# DEPARTMENT OF MINES AND ENERGY SOUTH AUSTRALIA

REPT.BK.NO. 86/83 BRUKUNGA MINE, INVESTIGATION OF ACID DRAINAGE

GEOLOGICAL SURVEY

by

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The abandoned 3rukunga Pyrite Mine is a source of acid drainage which pollutes nearby creeks.

Six holes were wrilled in the quarry benches to investigate the production of acid drainage. Comparison of chemical analyses of drillhole samples with analyses of uncontaminated groundwater and water in the outflow drains shows that acid drainage is produced in two ways:

- Rainwater is infiltrating the quarry benches and oxidizing pyrite.
- Groundwater from outside the quarry area is emerging in the lowest quarry floor and oxidizing pyrite.

#### Remedial work is proposed as follows:

- . The benches should be sealed in the 'recharge areas'.
- . Work should be carried out in the lowest cuts so that groundwater is discharged without coming into contact with air in the presence of pyritic material.

It is important that no work is done to cover up the quarry faces until it can be seen that the sealing of the quarry floor has been effective.

#### INTRODUCTION -

The Brukunga Mine lies about 30 km ESE of Adelaide and 4 km N of Nairne (Fig. 1).

Between 1952 and 1972, pyrite was mined for manufacturing sulphuric acid for superphosphate production.

Since abandonment acid drainage from the mine has been polluting the adjacent Dawesly Creek, causing low pH values in the summer and unsightly deposits of iron and manganese oxides.

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#### INTRODUCTION

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Since abandonment acid drainage from the mine has been polluting the adjacent Dawesly Creek, causing low pH values in the summer and unsightly deposits of iron and manganese oxides.

Most of the problem has stemmed from the tailings dam on the eastern side of Dawesly Creek. However a significant amount of acid drainage is being produced by seepage from the mullock heaps and mine faces on the western side of Dawesly Creek.

The object of this program was to investigate the nature of the seepages in the quarry face.

# GEOLOGY & HYDROGEOLOGY

The orebody was beds of the Nairne Pyrite Nember which occur in pyritic phyllites of the Talisker Calc-Siltstone (Belperio, 1985). Like most Kanmantoo Group rocks of Cambrian age these are generally of low permeability and well-yields are small.

Groundwater salinities are typically about 2 000 mg/L, reflecting poor circulation and low recharge rates.

Groundwater circulation is on a local scale in fissure aquifers of limited extent, which discharge into creeks, such as Dawesly Creek.

#### DRILLING

In November 1985, a total of eight holes were drilled at locations shown in Figure 2. Results are summarized in Table 1 and drillhole logs are shown in Appendix A. Water analyses are in Table 2.

TABLE 1 Wells Drilled - 1985

Unit No. *	Depth (m)	Water Cut(m)	Yield L/s	рĦ
7454 7455 7456 7457 7458	20.6 25 20.6 25 7	12 9 15 and 19 7 and 18 2	Very small 0.25 Very small Very small	4.7 4.9 4.3
7459	25	7 3 and 11	0.5 Very small	3.4 3.7

<sup>\*</sup>Add prefix 6627ww

TABLE 2 Chemical Analyses

Unit No.*	Depth (m)	Date	TDS	pH	Acidity to pas.3	Fe <sup>2+</sup>	Mn <sup>2+</sup>	¥134	zn²+	Ca <sup>2+</sup>	Mg <sup>2+</sup>	Na <sup>+</sup>	K*	HCO3	so <sub>4</sub> ?-	CI.	NO;
W5908	6	18/ 1/56	1796			292		103				300 W P 204 ® 1	W WINDSHIP			territorio de la compe	-
16917		1972	<b>95</b> 3	7.4	-	1.4			400	49	39	14	-	Wil	1155	145	Wi
<b>15</b> 318		18/ 1/52	2104	46		Nil	saps 	4529	-	40	39	263	10	165	00	440	× ×
W5920	34	25/ 5/50	1947		_	MIT	400	City City	***	83	97	586		150	127	1062	Ni
VI5944		18/ 1/55	2427		_	49	-	409	****	51	71	593	69	131	176	925	Ni
15945		5/ 1/73	11207	2.5	•		**	•	CED CED	125	113	530	-	147	257	1154	Wi
P5948		1976	1458	3.8	•••	848	<b>49</b>	***	***	548	720	660	4	111	790	530	44%
W7454	10	-13/11/93				67	45	47	-	50	55	220	9	Mil	830	350	•
W7455	9	14/11/85	9800	3.4	3436	1350	24	89	21	600	315	175	20	Nil	7060	129	<
W7456	20		16700	3.3	9050	3520	41	45	22	380	225	36	10	Nil	12400	33	~
W7456	20	27/11/85	17200	3.5	13000	5250	73	83	55	360	315	150	18	Mil	15100	227	<0.
W7456		8/ 5/86	14000	2.9		4380	72	49	45	247	250	125	10	Mil	12900	450	<0.
	-	9/ 5/86	12500	2.9		4050	68	45	37	240	240	150	13	Nil	11600		
W7457	7	15/11/95	16700	3.2	9800	3020	42	380	24	350	195	53	10	Nil		250	<0.
W7458	2	16/11/85	<b>1560</b> 0	3.0	9080	2750	51	285	29	320	190	30			13600	90	<
W7458	7	16/11/65	15100	3.0	9230	2670	49	285	32	255	190	32	18	Mil	11900	45	<
W7459		27/11/85	14800	3.3	9500	4430	95	75	50	450			11	Nil	11600	50	<
W7459		8/ 5/86	27600	3.1		8900	110	430	80		375	205	22	Mil.	13500	187	<0.
W7459		9/ 5/06	27200	2.8	•	8100	113	470	83	340	400	48	8	Ni.1	25700	140	<0.
P7469		13/11/85	18700	2.7	9560	2130	37	425		350	420	53	8	Nil	26300	150	<0.
P7468		13/11/85	21600	2.7	11750	2600			8	430	380	200	6	Nil	14800	311	2
		-,,		-9,	***************************************	#000	47	570	35	370	350	105	7	Nil	17100	372	1

\* Add prefix 6627W (Note: WW are water wells WP are water points)

#### SEEPAGES

Numerous minor seepages can be seen in the faces of the upper benches as high as 405 m AHD.

Water from these does not flow any distance before being lost to evaporation. These seepages are believed to be intermittent, operating for a limited time after rainfall.

The significant seepages are those occurring in the two lowest cuts and are described below.

### Northern Cut

This area is the major source of acid drainage, the total outflow being gauged at 0.22 L/s on 18/11/85. A water analysis is shown in Table 2 and pollutant outputs in Table 3 (6627WP7463).

TABLE 3
Estimated pollutant loads as at 13/11/85

	Northern Cut WP7468	Southern Cut WP7469	Total
Outflow, m3/day	20	3.3	23
Dissolved solids, kg/day	432	62	490
Acidity as CaCO3 kg/day	230	32	260
Iron, kg/day	52	7	60

Three groups of springs can be seen on the upper part of the west face of the cut. An attempt to gauge the flow from one of these was unsuccessful because of its small size and the permeable nature of the quarry floor.

The visible springs are too small to account for the total outflow and other inflows must be occurring either under the rockpiles at the southern end of the cut or upwards through the floor. This is confirmed by the water chemistry (see Discussion).

# Southern Cut

There are three groups of visible seepages all in the upper half of the face:

One at the northern end of the western wall. One at the southwestern corner.

One near the southern end of the western wall.

On the quarry floor at the southern end, there is also a small area of less acid (pH about 4.3) water which has been colonized by a clump of reeds. Presumably this marks the emergence of more deeply circulating groundwater.

The visible seepages appear to be large enough to account for the small outflow of this cut.

A water analysis of the outflow from this cut is shown in Table 2 (6627 WP 7469) and pollutant output in Table 3.

# PRODUCTION OF ACID DRAIMAGE

Acid seepage is generated by the oxidation of pyrite, as represented by the equation:

The reaction is catalyzed by Thiobaccillus bacteria and probably proceeds through a number of intermediate steps.

Water emerging from seeps in the quarry face has been observed to decrease from a pH of about 3.5 to 3.1. A decrease in pH was also observed in a sample of water taken from the rock Apparently this decrease is due to exidation of the forrecs to ferric ion and subsequent hydrolysis of the ferric

$$2Fe^{2+} + 2H^{+} + \frac{1}{2}O_{2} + 2Fe^{3+} + H_{2}O$$
 $Fe^{3+} + H_{2}O + Fe^{3+} + H^{+} (pR_{a} = 2.2)$ 

It can be seen from Figure 3 that much of the iron produced in the quarry area is not reaching the outflow drains.

Precipitated brown iron oxides are evident on the rock faces and in the pools on the pit floor, especially on the filamentous green algae which grow in the water.

The solubility of oxygen in water at  $26\,^{\circ}\text{C}$  is 0.04 g/L (Aylward and Findlay, 1966), sufficient to raise the sulphate concentration by 69 mg/L by oxidizing pyrite.

Since observed sulphate concentrations are many times higher than this, it is obvious that pyrite is being oxidized in contact with air, not merely by contact with water carrying dissolved oxygen. Therefore acid is being produced either close to the water table or by descending waters above the water table.

The quarry banch is a bare vegetation-free surface with crushed rock overlying fractured rock. It is therefore an ideal surface for infiltration of rainfall.

Water level measurements are available for the time of drilling (late spring) when no rain had fallen for a few months and after a wet winter (Table 4).

TABLE 4

Unit No.*	Water Water le	levels in observation wells vels, m below surface
	27/4/85	16/9/86
7454	1.41	0.16
7455	2.52	0.42
7456	10.40	9.83
7457	1.68	0.51
7458	1.60	1.21
7459	9.75**	0.95

<sup>\*</sup> Add prefix 6627WW

It can be seen that the water table rises almost to the surface after rain. Most of the problem seems to be due to oxidation within three metres of the surface at the bench.

Elemental sulphur can be seen on the lower quarry floor, a result of partial exidation of pyrite under acidic conditons (Krauskopf 1967, p. 276).

FeS<sub>2</sub> + 1/2 O<sub>2</sub> + 2H<sup>+</sup> + Fe<sup>2+</sup> + H<sub>2</sub>C + 2S

<sup>\*\*</sup>Not recovered at time of measurement.

### WATER CHEMISTRY

Waters in and around the mine fall into three broad groups each with distinct chemistry:

- uncontaminated groundwater,
- water below the quarry bench,
- water in the outflow drains.

# Uncentaminated Groundwaters

No wells nearby are now wailable for sampling.

However old analyses are available for a well near the Mine, one downstream and a diamond drillhole into the orebody which

These are shown in Table 5.

TABLE 5 Uncontaminated Groundwaters

					A MECh	GERRARE	ers	
Unit No.*	Date	Ca <sup>2+</sup>	4g <sup>2+</sup>	Na÷	ECO <sub>3</sub>	so <sub>4</sub> 2-	Cl-	Comenta
₩ <b>5</b> 91#	18/1/52	83	97	586	150	127	1062	Diemond drillhole
<b>134</b> 5920	25/5/50	51	71	593	131	176	925	in Pyrite Beds Well at mine site
VW5944	18/1/50	125	113	630	147	257	1154	Private well, south of mine
* All prefrix	6627	· · · · · · · · · · · · · · · · · · ·	·	TO SECURE THE PARTY OF THE PART	option of the second	BOOK (FIFTH TO BE AND ASSESSED.)	With Statement .	Va. 114.102

The important features of these waters are the relatively high sodium and chloride contents and the moderate sulphate levels. pH was not measured but the presence of bicarbonate shows that the waters were not acid.

It should be noted that although these analyses are all over 30 years old this does not mean that uncontaminated groundwater no longer exists in the area, merely that no suitable wells for sampling still exist.

# Waters below the quarry bench

These are the waters intersected during the 1985 drilling program and shown in Table 6.

TABLE 6
Water from holes in the mine area, 1985

Unit No.	* Fe <sup>2+</sup>	Al <sup>2+</sup>	Ca <sup>2+</sup>	MG <sup>2+</sup>	**	HCO3	so <sub>4</sub> 2=	Cl-	pH	Acidity to
WW7454	1350	89	600	315	175	9	70.50	C ALC	And the same of th	
<b>W74</b> 55	3520	45	380	225	36	0	7060	129	3.4	3430
WW7456	5250	83	360				2400	33	3.3	2050
W7456	4380	49	240	315 250	150	0	16100	227	3.5	12000
<b>M745</b> 5	4050	45			125	0	12900	450	2.9	***
<b>447</b> 457	3020	147	<b>24</b> 0	240	150	9	11600	250	2.9	-
<b>474</b> 58	2750	380	350	195	53 30	0	13800	36	3.2	12400
(2n)	2/30	285	320	150	30	9	11900	45	3.0	=080
647458 (7m)	2670	425	255	150	32	9	11600	50	3.0	2230
W7459	4430	75	450	375	205		0.0000			
W7459**	8900	430	340			9	13500	187	3.3	<del>-5</del> 00
W7459##	8100	470		400	48	o	26700	140	3.1	en ,
THE PARTY OF	3700	3/0	350	420	53	0	26300	150	2.8	,60a
CONTRACTOR CONTRACT : 400000	Diving the same of the same									

Add prefix 6627

These waters have the following characteristics:

- . Very high levels of sulphate, iron and acidity resulting from the oxidation of pyrite.
- . Zero bicarbonate, because of the high acid content.
- . High levels of calcium and magnesium resulting from reaction between the acidic water and the rock.
  - Sodium and chloride levels are much lower than in natural groundwaters of this area (Table 4). Chloride contents tend to increase with depth (Fig. 4).

The samples fall into two groups: WW7454, WW7456 and WW7459 with sodium and chloride levels over 120 mg/L and the remainder with sodium and chloride below 55 mg/L.

The latter represent waters infiltrated directly through the bench.

The analysis for WW7454 is consistent with mixing of uncontaminated groundwater with directly infiltrated contaminated water. The significance of analyses from WW7456 and WW7459 is not clear.

<sup>\*\*</sup> This water had been sitting in the well for months and these analyses should be disregarded.

Originally it was suspected that the high level of contamination in these wells was a result of bailer sampling a day or more after drilling.

The wells were pumped and sampled to check this. When Pumped, MM7450 yielded only the volume in storage and showed no recovery overnight. The samples obtained had the highest levels of sulphate recorded in this area. It is concluded that the samples represent water which had been in the well for months reacting with the pyritic rock.

HW7456 produced some water from the aquifer when pumped and showed significant recovery overnight.

Sulphate was significantly lower than in the original bailed sample showing that this had been affected by reaction between air, water and the rock.

The variation in chloride content between samples taken on consecutive days is probably due to analytical error.

The results from this well can be interpreted in two ways:

- The high level of sulphate results from the oridation of pyrite in the well wall, and the samples can be disregarded.
- Native groundwater is in fact oxidizing pyrite at the water table.

The former seems the more likely, but, the possibility that oxidation is occurring at the water table cannot be eliminated.

## The Outflow Drains

Analyses of water from the outflow drains are shown in

TABLE 7 Water from the quarry drains 13/11/85 Unit No.\* Pe2+ Al3+ Ca2+ Mg2+ Na+ MCO3 SO42- Cl ph Acidity to MIF as C:CO3 WP7469 2130 425 430 380 200 0 14800 311 2.7 9560 WP7468 2600 570 370 350 185 0 17100 372 2.7 11750

<sup>\*</sup> Add prefix 6627

These samples have similar levels of contamination from oxidizing pyrite to those in the test holes shown in Table 5.

However sodium and chloride concentrations are much higher. It is concluded that the acid water flowing out of the open cut is a mixture of waters formed in two ways.

Firstly, acidic waters of the type found in the test holes (Tab. 5) are formed within the quarry benches and seen into the open cut.

Secondly, some local groundwater (high sodium and chloride) is emerging in the floor of the cut and reacting with pyritic material on the quarry floor.

The following supporting evidence is offered:

- . In the northern cut, the seepages visible in the sides of the cut are clearly less than what is flowing out of the drain.
- In the southern cut is a small area, where the water in the broken material of the quarry floor is less acid (pH about 4), and which has been colonized by a clump of reeds. Presumably slightly contaminated groundwater is emerging into the quarry floor.
- . In the floor of the cut boulders of pyritic rock are crumbling under chemical attack and native sulphur is abundant, clear evidence that pyrite is oxidizing.

Chioride and supposte contents are shown in Figure 5.

The proportion of sulphates produced by the two processes can be estimated as follows.

Estimated average sodium & chloride concentrations are:

	Ma <sup>+</sup> (mg/L)	Cl-(mg/L)
Groundwater	590	1000
Water under bench	37	40
Water in outflow drain	185	311

Assuming that evaporation can be neglected, the groundwater contribution to outflow is calculated as 0.27 and 0.28 respectively.

From this it is estimated that at the time of measurement, 40% of sulphate in the outflow had been produced in the pit floor.

Calcium and magnesium concentrations are higher in the outflow drain than in either uncontaminated groundwater or the contaminated groundwaters under the quarry bench. This shows that the acid waters are dissolving calcium and magnesium from rock on the pit floor.

### PRESENT SITUATION

At present the following remedial measures have been taken (Fig. 5).

- Dams, drains and pipes have been constructed to divert surface runoff from the pit area.
- . Acid drainage is collected and sumped to the dam below the tailings pond to be treated by the lime neutralization plant.

The effectiveness of these measures has been reduced by broken pipes and partly blocked drains resulting from inadequate

# POSSIBLE SOLUTIONS

The treatment of acid drainage in the lime neutralization plant cannot be considered to be a long term solution, and ways must be found to reduce acid production.

At the time of measurement about 60% of sulphates originated within the quarry bench and 40% were produced by emerging groundwater within the quarry floor.

These proportions will vary through the year because of different responses to rainfall, but clearly both processes are important and need to be controlled.

# · Prevention of Infiltration.

The quarry benches, being free of vegetation and natural soil cover allow ready infiltration of rainfall. To prevent this the following measures are needed.

- The existing system of drains to prevent surface runoff entering the pit area should be maintained and ungraded where necessary.
- . The bench floors should be sealed with clay, bitumen or plastic.
- . The sealed areas must be drained without water coming into contact with pyritic material.
- Control of groundwater entering the quarry.

  It is not feasible to prevent natural groundwater from entering the quarry at the lowest levels

Acid production could be stopped by preventing water and air coming into contact with pyrite simultaneously. This could be achieved by levelling out the broken rock in the floor of the cut and covering with a layer of clay. By keeping a water table within the clay layer, oxygen would be prevented from coming into contact with the pyrite, and groundwater could be discharged with only slight contamination.

Because of the uncertainties surrounding mechanisms of acid production and their control, remedial work should be carried out in stages.

It is most important that the bench near the Pistol Club should be sealed first so that the effectiveness or otherwise of sealing can be evaluated before any measures are taken to cover the seepage faces.

### CONCLUSIONS

- 1. Acid drainage is being produced in two ways:
  - Rainfall infiltrates into the quarry benches, oxidizes pyrite and re-emerges in the lowest cut.
  - · Natural groundwater from outside the mine area seeps into the lowest cut and oxidizes pyrite in contact with the air.
- The first mechanism of acid production could be controlled by sealing the quarry benches to prevent rainwater from infiltrating.

- 3. The second mechanism of acid production could be controlled by levelling the floor of the lowest cut and covering with clay to allow groundwater to drain out without coming into contact with air.
- 4. The northern end of the quarry occupied by the Pistol Club is the major source of acid drainage.

### RECOMMENDATIONS

- The quarry bench in the area of the Pistol Club should to sealed with clay, covered with soil and grassed to prevent water from infiltrating.
- Drains chould be constructed to conduct surface runoff away from the sealed area without coming into centact with pyritic material.
- 3. No work should be done to cover the quarry faces until sealing of the benches has proved to be effective. This will mean leaving it for at least one winter.
- 4. When acid production from infiltrating rainwater has been effectively controlled remedial work should be carried out on the lower cut as follows:
  - The broken pyritic rock should be levelled across the base of the cut.
  - The above should be covered with about a metre of clay.
  - . A bund and outflow drains should be constructed to maintain an artificial water table within the clay.
  - The clay could then be covered with rock from the mullock heaps to produce the desired contours. This in turn should be covered with clay and soil and vegetated.

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RER: 2V

### REFERENCES

- Aylward, G.H. and Findlay, T.J.V. (Ed.) 1966. Chemical Data Book. 2nd edition. John Wiley and Sons. Australasia
- Atlas of South Australia, 1:50 000 series. Geological S. Aust.
- Krauskopf, K., 1967. Introduction to Geochemistry. McGraw-Hill Book Company.

# APPENDIX A GEOLOGICAL LOGS

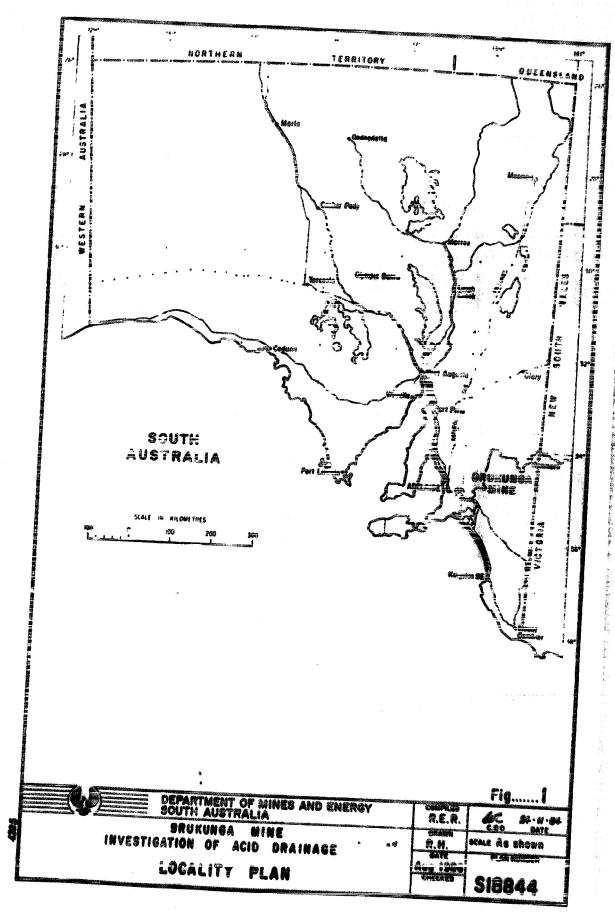
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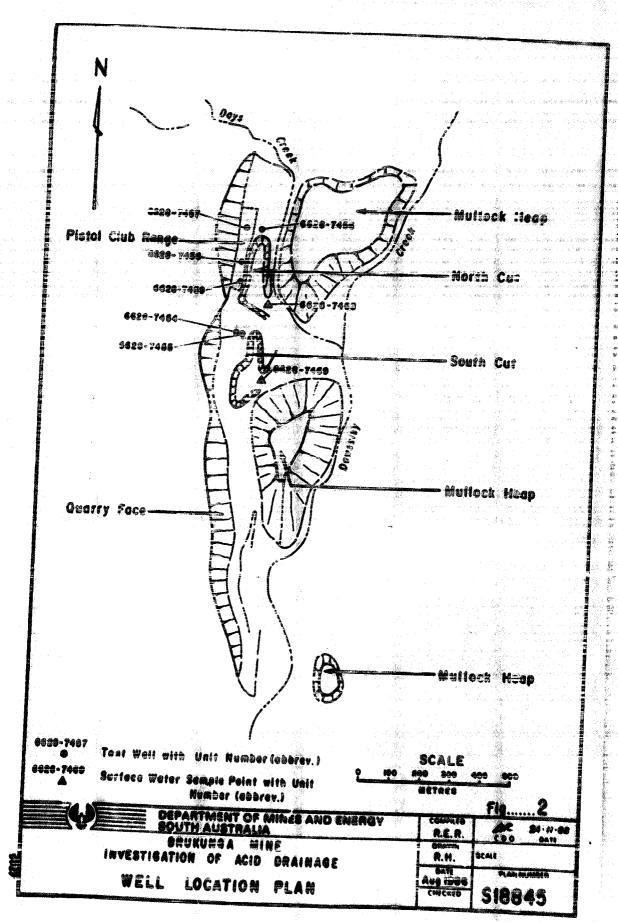
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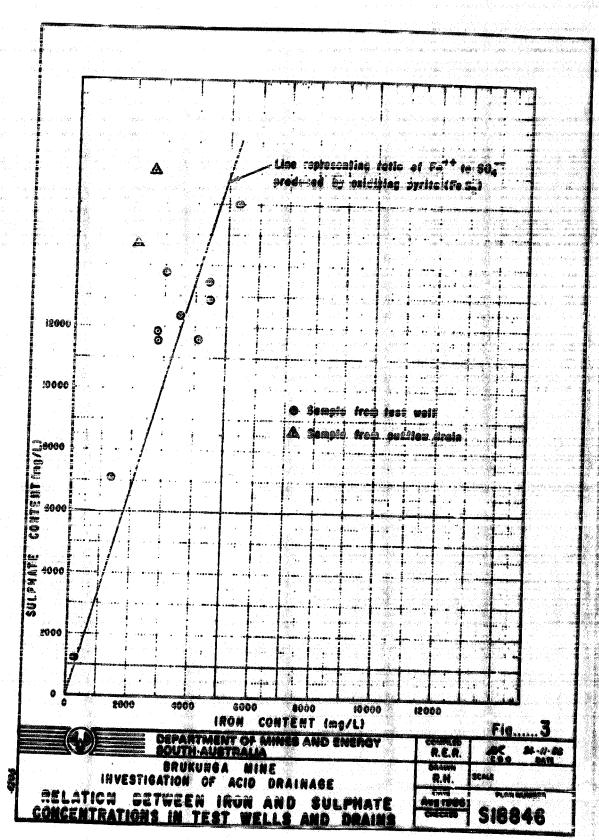
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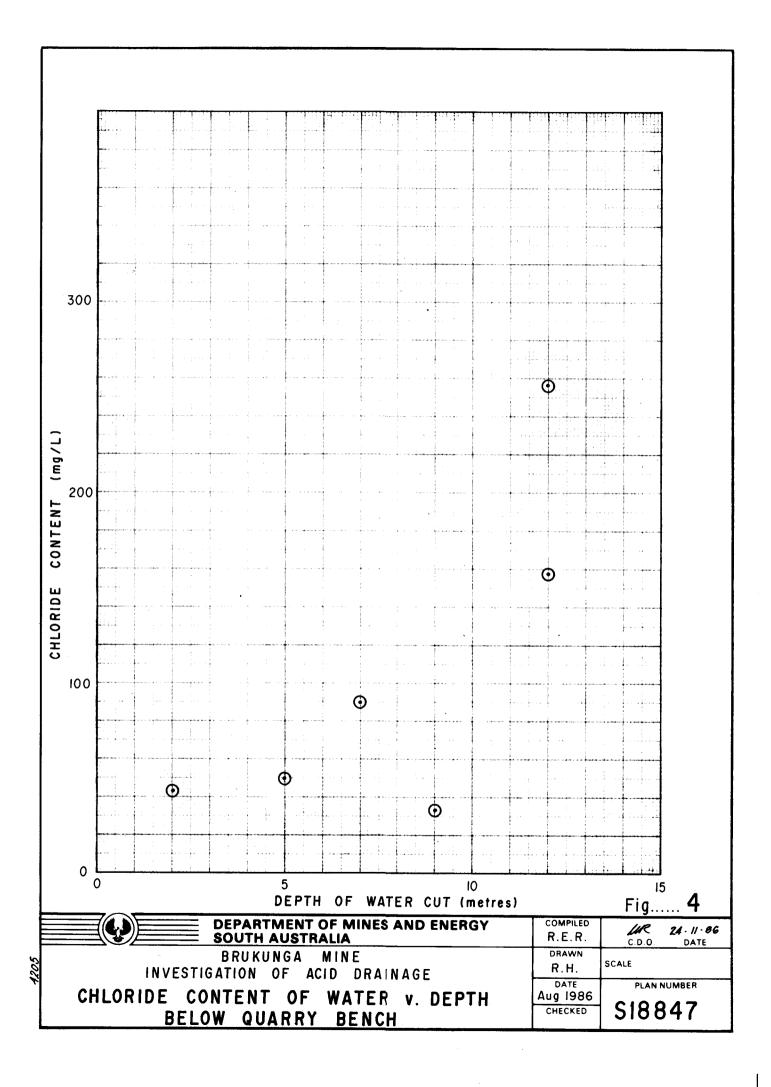
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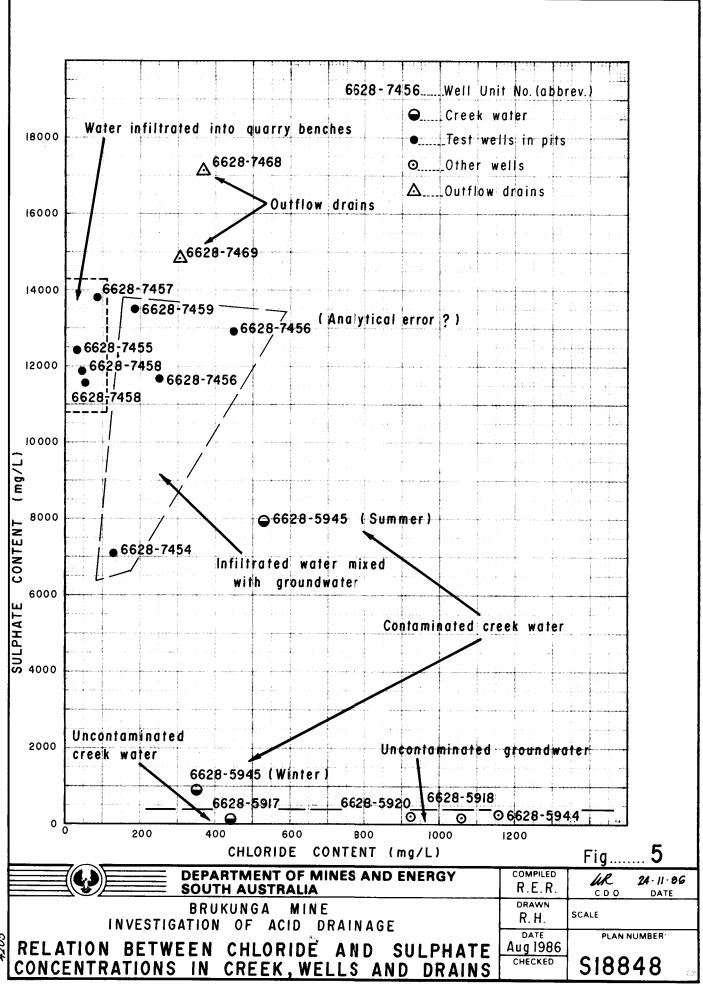
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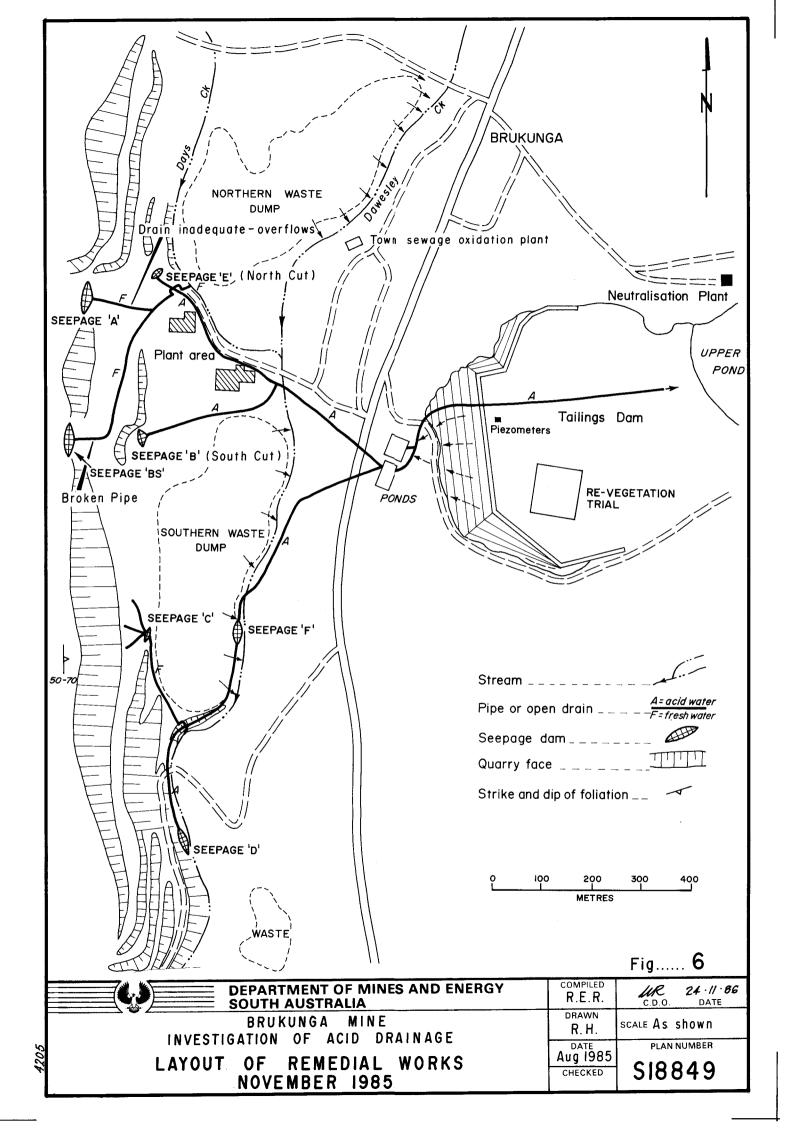












### APPENDIX

NAIRME PYRITE MEMBER

LOGS OF DIAMOND DRILL HOLES 108 AND 100

(REPRINTED FROM RB 66/119)

650/69 SEC\* 0% 4410 HANDELT KANMANTOO COORDINATES 4250 5 JUIN CHE HTUOG HOTALE 588 E 5 - Serior 1112-0 ANGLE FROM HOR ZONTAL 30" of surface LOCATION BRUKUNGA IIID A DIRECTION 270° GRID 260° TRUE Down Pt. Adelaide M.S. \$ 15.20 | SEACTOR STRUCTURES

PORTS OF NO. 12 ANS.
SOCIETE TOWNS, TRUSHED TOWN OF TO PRIOR OF COST PEIMARY STRUCTURES 4 4 64 Red clay. High plastic took of the street of GRANOFELS - Brown to mo come Incipient schistocity Planar, 10 to axis of care Joints - open Hemotite and clay Coutage planar 50% porally. To schistocity Rest various angles 45° to axis of care 1-3 mm. wide 0.4 ft. apoit. grey medium grained No visible 160% quartz, 10% mica rest feldspar. Fen % loyering schene HO CORE GPANOFILS - Grey fine Alignment of mice to give incipient schistocity. Joints if one 70° to axis of core if immatite cored 1 to 3 mm. wide 02 ft. apart. Class of the matite filled 1 mm. wide mainly 70° to axis of core 01 ft. apart. grained 50% quartz 10% mica 3% sohen-Rest weathered feldspar. NO CORE Grandotional boundary GRANOFELS - Grey Joints, open planer Hemarite coated, 60% medium to fine grained 50% quarta 10% biotite , 3% sphere Rest Feldspar 70° to axis of core. Rest 25° to axis of core. 05 ft GOOFT. GROUP ATION Gredational boundary GRAHOFELS-CALCIVLICATE deints - planar, open neor horizontal 10 ft. upart. Hematite cooted. white .Fine grained. &it. pkuioclase .N. gyart ... Rest tremolite actinolite GNr. 155 - red brown Juints wavy associated with attered zones confine grained hierasir-50", Quartz 5% herra-Legenne vegue to 000 taining Koolin day 60% tite after Fe sulphides nonexistent near horizontal. Rest 20° to oxis of core. 5% mica. Rest weathered Feldspar. 70° to oris 0.4 ft opart. GNEISS - AUGEN - Grey pianar. Portings 0.5 ft. apart. to brown . 12% cavities Lavering Jany 1-2:nm. wide offer Fe sulphides 40% 40 con-guartz, 10% mica. Resi Kaolin and weathered good, plani up to 3 mm. mide. 75° to .oxis of one 70 Feldspor. Limit of Oxidation to come As above Grey, 12% Partings Vivianite coated 1-2 mm. wide, open, planar 15 ft. apart. Joints Kaolin Sulphides 20% Augen 2-4 mm. diam. commonly 15 11. Spart Joints nowing clay filled Vivianite coated below 83 ft. 1-4 mm wide Mainly 45° to axis of care 20 ft. apart. associated with coorse grained sulphides. Sulphides SE 2 tending to occur in ill defined bands up to 3 mm wide. (3) (4) (5) 100 WEATHERING LEGEND METALLIC MINERALE Quartz toutite Granofels == SECTION \*\* \* Breccio Zone Major Joint Madernie COOKET EX 555 HI-CO-SCHIST Bedding Trend \*\*\* \* 1000 M MASON GNEISS. METASILT . ASCHMONEIT SACT BE LOG ... 24 TH JALY '67 \*\*\* 30TH JUNE '67 Attered Zonk ••• LAS 3 1 1 GRANOFELS CALCSILICATE LATE ATT LVW Suu 76 and the same - : · 3 

Mars 46 108 PRO ET ATTENE PYRITES PTY LTD. LOG OF DIAMOND DRILL HOLE SEC\*-0% 4410 HUNDELD KANMANTOG COOSDINATES 4250 5 588 E JUIN CHE HTUOU HUTAN E . S. 100 P 1112.0 A-VOLE FEON HOE ZONTAL 30" of surface 1112 4 LOCATION BRUKUNGA DIRECTION 270° GRID 260° TRUE Dalum Pl. Adelaide M.S.L SE SEL PRACTURE PRIMARY
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mm. wide 0.4 ft. uport grey medium grained 160% quartz, 10% mica rest feldspar. Few % No visible loyering sphene ند. NO COME Alignment of mico to give incipient schistocity. Joints open 70° to axis of core GRANOFELS - Grey fine grained. 50% quartz. 10% mica. 3% sphene Rest weathered feldspan hismotite cooted I to 3 mm. wide 02 ft. apart. Closed hematite filled I mm. wide mainly 70° to axis of care 0 i ft. apart. 30 NO CORK Gradofional boundary GRANOFELS - Grey Joints, open planar Hematite conted. 60% 70° to axis of core Rest medium to fine grained 50% quartz, 10% biotite, 3% sphene Rest Feldspar 25" to axis of core. 05 # coort. ANTOO GROUP FORMATION Gradational boundary GRENOFELS - ALC:VLICATE Jants-planar, open neor horizontal 1:0 ft. opart. Hematite coated. white .fine growed 60% plagioclase .M. quartz Rest themolite uninolite GNEISS - red brown . Joints wavy associated with altered zones con-Layering fine groined Metasiti 50% Quartz 5% hema-tite after Fe sulphides 5% mica. Rest taining Kaolin clay. 50% near horizontal. Rest 20° to axis of core. 0.4 ft apart. nonexistent 70° to exis & weathered Feldspar. planar. GNEISS - AUGEN - Grey Parting- 05 ft opent. Layering ver to brown . 12% cavities l-2mm wide ofter for sulphides 40% no cons good, plana up to 3 mm. mide . 75° to quartz,10% mica. Rest axis of cor Kaolin and weathered Feldsnor Limit of Oxidation to come As above Grey, 12%, sulphides 20% Augen Partings Vivianite conted 1-2 mm. wide, open, planar 15 ft. apart. Joints Kaolin 2-4 mm. diam. commonly associated with clay filled Vivicinite coated below 83 ft. 1-4 mm wide Mainly 45° to axis of core 2.0 ft. apart. course grained sulphides. Sulphides 980 2 tending to occur in to 3 mm wide (3) 100 WEATHERING LE GEND METALLIC MINERALS CAMBRIAN ANNANTOO GROUF == = \* \* Breccia Zone 50.ge. Major Joint E SUN SCHIST \*\*\* F 1000 M MASON pedding mend . .. ASCHMONEIT ENN DATE BALY ALC US Aftered Zonk \*\*\* BOTH JUNE 357 22.1 CALCULTAN T . C. IITH JULY 'ST HI M LAW 1.3

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	graned fe sulphides and as fine grains within the mass 70% of fe sulphides in bonds parallel to layering 05 to 5 mm wide 3 to 20 mm apart.	W. C.	Mose Byrnd Faulh	o 3mm wide - e lenges ment along the scands is ed joints. Moven	coarse shown by nent is only		the samples are a	•
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	Below 122 in sulphide bands thicker (5 mm) and further apart. (40 in 60 mm)		doc. 15 m limit Joint	10 5 ft. apart.  ly opered of 1  Koolin contect of oxidation  - eleged 5 to of nore. Vivia	lo, lie end I hear 5° to			•
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