays and mineralogical examinations of the samples in order to obtain reliable and accurate information about the grade, textural associations and metallurgical aspects of the gold. Dr. Asklund holds a title of Associate Professor of Mineral Chemistry, and one of the most sophisticated laboratories in the world is at her disposal. The author of this report worked with Dr. Asklund for several years, and is convinced that she is the right scientist to cope with the situation.

VII. BUDGET PROPOSAL

1. Surface sampling

Sampling, assaying, evaluation	$ 2500:00

2. Drilling

Sampling, assaying, evaluation (The costs of drilling has been covered by the exploration expenditure for copper)	$ 3500:00

3. Mineralogy and metallurgy

Professional fees, assaying, tests and freight.	$ 2500:00
TOTAL	$ 8500:00

VIII. REFERENCES

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APPENDIX I

14 SURFACE SAMPLES

Sample descriptions

Assay results by Daniel C. Griffith (Aust.) Pty. Ltd.

DESCRIPTION OF ROCK SAMPLES TAKEN FROM KAPUNDA MINES ON MAY 20TH, 1971.

1. Location: Shervin Open Cut, south-west corner, Richard Lode.

   Description: A mixture of quartz vein and kaolin rock with chalcocite and pyrite.

2. Location: As above, Coyle Lode, western end.

   Description: As above.

3. Location: As above, unnamed lode about 80 ft. north of Coyle Lode, western end.

   Description: As above.

4. Location: Main Open Cut, northern end of the Main L 'e.

   Description: Main ite vein quartz material with iron stained zones.

5. Location: As above Main Lode

   Description: Kaolin rock with veins and pods of malachite.

6. Location: Dump at the eastern side of the Main Open Cut.

   Description: Channel sample of dump material comprised of quartz and kaolin with visible malachite.

7. Location: Prominent quartz vein at the eastern side of the Main Open Cut.

   Description: White and brown coloured quartz with pseudomorphs after pyrite.

.../2.

8. Location: Dump at the south-east corner of the Main Open Cut.

Description: Channel sample of dump material comprised of quartz and kaolin rock with visible malachite.

9. Location: Dump material on the floor of the Main Open Cut. The material came probably from the Harris Shaft (Dr. Harrington's sample locality).

Description: Yellow-colour granular material comprised mainly of kaolin rock and quartz.

10. Location: Vein situated in the sout-west corner of the Main Open Cut, exposed by running rain water.

Description: White, creamy kaolin rock with malachite veins.

11. Location: As above

Description: A mixture of vein quartz and kaolin rock with malachite and secondary copper sulphides.

12. Location: Dump at the western side of the Stock-yard Open Cut.

Description: Channel sample of dump material comprised of quartz and kaolin rock with visible malachite.

13. Location: Dump at the eastern side of the Stock-yard Open Cut.

Description: As above.

.../3.

14. Location: Dump at the western side of the Main Open Cut.

Description: Channel sample of dump material comprised of quartz and kaolin rock.

The samples were taken by :

L. G. Szabo, Chief Geologist of Ausminco Services Pty. Ltd.

C. M. Horn, Geologist of Mintech Services Pty. Ltd.

I. C. Grant, Geologist, Managing Director of Mintech Services Pty. Ltd.

June 10th, 1971.

L. G. SZABO.

GRIFFITH-INTECO (AUSTRALIA) PTY. LTD.

REGISTERED OFFICE: 4-8 GWYNNE STREET, RICHMOND, VICTORIA, AUSTRALIA, 3121
TELEPHONE: 42 4706 42 4707 TELEX: 31961 CABLES: GRINLABS MELBOURNE

INCORPORATING THE PRACTICE OF **R. J. GLUYAS & CO.**
5 BISHOP'S PLACE, KENSINGTON, S.A., 5068. TELEPHONE 31 8533

Job No :71/286.

May 26th, 1971.

Ausminco Services Pty. Ltd.,
233 Collins Street,
MELBOURNE. VIC. 3000.

Attention : Mr. L. Szabo.

Sample No's.	Au oz/ton.		% Cu.	
1	0.18	(3.6)	— .72	Lode, Richard shallocate & pyrite
2	0.13	(2.6)	— .15	Coyle Lode "
3	0.11	(2.2)	— .74	Lode "
4	0.14	(2.8)	— .14	Main Lode pyrite
5	0.13	(2.6)	m 1.87	Main Lode
6	0.10	(2.0)	m 1.83	Dump Main Lode m
7	0.12	(2.4)	— .99	Q vein
8	0.13	(2.6)	m 1.82	Dump malachite
9	0.15	(3.0)	— .57	Dump Harris Hill
10	0.11	(2.2)	m 3.12	Vein malachite (m)
11	0.08	(1.6)	m 1.49	Vein (m)
12	0.10	(2.0)	m 2.76	Dump W. Stockyard Lode (m)
13	0.12	(2.4)	m 3.26	Dump E Stockyard Lode (m)
14	0.12	(2.4)	— .55	Dump Main Lode

7-m = malachite samples av 2.3% Cu { 3-6 dwt Ag / 2.2 dwt Au
7 — = pyritic " av .55% Cu { 3-6 dwt Ag / 2.7 dwt Au

Method : Fire assay, for Au.

Atomic absorption ± 7% Relative accuracy for Cu.

A. NORTON.
MANAGER.

Gold values in dwts / long ton are shown in brackets.

DANIEL C. GRIFFITH (AUSTRALIA) PTY. LTD.
~~GRIFFITH-INTECO (AUSTRALIA) PTY. LTD.~~ INTECO
DANIEL C. GRIFFITH EXPLORATION LABORATORIES.
REGISTERED OFFICE: 4-8 GWYNNE STREET, RICHMOND, VICTORIA, AUSTRALIA, 3121
TELEPHONE: 42 4706 42 4707 TELEX: 31961 CABLES: GRINLABS MELBOURNE

Job No : 71/286. June 2nd, 1971.

Ausminco Services Pty. Ltd.,
[illegible] Collins Street,
MELBOURNE. VIC. 3000.

Attention : Mr. L. Szabo.

Dear Sir,

We now enclose herewith the analysis of your 14 samples for Silver and Bismuth, which was a further request by you.

Sample No's.	Ag oz/ton.		Bi ppm.
1	0.16	(3.2)	40
2	0.23	(4.6)	5
3	0.19	(3.8)	35
4	0.15	(3.0)	30
5	0.25	(5.0)	25
6	0.20	(4.0)	25
7	0.19	(3.8)	25
8	0.16	(3.2)	10
9	0.13	(2.6)	30
10	0.12	(2.4)	10
11	0.12	(2.4)	45
12	0.19	(3.8)	40
13	0.12	(2.4)	5
14	0.22	(4.4)	10

Method : Ag oz/ton : Fire Assay.
Bi ppm. : Atomic absorption ± 7% Relative accuracy.

Yours faithfully,

.....
A.G. NORTON.
Manager.

Silver values in dwts / long ton are shown in brackets.

DANI[illegible] LABORATORIES

Paid 25/6-71

GRIFFITH-INTECO (AUSTRALIA) PTY. LTD. INTECO

REGISTERED OFFICE: 4-8 GWYNNE STREET, RICHMOND, VICTORIA, AUSTRALIA, 3121
TELEPHONE: 42 4706 42 4707 TELEX: 31961 CABLES: GRINLABS MELBOURNE
INCORPORATING THE PRACTICE OF **R. J. GLUYAS & CO.**
5 BISHOP'S PLACE, KENSINGTON, S.A., 5068. TELEPHONE 31 8533

Job No : 71/322. June 15th, 1971.

Ausminco Services Pty. Ltd.,
233 Collins Street,
MELBOURNE. VIC. 3000.

Attention : Mr. Szabo.

Sample No's.	Auoz/ton.	% Cu.
Composite 1 - 14	0.13 (2.6)	1.37

Method : Au oz/ton : Fire Assay.

% Cu : Atomic absorption ± 7% Relative accuracy.

Yours faithfully,

Harry Fishman.

H. FISHMAN
Manager.

Gold values in dwts / long ton is shown in brackets.

Composite sample prepared by Sharp and Howells P/L

DANIEL C. GRIFFITH EXPLORATION LABORATORIES

GRIFFITH-INTECO (AUSTRALIA) PTY. LTD. INTECO

REGISTERED OFFICE: 4-8 GWYNNE STREET, RICHMOND, VICTORIA, AUSTRALIA, 3121
TELEPHONE: 42 4706 42 4707 TELEX: 31961 CABLES: GRINLABS MELBOURNE

INCORPORATING THE PRACTICE OF **R. J. GLUYAS & CO.**
5 BISHOP'S PLACE, KENSINGTON, S.A., 5068. TELEPHONE 31 8533

Job No : 71/286. June 10th 1971.

Ausminco Services Pty. Ltd.,
233 Collins Street,
MELBOURNE. VIC. 3000.

Attention : Mr. Szabo.

Sample No's.	Au oz/ton.	Ag oz/ton.	Pt dwts/ton.
Composite 1 - 14	0.15 (3.0)	0.17 (3.4)	0.02

Method : Au oz/ton :
Ag oz/ton : Fire Assay.
Pt dwts/ton :

Yours faithfully,

.....
A.G. NORTON.
Manager.

Gold and silver values in dwts/~~ton~~ long ton are shown in brackets.

Composite sample, prepared by Daniel C. Griffith (Aust.) P/L

$ 13:50
Paid - 7/7 - 71

DANIEL C. GRIFFITH (AUSTRALIA) PTY. LTD.

DANIEL C. GRIFFITH EXPLORATION LABORATORIES

REGISTERED OFFICE: 4-8 GWYNNE STREET, RICHMOND, VICTORIA, AUSTRALIA, 3121
TELEPHONE: 42 4706 42 4707 TELEX: 31961 CABLES: GRINLABS MELBOURNE

INCORPORATING R. J. GLUYAS & CO.

5 BISHOP'S PLACE, KENSINGTON, S.A., 5068. TELEPHONE 31 8533

Job No : 71/360. July 6th, 1971.

Ausminco Services Pty. Ltd.,
233 Collins Street,
MELBOURNE. VIC. 3000.

Attention : Mr. L.G. Szabo.

Dear Sir,

Please find enclosed the analysis of your two (2) samples for Gold, in reference to your letter of July 2nd, 1971.

Please address all correspondence to Mr. H. Fishman.

Sample No's.	Au oz/ton.	
K 1 - 1	0.03	(0.6)
K 1 - 2	0.02	(0.4)

Method : Fire Assay.

Yours faithfully,

H. FISHMAN
Manager.

Gold values in dwts/long ton and shown in brackets

APPENDIX II

9 DRILL CORE SAMPLES

Sample descriptions

Assay results by Spectrum Analytical Laboratories

and

Daniel C. Griffith (Australia) Pty. Ltd.

SPECTRUM ANALYTICAL LABORATORIES

sal

5 MARY PARADE, RYDALMERE, N.S.W. 2116 Telephone: 638-5905

P.O. BOX: 275 RYDE, 2114

TELEX: 20374

GLW:DAC

8th., July,1971.

The Chief Geologist,
AUSMINCO SERVICES PTY. LTD.,
233 Collins Street,
MELBOURNE. VICTORIA. 3000.

Attention: Mr.L. G. SZABO.

Dear Sir,

Further to our telephone conversation of the 7th., instant, I would like to re-iterate the following points.

There is no charge for the checks carried out by Atomic Absorption Spectrophotometry. This method employs an aqua regia attack followed by baking, re-dissolving in hrdrochloric acid and then an extraction using MIBK. Sample weight used is 5 grams.

Sample weights supplied were hardly sufficient for one assay in several cases. Fire Assays were conducted using 1 assay-ton (29.17 gm.) of sample.

Although there is a disparity between the cross checks and the original results, we feel confident that the values reported are accurate to within ± 5% of the result for the section of sample analysed. Gold, whether occuring in a native or combinedstate, is more often than not unevenly dispersed throughout an ore boby. Because of this, small samples of ore are likely to have anything from absolutely no gold content to very high gold content and hence be entirely unrepresentative. Further to this, if a small ore sample does contain gold, unless the gold is already present in a microfine state, it will be impossible to ensure complete sample homogenity even with the most careful sample preparation. The results from check analyses on such a sample would be typified by the check results shown in the accompanying report.

Considering these factors, it can be seen that sampling and sample preparation are of paramount importance. We recommend that a sample weight of approximately 2 lb., be supplied if possible. Even with large samples and correct

preparation techniques, check results of only the same order of magnitude could be expected. (A speck of gold weighing 0.001gm in a one assay ton sample is equivalent to 1 troy ounce / short ton in the ore body.)
It would be exceedingly unlikely for a cross check to agree exactly with an original result.

With regard to analytical techniques, we have a liaison with Mr. T. W. Steele at the South African Institute for Metallurgy. We are currently evaluating their analytical techniques and investigating lines of thought of our own. Routine analysis is presently being done using conventional Fire Assay techniques.

Should you have any enquiries regarding any analytical problem do not hesitate to contact us.

Assuring you of a fast, accurate and confidential service at all times.

Yours faithfully,
SPECTRUM ANALYTICAL LABORATORIES.

G. L. WINDRIDGE
Managing Director.

SPECTRUM ANALYTICAL LABORATORIES

5 MARY PARADE, RYDALMERE, N.S.W. 2116 Telephone: 638-5905

P.O. BOX: 275 RYDE, 2114
TELEX: 23074

GLJ:DAC

7 July 1971

ANALYTICAL REPORT

Customer: Ausminco Services Pty. Ltd.,
233 Collins Street,
MELBOURNE. VIC. 3000.

Attention: Mr. L.G. SZABO

Report No. 0239

Refer: -

Date Received: 3. 7.71

No. of Samples: 8

Date Reported: 7. 7.71 ('phone)

To Follow: -

Type of Analysis: Fire Assay

Sheet 1 of 1

Your Sample No.	SAL Code No.	Element Au Troy ounces/short ton					
		Original		Check		A.A.S.	
K1	B69/1	0.06	(1.4)	*		*	
K2	2	0.13	(3.0)	*		*	
K3	3	0.07	(1.6)	0.04	(1.0)	0.09	(2.0)
K4	4	0.03	(0.6)	0.04	(1.0)	0.04	(1.0)
K5	5	0.07	(1.6)	*		0.18	(4.0)
K6	6	0.07	(1.6)	*		*	
K7	7	0.08	(1.8)	0.03	(0.6)	0.15	(3.4)
K8	8	0.05	(1.2)	0.06	(1.4)	0.45	(10.0)

COMMENTS:

* Insufficient sample for check analysis
Please refer covering letter

Considering the checks on samples K4 & K7 & K8
original assay (Fire) varied from 0.6 & 1.8 dwt/ton av 1.3 dwt/ton
1st check (Fire) " " 0.6 & 1.4 " " 1.0 " "
2nd check (AAS) " " 1.0 & 10.0 " "
av 4.1 dwt/ton
i.e. 3 to 4 times other averages

G. L. Jackson
G.L. Jackson (B.App.Sc.)
Laboratory Manager

Gold values in dwts/long tons are shown in brackets.

LTD.

DANIEL C. GRIFFITH ... LABORATORIES

GRIFFITH-INTECO (AUSTRALIA) PTY. LTD. INTECO

REGISTERED OFFICE: 4-8 GWYNNE STREET, RICHMOND, VICTORIA, AUSTRALIA, 3121
TELEPHONE: 42 4706 42 4707 TELEX: 31961 CABLES: GRINLABS MELBOURNE

INCORPORATING THE PRACTICE OF **R. J. GLUYAS & CO.**
5 BISHOP'S PLACE, KENSINGTON, S.A., 5068. TELEPHONE 31 8533

Job No : 71/317.

June 10th, 1971.

Re. < 20 PPM

Ausminco Services Pty. Ltd.,
233 Collins Street,
MELBOURNE. VIC. 3000.

Attention : Mr. Szabo.

Dear Sir,

We enclose herewith the analysis of your 8 samples for Copper and Gold.

Sample No's.	% Cu.	Au oz/ton.	
K - 1	2.38	0.11	(2.2)
K - 2	0.13	0.26	(5.2)
K - 3	1.02	0.13	(2.6)
K = 4	0.09	0.10	(2.0)
K - 5	0.53	0.28	(5.6)
K - 6	4.48	0.20	(4.0)
K - 7	1.80	0.12	(2.4)
K - 8	1.24	0.10	(2.0)

4/9.0
2.2

21.0 av. 3.2

Method : % Cu : Atomic absorption ± 7% Relative accuracy.
Au : Fire assay.

Yours faithfully,

A.G. NORTON.
Manager.

Gold values in ~~long~~ dwts | long tons are shown in bracket.

REGISTERED OFFICE: 4-8 GWYNNE STREET, RICHMOND, VICTORIA, AUSTRALIA, 3121
TELEPHONE: 42 4706 42 4707 TELEX: 31961 CABLES: GRINLABS MELBOURNE

INCORPORATING THE PRACTICE OF R. J. GLUYAS & CO.
5 BISHOP'S PLACE, KENSINGTON, S.A., 5068. TELEPHONE 31 8533

Job No : 71/338. June 21st, 1971.

Melinga Mining & Finance Co. Pty. Ltd.,
22 Yurilla Drive,
BELLEVUE HEIGHTS. S.A. 5050.

Attention : Mr. A.J. Weil.

Dear Sir,

We now enclose herewith the analysis of your sample for Gold, reference your recent undated letter.

Sample No.	Au oz/ton.
K 9 - 2	0.18 (3.6 dwts/long ton)

Method : Fire Assay.

c.c. Ausminco Services Pty. Ltd., 233 Collins St. MELBOURNE.

Yours faithfully,

H. FISHMAN.
Manager.

Sample taken by Mr. A.J. Weil from K-6 sample locality.

APPENDIX III

Assay Reports

by

Sharp and Howells Pty. Ltd.

and

R.M.I.T.

Sharp and Howells Pty. Ltd.

INCORPORATING HOLLWAY & REDCLIFFE

CHARTERED CHEMISTS — ANALYTICAL, CONSULTING, INDUSTRIAL, & PETROLEUM

Reg. Office. 47 Yarra Bank Road,
South Melbourne, Vic. 3205

Telephone:
61 2041

21st June 1971

Ausminco Services Pty.Ltd
233 Collins Street
MELBOURNE. VIC 3000.

Dear Sirs,

Attention Mr Duncan C . Pursell

T E S T R E P O R T

Copper/ Gold ores
Lab. Nos 71/A/613 to 616

Sample marked	11.	12.	13.	14
Copper	1.6 %	2.6 %	3.5 %	0.3 %

Gold (Result from Royal Melbourne Institute of Technology)

Average on the four samples above 1.9 dwt/ton

± 0.3 dwts

Yours faithfully

for SHARP & HOWELLS PTY.LTD

(R.W.Scoborio.)

RWS/DM.1.

Sharp and Howells Pty. Ltd.

INCORPORATING HOLLWAY & REDCLIFFE

CHARTERED CHEMISTS — ANALYTICAL, CONSULTING, INDUSTRIAL, & PETROLEUM

Telephone:
61 2041

Reg. Office. 47 Yarra Bank Road,
South Melbourne, Vic. 3205

13th July 1971

Ausminco Services Pty.Ltd.
233 Collins Street
MELBOURNE VIC 3000.

Dear Sirs,

Attention Mr Duncan C. Pursell

T E S T R E P O R T

Samples of Copper/Gold ores received 31/5/71 and 4/6/71

Lab.No.	Sample No	Copper as Cu %	Gold (from A.M.Henderson R.M.I.T.) as Au (dwt.per long ton)
71/A/603	1	0.3	trace
604	2	0.1	0.4
605	3	0.6	trace
606	4	0.1	0.3
607	5	1.9	0.6
608	6	1.7	0.3
609	7	0.7	0.4
610	8	1.4	0.5
611	9	0.4	0.4
612	10	1.9	0.4
613	11	1.6	0.4
614	12	2.6	0.5
615	13	3.5	0.5
616	14	0.3	0.4
648	1-9 NaCN leach		0.04 (0.014 mg.of Au from 225 ml. of solution)
649	1/9 Cu leach	0.13	
650	leach residue	0.12	trace (insufficient sample)

other right show average 1.9 dwt ± 0.3 dwt

Yours faithfully
for SHARP & HOWELLS PTY.LTD

(R.W.Scoborio)

RWS/DM.1.

APPENDIX IV

Report on x-ray fluorescence scan

DANIEL C. GRIFFITH (AUSTRALIA) PTY. LTD.

DANIEL C. GRIFFITH EXPLORATION LABORATORIES

REGISTERED OFFICE: 4-8 GWYNNE STREET, RICHMOND, VICTORIA, AUSTRALIA, 3121
TELEPHONE: 42 4706 42 4707 TELEX: 31961 CABLES: GRINLABS MELBOURNE

INCORPORATING R. J. GLUYAS & CO.

5 BISHOP'S PLACE, KENSINGTON, S.A., 5068. TELEPHONE 31 8533

June 30th, 1971.

Ausminco Services Pty. Ltd.,
233 Collins St.,
MELBOURNE. VIC. 3000

Attention : Mr. Pursell.

Dear Sir,

I am enclosing the report which was promised to you, for the Rhenium estimations.

I felt you should have a copy of the X.R.F. sheets so that you could see that this type of work does take some time, if it is to be thorough.

Yours faithfully,

H. FISHMAN
Manager.

Specimens E 71/281, W2; E 71/286 composite of samples 1 - 14.

These two specimens have been analysed by X-ray fluorescence in a rapid scan to determine any interfering elements. The composite sample 1 - 14 shows traces of elements such as yttrium, zirconium, molybdenum, cobalt and an above average copper content. The molybdenite speciment (W2) shows, in addition to molybdenum, a variety of elements. There are traces of gold, selenium, bismuth mercury and rhenium.

Rhenium contents have been determined by several methods involving X.R.F. The $L\alpha_1$ line is not available because of overlap from zinc and second order molybden-um. The $L\beta_1$, $L\beta_2$ lines are available, provided second orders of molybdenum are not stimulated and allowance is made for any mercury or thallium content. Protracted counting rates enable a sensitivity of six parts per million (6 ppm) to be reached. The composite sample E 71/286 (samples 1 - 14) is below this concentration of rhenium. The specimen of molybdenite E 71/281, W2, is variable in rhenium content. Three separate specimens have been run. One specimen gave 190 parts per million - this was a discoloured specimen. Another specimen gave 60 parts per million - this was admixed with gangue material. An average of half the sample has given a value of one hundred parts per million (100 ppm).

The conclusion reached is that rhenium is concentrated in the molybdenite and may be variable in content, because of both admixed gangue material, as well as some regions of the sulphide having higher values than the average.

Sample No. E 71/286 composite of samples 1-14, came from Kapunda.

Sample No. E 71/281, W-2, came from N.S.W

APPENDIX V

Mineralogical Reports

Extracts from the Metallurgical Report

(AMDEL)

METALLURGY Progress Report No. 1. E-4

479' - P.S. 12680

To the naked eye, this specimen consists of a grey-brown siltstone with chalcopyrite and rare associated pyrite partially occupying a network of irregular cracks.

In detail, the boundary of the chalcopyrite with the host is occupied by discontinuous rims and globular aggregates of pyrite. These pyrite rims are locally up to 24 microns wide.

Discrete pyrite in gangue in euhedral to subhedral crystals occurs as grains up to 0.56 x 0.385 mm. Some such pyrite occurs partly in the matrix and partly in chalcopyrite.

Trace amounts of an exceedingly high reflectivity, white mineral (? silver) of very fine grain size occur in the pyritic rim and adjacent gangue around part of the chalcopyrite. It is recommended that is identity be determined by electron probe microanalysis. Most of the white grains are finer than 1.6 microns, and they form streaky loose aggregates.

Fine rutile occurs scattered lightly through the host rock in grains mostly finer than 14 microns, but up to 84 x 21 microns. Some of the coarser rutile is marginally intergrown with pyrite/chalcopyrite intergrowths.

Report and Investigation by: M. Wort

DESCRIPTION OF DIAMOND DRILL CORE SAMPLES

TAKEN FROM D.D.H. - K.P.1, on JUNE 7, 1971

sent to Spec Lab

K-1 Sampled intersection: 352 ft. to 362 ft. XX

Core Recovery 36% 1-30% Cu + 1-06% Cu specks & chains of weathered pyrite in Kaolin 2" wide seam of Q + py at 352

Kaolin rock with secondary copper sulphides

XX

K-2 Sampled intersection: 448 to 449 ft.

Granular pyrite zone intercalated by kaolin rock.

Felspathic silt stone with sulphide mineralisation on bedding planes. Q py veins 2" wide at 448', 458 458½, 459, 465, 4 9 509, 515, 533, 534½

K-3 Sampled intersection: 473 ft to 573 ft.
(chips taken from 473, 479, 496, 497, 503
512, 518, 530, 532, 536, 537, 543, 547, 556,
566, 573 ft. horizons).

Feldspathic siltstone with veins of primary and secondary copper sulphides and quartz veins.

K-4 Sampled intersection: 476 ft. to 570 ft.
(chips taken from 476, 486, 492, 498, 508, 515
527, 535, 540, 550, 560 and 570 ft. horizons).

Feldspathic siltstone with sparsely disseminated sulphides but without veins.

K-5 Sampled intersection: 610.0 to 610.5 ft.

Sulphide zone composed of pyrite, minor chalcopyrite and secondary copper sulphides. X

K-6 Sampled intersection: 742 ft to 752 ft. X X
Samples from three major quartz - sulphide veins.

K-7 Sampled intersection: 843 ft. to 893 ft.

Samples from major sulphide veins.

K-8 Sampled intersection: 8 ft to 320 ft. only 4' of core from 0-150' and 58' of core from 150-320' } 20%

Representative sample of kaolin rock intersection.
Samples have been taken at 2 to 3 inch intervals.

The samples were taken by:

L. G. Szabo, Chief Geologist, Ausminco Services Pty. Ltd.

METALLURGY Progress Report No. 2.

(AMDEL)

APPENDIX C

MINERAGRAPHY OF TEST 5 FLOTATION CLEANER CONCENTRATES

TEST 5 Sulphide Cleaner Conc. 1·69 Wt%, 21·6% Cu, 19·5% Fe, 28·4% S, 20% acid insol, 131g/t Ag + ≥0·01g/t Au

P.S. 12581

The following minerals were observed in polished section by reflected light: pyrite, chalcopyrite, covellite, neodigenite, chalcocite, malachite, limonite, quartz.

The relative order of abundance of the main mineral grain types is:

	%
Pyrite	53.2
Chalcopyrite	14.4
Chalcopyrite/covellite	6.3
Chalcopyrite/neodigenite	3.6
Pyrite/chalcocite	4.5
Chalcocite	12.6
Covellite	4.5
Chalcopyrite/chalcocite	0.9
	100.0%

Trace amounts of other grains occur - e.g. malachite, limonite and quartz.

From the above proportions it can be seen that

(a) Pyrite is present in much greater quantity than chalcopyrite

(b) Most of the pyrite is free, whilst most of the chalcopyrite occurs as partly replaced grains.

Much of the chalcopyrite replacement is by neodigenite and by covellite. Various stages of replacement occur, from surficial alteration showing as a rim in polished section, to penetration along fine cracks. In some grains both types of attack occur, and the most altered grains contain only relict blobs and fine specs of chalcopyrite.

Where chalcopyrite has been replaced by covellite a pink-brown (?bornite) phase sometimes occurs within the covellite.

Pyrite replaced by chalcocite may occur either as uniform grey areas containing completely unattacked, even enhedral pyrite, or as off-grey grains which on examination at x1300 magnification are seen to be clouds of submicroscopic pyrite relict grains set in chalcocite.

For beneficiation purposes chalcocite (Cu_2S) and neodigenite (Cu_9S_5) may be considered identical. Neodigenite is a more-blue phase and appears to occur mainly (in this specimen) as a replacement of chalcopyrite.

All the sulphide grains observed were liberated from gangue. Binocular examination revealed some malachite/chalcocite composites lying below the plane of the section.

The pyrite is mainly very angular. Some grains are strongly fractured. A few "porous" or "gel-structure" grains occur. Size range is 0.021-0.101 mm. The average grain size is about 0.035-0.07mm. 1 grain of spherical gel pyrite was observed, 0.14 mm in diameter.

Liberated chalcopyrite up to 0.175 mm size occurs. Covellite ranges from 0.0012 x 0.0025 mm up to 0.064mm x 0.160mm.

A few composites of more than one phase occur, e.g.:

pyrite/chalcopyrite/covellite
or pyrite/chalcopyrite/neodgenite.

In these cases, the chalcopyrite is selectively replaced by the secondary sulphides, leaving the pyrite intact.

TEST 5 Oxide Cleaner Conc.

P.S. 12580

Binocular examination of the polished section, revealed that the ratio of yellow sulphides to malachite to azurite is approximately 80:10:1.

The following minerals were observed: pyrite, chalcopyrite, covellite, neodigenite, malachite, azurite, limonite, ?marcasite, chalcocite.

The cominant mineral present is pyrite. The extreme size range is about 0.021-0.28 x 0.14mm. Most grains however are 0.035-0.10 mm in size. Porous-textured grains are not uncommon. Covellite and neodigenite are present only in very minor amounts. Chalcopyrite is present in trace amounts. One grain of pyrite/chalcocite composite was seen - suggesting complete selective replacement of chalcopyrite, leaving pyrite inclusions unattacked.

Rare grains of ?marcasite/pyrite composite were observed, ranging from 0.0025mm to 0.07 x 0.049mm. A larger grain of ?marcasite, 0.21 x 0.09mm, was observed with a 0.035mm pyrite inclusion.

Conclusions

P.S. 12581 (Sulphide Cleaner Concentrate) and P.S. 12580 (Oxide Cleaner Concentrate) show that copper is effectively recovered but that pyrite is still evading suppression in the oxide flotation.

BLOCK "B"

BLOCK "A"

BLOCK "C"

BLOCK "D"

3 / 2·2

2 / 2·6

1 / 3·6

H-3 / 0·8

5 / 2·6

4 / 2·8

14 / 24

6 / 2·0

7 / 24 & H-2 / 2·0

11 / 1·6

10 / 2·2

8 / 2·6

9 / 3·0 & H-1 / 3·0

12 / 2·0

13 / 2·4

Coyle Lode

Richard Lode

Truscott Lode

Main Lode

Trounce Lode

Traffon Lode

Minor Lode

Hart Lode

Quoshan Lode

Mitchell Lode

Central Lode

Eastern Lode

Boundary Lode

Western Lode

Kyar Shaft

Bagot Shaft

Magor Shaft

Harris Shaft

Kaolin Shaft

Double Whip Shaft

Stockyard Shaft

East Kapunda Shaft

Boundary Shaft

Triplett Shaft

Hillside Shaft

U.D.P. Shaft

Thomas Shaft

KV1 KV2 KV3 KV4 KV5 KV6 KV7 KV8 KV9 KV10 KV11 KV12 KV13 KV14 KV15 KV16 KV17 KV18 KV19 KV20 KV21 KV22 KV23 KV25 KV26 KV27 KV28 KV29 KV31 KV32 KV33 KV34 KV35 KV36 KV38 KV39 KV40 KV41 KV42 KV43 KV45

KP1

PD1 PD2 PD3 PD4 PD5 PD6 PD7 PD8 PD9 PD10

DD1 DD2 DD3

SECTION LINE 2000N

SECTION LINE 1000N

SECTION LINE 500N

SECTION LINE 00N

I.P. 150' SPACING

I.P. 200' SPACING

I.P. 300' SPACING

LP SPACING 100'
IP 200' SPACING

2200N 2000N 1800N 1600N 1400N 1200N 1000N 800N 600N 400N 200N 00 200S 400S 600S 800S

200W 00 200E 400E 600E 800E 1000E 1200E 1400E

LEGEND :

SAMPLE LOCALITY

CHANNEL SAMPLE LOCALITY

6 ← SAMPLE NUMBER

2·0 ← GOLD dwts/ton

PLAN SHOWING THE SURFACE SAMPLE LOCALITIES

AUSMINCO PTY. LTD.

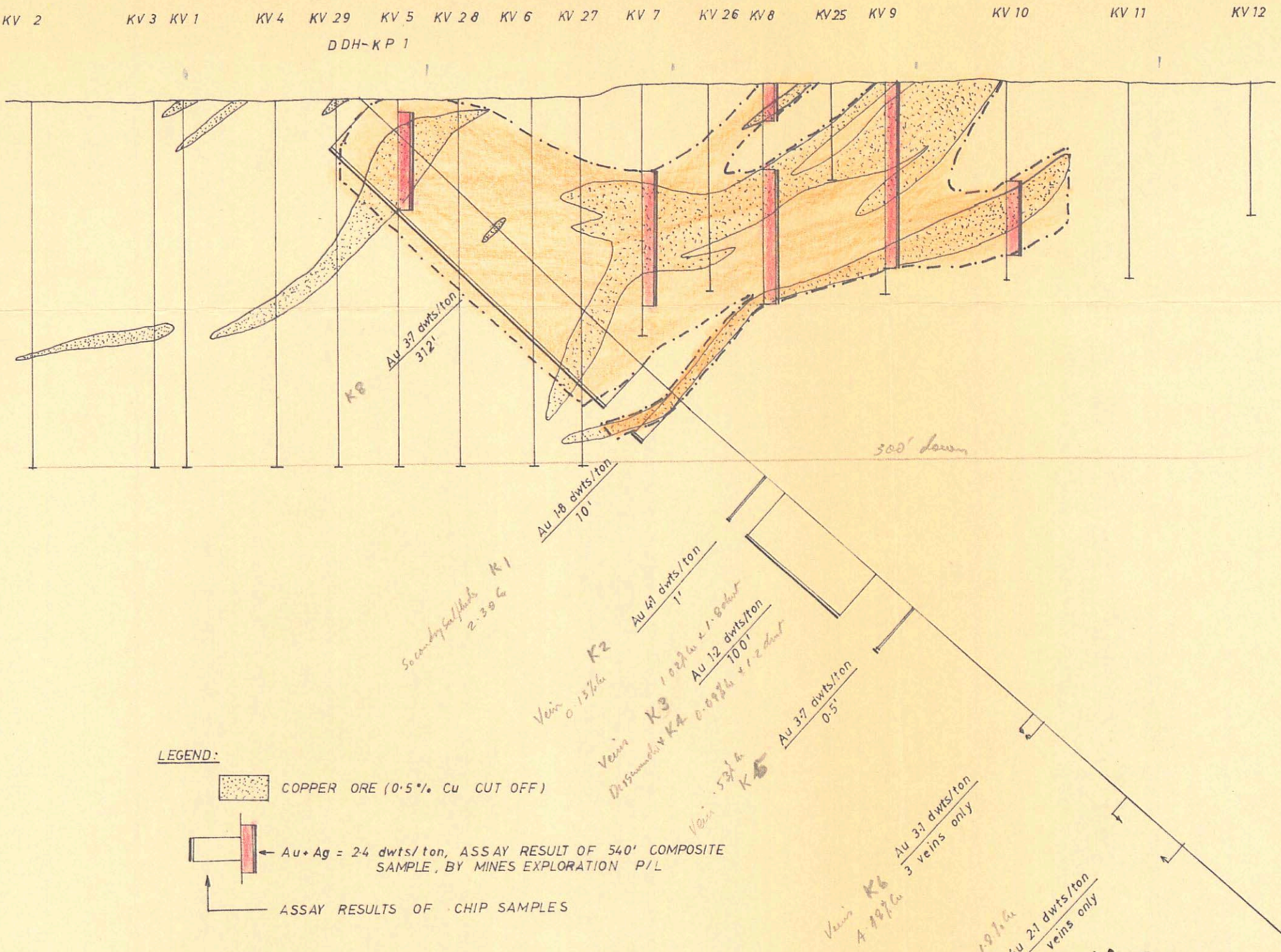
KAPUNDA MINES

PLAN SHOWING DRILL HOLES AND ORE OUTLINE

1651-2

RECEIVED
10 AUG 1971
DEPT. OF MINES
SECURITY
1651

COMPILED : L. SZABO	DRAWN : D.M.	Drg. N°
SCALE : 1" - 100'	DATE : APRIL 1971	



LEGEND:

COPPER ORE (0·5 % Cu CUT OFF)

← Au + Ag = 2·4 dwts/ton, ASSAY RESULT OF 540' COMPOSITE SAMPLE, BY MINES EXPLORATION P/L

ASSAY RESULTS OF CHIP SAMPLES

GOLD - SILVER MINERALISATION

1651-3

NORTHLAND MINERALS LTD

KAPUNDA MINES - GOLD MINERALISATION

SECTION LINE 1000 N

COMPILED: L.G.SZABO	DRAWN: L.G.S.	DRG. No: 2.
SCALE: 1"=100'	DATE: JULY 1971	