CANADA

DEPARTMENT OF MINES AND TECHNICAL SURVEYS

OTTAWA

MINES BRANCH INVESTIGATION REPORT IR 63-1

MINERALOGICAL REPORT ON A SULPHIDE FLOTATION CONCENTRATE, PAMOUR PORCUPINE MINES LTD., PAMOUR, ONTARIO

by

M. R. HUGHSON & S. KAIMAN

EXTRACTION METALLURGY DIVISION

NOTE: THIS REPORT RELATES ESSENTIALLY TO THE SAMPLES AS RECEIVED. THE REPORT AND ANY CORRESPONDENCE CONNECTED THEREWITH SHALL NOT BE USED IN FULL OR IN PART AS PUBLICITY OR ADVERTISING MATTER.

COPY NO. 17

JANUARY 21, 1963

Mines Branch Investigation Report IR 63-1

MINERALOGICAL REPORT ON A SULPHIDE FLOTATION CONCENTRATE, PAMOUR PORCUPINE MINES LTD., PAMOUR, ONTARIO

by

M. R. Hughson* and S. Kaiman**

SUMMARY

Mineralogical study of a flotation concentrate from Pamour Porcupine Mines Ltd. showed that it contained approximately 50 per cent pyrite, 20 per cent pyrrhotite, 5 per cent arsenopyrite, chalcopyrite, pentlandite, ilmenite, rutile, sphalerite, mangetite, anatase, and native gold and 25 per cent non-opaque gangue minerals.

Pyrrhotite is more abundant in the present flotation concentrate than in the three flotation concentrate samples from Pamour Porcupine Mines Ltd. investigated previously.

---

*Scientific Officer and **Head, Mineralogy Section, Extraction Metallurgy Division, Mines Branch, Department of Mines and Technical Surveys, Ottawa, Canada.

INTRODUCTION

A sample of flotation concentrate from Pamour Porcupine Mines Ltd., Pamour, Ontario was received by the Extraction Metallurgy Division of the Mines Branch on October 30, 1962 and was given our Reference No. 10/62-6. A 200 gram sample of this material was submitted to the Mineralogy Section for determination of the sulphide mineral composition. The results were to be compared with those of three previous flotation concentrates of Pamour mill feed (1, 2 and 3).

PROCEDURE AND RESULTS

The procedure followed in this investigation was similar to that of a previous investigation of a flotation concentrate of Pamour mill feed (3). The 200 gram sample was washed first with alcohol and then with ether to remove residual flotation reagents. The washed sample was screened with the results shown in Table 1.

TABLE 1

Screen Analysis of Flotation Concentrate

Size	Weight, g	Weight, %
+ 65 mesh	12.3	6.3
- 65+100 "	32.8	16.8
-100+150 "	27.2	13.9
-150+200 "	32.4	16.5
-200+270 "	28.1	14.3
-270+325 "	46.9	23.9
-325 "	16.2	8.3
Totals	195.9	100.0

To determine the mineral composition three of the size fractions, comprising 57.2 per cent of the weight of the sample, were selected for a point count analysis. Two polished sections of each of the minus

65 plus 100, minus 150 plus 200 and minus 270 plus 325 mesh fractions were traversed with a Swift automatic point counter. The sulphide minerals were differentially stained (2) prior to the point count analysis so that pyrite could be more easily distinguished from pyrrhotite, and pentlandite from arsenopyrite. The identification of all mineral constituents was confirmed by X-ray diffraction methods.

The results of the point count analyses of the individual sized fractions are shown in Table 2. The specific gravities used in calculating the weights of the ilmenite etc., and the non-opaque mineral groups are estimates of the average of the specific gravities of the minerals present.

Pyrite and pyrrhotite are the major metallic minerals comprising 53.8 and 19.3 per cent of the weight of the sample. Minor to trace amounts of arsenopyrite, chalcopyrite, pentlandite, ilmenite, rutile, sphalerite, magnetite, and anatase make up 4.7 per cent. The remaining 22.2 per cent consists of non-opaque minerals of which plagioclase feldspar, talc and chlorite were identified by X-ray diffraction methods.

Native gold was observed only in the coarsest of the three sizes, the minus 65 plus 100 mesh fraction. One of the two particles observed was apparently completely enclosed in a grain of pyrite. The other, however, was only partly enclosed by the pyrite grains (Figure 1). The enclosed particle measured 7 by 15 microns and the partly exposed particle 15 by 30 microns.

The presence of glaucodot [(Co, Fe)AsS] and of klockmannite [CuSe] was suggested by X-ray diffraction patterns but because of the small amounts of these minerals present in the sections studied it was not possible to confirm the identifications.

DISCUSSION AND CONCLUSIONS

The results of this investigation are similar to those of a previous study of a flotation concentrate from Pamour Porcupine Mines Ltd. (3). The sulphide mineral content increases as the grain size becomes finer whereas the non-opaque mineral content decreases (see Table 2). This is probably due to the greater friability of the sulphide minerals over that of the non-opaque minerals, combined with the classification of the heavy sulphide minerals which occurs in a closed grinding circuit.

A comparison of the sulphide mineral composition of the present sample and that of three previous floation concentrates is given in Table 3. It can be seen that the pyrrhotite content of the present sample is

(Continued on Page 6)

TABLE 2

Mineralogical Composition of Sized Samples

Minerals	Specific Gravity	-65+100 mesh		-150+200 mesh		-270+325 mesh		Weighted Overall Content (%)
		Counts	Wt (%)	Counts	Wt (%)	Counts	Wt (%)	
Pyrite	5.0	764	45.7	1043	56.8	910	57.5	53.8
Pyrrhotite	4.6	86	4.7	399	20.0	499	29.0	19.3
Arsenopyrite	6.0	17	1.2	51	3.3	67	5.1	3.4
Chalcopyrite	4.2	4	0.2	4	0.2	11	0.6	0.4
Pentlandite	5.0	1	0.1	1	0.1	3	0.2	0.1
Ilmenite, Rutile, Sphalerite, Anatase, Magnetite	4.7	17	1.0	11	0.6	14	0.8	0.8
Non-opaque minerals	2.7	1456	47.1	647	19.0	200	6.8	22.2
Totals	--	2345	100.0	2156	100.0	1704	100.0	100.0

PHOTOMICROGRAPH

Figure 1. Two particles of native gold (au) associated with a grain of pyrite (py). The black areas are bakelite mounting medium. X500.

TABLE 3

Sulphide Mineral Composition of Pamour Flotation Concentrates*

Minerals	Weight Per Cent				
	IR 61-74	EMT 62-4	EMT 62-10		Present Sample
	-100+150m	Unsized	-100+150m	-150+200m	-150+200m**
Pyrite	95.7	80.6	87.5	79.1	70.7
Pyrrhotite (and trace chalcopyrite)	0.7	17.6	8.0	14.0	25.1
Arsenopyrite (and trace pentlandite)	3.6	1.8	4.5	6.9	4.2
Totals	100.0	100.0	100.0	100.0	100.0

* Sphalerite is not included in this table

** Calculated from Table 2

higher and the pyrite content lower, than in the previous flotation concentrates examined.

Two particles of native gold were observed associated with a grain of pyrite.

REFERENCES

1. M.R. Hughson and S. Kaiman, "Mineralogical Report on a Gold Ore from Pamour Porcupine Mines Ltd., Pamour, Ontario", Mines Branch Investigation Report IR 61-74, Department of Mines and Technical Surveys, Ottawa, (1961).

2. M.R. Hughson and S. Kaiman, "Mineralogical Report on a Cyanide Circuit Feed Sample from Pamour Porcupine Mines Ltd., Pamour, Ontario", Extraction Metallurgy Division Internal Report EMT 62-4, Department of Mines and Technical Surveys, Ottawa, (1962).

3. M.R. Hughson and S. Kaiman, "Mineralogical Report on a Sulphide Flotation Concentrate, Pamour Porcupine Mines Ltd., Pamour, Ontario", Extraction Metallurgy Division Internal Report EMT 62-10, Department of Mines and Technical Surveys, Ottawa, (1962).

MRH:SK/im