DEPARTMENT OF MINES.

South Australia.

-RESEARCH AND DEVELOPMENT BRANCH-

TREATMENT OF FLOTATION CONCENTRATE SUBMITTED BY PEKO MINES N.L.

FIRST REPORT.

MAGNETIC SEPARATION.

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-Contents-

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FIRST REPORT.

MAGNETIC SEPARATION.

1. SUMMARY.

A sample of flotation concentrate submitted by Peko Mines N.L. was subjected to magnetic separation as received, and after grinding.

Approximately 10 per cent of the weight of the concentrate can be rejected as a magnetic fraction which contains five per cent of the copper present in the initial concentrate.

2. INTRODUCTION.

A sample of flotation concentrate was received from Peko Mines N.L. for investigating the possibility of removing magnetic impurities by magnetic separation.

3. MATERIAL EXAMINED.

The material submitted assayed:

Copper.	(Cu).	27.7 per cent.
Iron.	(Fe).	32.3 " "
Sulphur.	(S).	31.7 " "

The screen analysis of the material was:

Screen Mesh. (B.S.S.)	Weight %.
+ 72	0.3
- 72 + 100	0.9
-100 + 150	0.7
-150 + 200	1.2
-200	96.9
Total ...	100.0

4. EQUIPMENT USED.

The "Davis Tube" magnetic separator was the only item of equipment used.

5. EXPERIMENTAL PROCEDURE and RESULTS.

Magnetic separation in a Davis Tube unit was carried out on samples of the flotation concentrate.

(a) as received,
(b) after grinding for 15 minutes.

A sample ground for 15 minutes at 60 per cent solids gave a product which was virtually 100 per cent minus 200 mesh.

The two Davis tube magnetic separation tests were conducted under the conditions shown in Table 1.

TABLE 1.

Conditions of Davis Tube Magnetic Separation.

Feed rate.	lb/hr.	1.5
Water rate.	galls/hr.	10
Coil current.	amps.	3
Stroke frequency.	strokes/min.	80

The results of the two tests are given in Table 2. Test 1 was carried out on the sample as received and Test 2 on the ground sample.

TABLE 2.

Results of Davis Tube Magnetic Separation.

Test No.	Fraction.	Wt. %.	Assay %.			Distrib. %.		
			Cu.	Fe.	S.	Cu.	Fe.	S.
1.	Magnetics*	10.5	13.3	52.5	23.8	5.1	17.0	7.9
	Non-magnetics.	89.5	29.4	29.9	32.6	94.9	83.0	92.1
	FEED.	100.0	27.7	32.3	31.7	100.0	100.0	100.0
2.	Magnetics*	9.3	11.3	54.8	22.6	3.8	15.8	6.5
	Non-magnetics.	90.7	29.4	30.0	32.6	96.2	84.2	93.5
	FEED.	100.0	27.7	32.3	31.7	100.0	100.0	100.0

*The assay values for the two magnetic fractions are calculated.

The approximate mineralogical composition of the fractions from each test and of the original feed was calculated on the assumption that chalcopyrite, pyrrhotite and magnetite are the only copper and iron minerals present. On this basis all copper was accounted for as chalcopyrite, surplus sulphur accounted for as pyrrhotite and surplus iron accounted for as magnetite.

The results of these calculations are shown in Table 3.

TABLE 3.

Davis Tube Magnetic Separation.
Calculated Mineralogical Compositions.

Test No.	Fraction.	Wt. %.	Mineral %.			
			Chalco.	Pyrrhot.	Mag.	Others.
1.	Magnetic.	10.5	38.0	27.0	33.0	2.0
	Non-magnetic.	89.5	85.0	7.0	-	8.0
	FEED.	100.0	80.0	9.0	3.0	7.0
2.	Magnetic.	9.3	33.0	29.0	38.0	-
	Non-magnetic.	90.7	85.0	7.0	-	8.0
	FEED.	100.0	80.0	9.0	3.0	7.0

Test No.	Fraction.	Wt. %.	Mineral Dist. %.			
			Chalco.	Pyrrhot.	Mag.	Others.
1.	Magnetic.	10.5	5.0	31.0	100.0	3.0
	Non-magnetic.	89.5	95.0	69.0	-	97.0
	FEED.	100.0	100.0	100.0	100.0	100.0
2.	Magnetic.	9.3	4.0	30.0	100.0	-
	Non-magnetic.	90.7	96.0	70.0	-	100.0
	FEED.	100.0	100.0	100.0	100.0	100.0

6. OBSERVATIONS and CONCLUSIONS.

The results in Table 2 show that approximately ten per cent by weight of the flotation concentrate can be rejected containing approximately five per cent of the copper values, probably most of the magnetite and at least some of the pyrrhotite.

The presence of composite particles would account for the relatively high copper loss in the magnetic fractions.

Because of this copper loss, it may not be considered worthwhile to remove the magnetics from the flotation concentrate.