Cyprus Industrial Minerals Company

Interoffice Correspondence

PLAINTIFF'S EXHIBIT
CAM-338

To E.P. Tiritas

Date July 5, 1989

From E.H. Reade

Subject AUR Resources Talc

The AUR Resources talc sample categorized by P. Colville does not warrant further study and Resource Development will consider this a dead project unless you direct otherwise.

E.H. Reade

EHR/msw
cc: R.J. Buettner
E. McCarthy

E. READE cc EPT. 5/25/89

P. Colville

Attached came from P. Wolf via G. LESSNER. Stockford will send us a few hundred grams of the floated concentrate to evaluate.

We need to do basic mineralogy, amphiboles, color and chemistry for for Cyanide — as this is a gold tailings pile. They are looking at this as a source of low grade (off color) talc.

Ed McC.

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Toronto, Ontario M5H 3P5
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TELECOPIER INFORMATION SHEET

DATE: May 24, 1989

TO: George Lesner

COMPANY: Cyprus Industrial Minerals Co.

TELECOPIER NO.: 303-643-5168

FROM: Howard R. Stockford

COMPANY: Aur Resources Inc.

NUMBER OF PAGES 15 (including cover sheet)

COMMENTS:

The report was forwarded to you today. It appears like this page did not go through. Report is Preliminary Talc Flotation Study

Should any transmission or reception problems occur call (416) 362-2614.

Gold Mine is in Valdor 300 mi North of Montreal

AUR RESOURCES INC.

PROJECT 89LI01

PRELIMINARY TALC FLOTATION STUDY FROM CYANIDATION TAILINGS

By

Rémi Tremblay, P. Eng.

Final Report
May 8, 1989

CANMET

CENTRE DE RECHERCHES MINÉRALES

Québec

Ministère de l'Énergie et des Ressources
CENTRE DE RECHERCHES MINÉRALES
Complexe Scientifique
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SAINTE-FOY (Québec)
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AUR RESOURCES INC.

PROJECT 89LI01

PRELIMINARY TALC FLOTATION STUDY FROM CYANIDATION TAILINGS

FINAL REPORT

May 8, 1989

COPIE NO: 2

To the attention of:

Mr. Len O'Gorman
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Prepared by:

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Head of Service
Metallurgical Research Laboratory

Signature:

Date: May 8, 1989

ABSTRACT

We describe the preliminary talc flotation tests from the company's cyanidation tailings. It is possible to produce a concentrate assaying 99% talc + chlorite (<5% chlorite) at a recovery of 97.5%.

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1. INTRODUCTION

Mr. André Tardif, consulting engineer, requested the following:

1) Preliminary testwork to determine if this talc can be floated.

2) Development of a flowsheet.

3) Pilot planting the developped flowsheet.

This study encompasses phase 1 only.

2. CONCLUSIONS

We can obtain a talc + chlorite flotation concentrate suitable for the market from both samples. On the first sample the best possible results might give a 99% talc + chlorite concentrate at 97.5% recovery. The calculated head was 28.6% talc + chlorite.

If required, a talc concentrate assaying 99% talc + chlorite with less than 5% chlorite can be produced. A closed-circuit flotation test would be required to determine the talc recovery which could be obtained in order to float such a product.

The second sample floated just as well as the first sample. The products were not examined under the microscope but the grade of talc + chlorite in the feed appear higher than the first. The tailing contains about 10% chlorite which is coarse and speckled with rutile.

All assays are by microscopic examination. We did not determine an analytical procedure for assaying the talc content of the flotation products. The ore is far too complex to permit the usual methods (LOI or insolubles or X-Ray fluorescence). X-Ray diffraction identifies the minerals in a sample but not their contents.

3. RECOMMENDATIONS

Should any further testwork be required, the most pressing requirement is the development of a pyroanalytical procedure for assaying the various flotation products.

The talc content of this ore cannot be determined by loss on ignition because of the presence of carbonates (≈50% CO_2), and chlorite (18-27% H_2O). Nor can it be determined by acid insolubles because of the presence of carbonates, chlorite, feldspar and quartz. From previous experience we know that its determination by X-Ray fluorescence leaves a lot to be desired. This is possible when the gangue consists only of carbonates.

This is only a preliminary study to see if the talc can be floated. The development of an optimized flowsheet will require much more work.

4. APPARATUS AND EXPERIMENTAL PROCEDURES

The first sample received April 12, 1989 consisted of two pails each containing a plastic bag of very wet tailings. We dried the contents of one pail and split it into 250 g lots. There were 14.5 g dry. This sample was used in tests 1 to 18 inclusive. A preliminary mineralogical examination showed the mineral composition in Table I.

The second sample received April 28, 1989 consisted of two small bags of filter cake. We used 300 g of the wet cake in test 19 to see if the flotation response would be the same as the first sample.

All flotation tests were done with a Denver D-1 Laboratory flotation cell. The water used was demineralized. Analyses were done by rough microscopic counting.

5. RESULTS

Table I presents the mineral composition of the first sample per a preliminary examination under a polarized transmitted light microscope.

In Table II we find the conditions and results of test 6. Table III shows the conditions and results of test 18.

TABLE I

Preliminary Mineralogical Examination
Polarized Transmitted Light Microscope

Sample 1

Mineral	%
Chlorite (clinochlore)	25
Talc	20
Plagioclase feldspars	30
Calcite + dolomite	14
Opaque minerals	5
Quartz	4
Mica	2
Amphibole	<1
Other minerals	<1

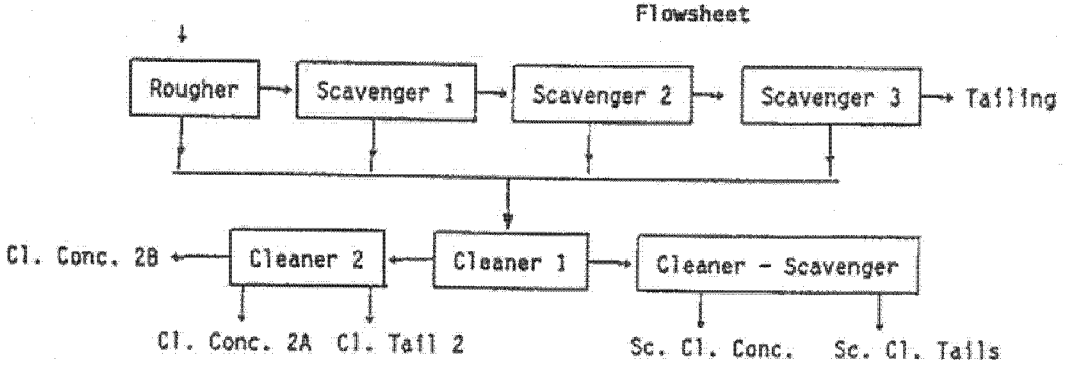
Talc: greyish green; will have low brightness

TABLE II

Conditions and Results
Test 6; First Tailing Sample

Conditions	Cond.	Rougher	Scav. 1	Scav. 2	Scav. 3	Cleaner 1	Cl. Scav.	Cleaner 2	
								A	B
RPM	1100	1100	1100	1100	1100	900	900	900	900
Solids, g	250								
Cell volume, l	2.5	2.5	2.5	2.5	2.5	1.25	1.25	1.25	1.25
Time, min.	2	10	3	5	2	7	8	5	5
pH	Natural	9.3							
Reagents									
Calgon 0.1%, ml	12.5								
Arquad 2C-75, 1%, ml	2.25		1	1	1				1
MIBC pure, drops	3						1		

Flowsheet



Results

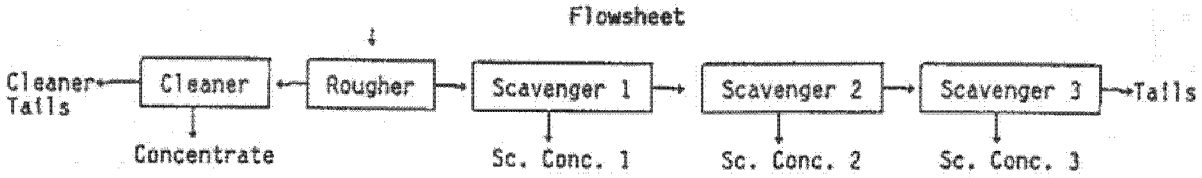
Product	Weight, g	Microscope Observation
Sc. tl. 3	199.1	
Sc. Cl. Conc.	11.3	
Sc. Cl. Tails	25.7	
Cl. Conc. 2A	5.0	94% talc, 5% chlorite, 1% other
Cl. Conc. 2B	2.9	
Cl. tl. 2	3.6	

TABLE III

Conditions and Results
Test 18; First Tailing Sample

Conditions	Cond.	Rougher	Scav. 1	Scav. 2	Scav. 3	Cleaner
RPM	1100	1100	1100	1100	1100	1000
Solids, g	250					
Cell volume, l	2.5	2.5	2.5	2.5	2.5	1.25
Time, min.	2.0	11.5	8.5	6.5	4.0	8.0
pH	Natural 9.3					
Reagents						
Tylose 1%, ml	5.0		2.5	2.5	2.5	
2C-75 1%, ml	2.25		2.25	2.25	2.25	
MIBC pure, drops	4		3	1		
Calgon 0.1%, ml						0.75

Flowsheet



Detailed Metallurgical Balance

	Weight, %	Analysis, Talc + Chlorite, %	Dist., %
Scavenger Conc. 1	5.1	88	15.6
Scavenger Conc. 2	7.5	87	22.9
Scavenger Conc. 3	20.7	25	18.1
Scavenger Tails	50.8	1	1.8
Cleaner Conc.	7.3	99	25.2
Cleaner Tails	8.6	55	16.4
Calculated Head	100.0	28.6	100.0

Best Possible Overall Metallurgical Balance *

	Weight, %	Analysis, Talc + Chlorite, %	Dist., %
Final Concentrate	28.2	99.0	97.5
Final Tailing	71.8	1.0	2.5
Calculated Head	100.0	28.6	100.0

* Composite all recyclage products and dividing between concentrate or tails

6. DISCUSSION OF RESULTS

The talc in these tailings does not float as easily as a normal talc ore. With a normal talc ore the density of the pulp to be floated is always very low at 5% to 15% solids. A good portion of the talc is very hydrophobic and floats with air only. After this stage a frother is added which floats another portion. Finally additions of fuel oil finish the float.

This procedure was followed unsuccessfully with this tailing sample in test 1, 2, 3 and 4. Additions of Calgon in test 3 to disperse slimes and raise the pH did not help. In test 4 fuel oil was used and the pH lowered with H_2SO_3 to no avail.

In test 5 we used a coco based quaternary amine collector, Arquad 2C-75, and MIBC frother. The talc floated well but slowly as with most other talc ores. A little collector is added followed by a float until the froth is empty. More collector is added followed by a float until extinction of talc in the froth and so on. As this continues more and more chlorite floats with the talc.

The conditions, flowsheet and results of test 6 are given in Table II. Calgon was used as a silicate dispersant and depressant. Concentrate 2A contained 94% talc and 5% chlorite but the talc recovery was low.

In test 7 to 12 inclusive we were attempting to float talc only by use of more selective collectors, different frothers and HF. The tested collectors were Arquad 2HT-75 and Arquad 1Z-75 which are tallow and dodecyl based quaternary amines respectively. The frothers were pine oil and cresylic acid. The rougher froth was always whitish green at first turning to darker green towards the end of the float. This indicated that talc (greyish green in this tailing) floated faster than the chlorite (green).

The Ontario and Quebec talc producers market a talc product containing chlorite either as the mineral or as part of the talc molecule. We contacted Mr. A. Tardif as to the necessity of removing the chlorite from this talc. We were advised to forget the chlorite for now.

In tests 13 to 18 we developped a suitable flowsheet. A Hoechst product Tylose CR-700N, a methyl cellulose, is used in the roughing and scavenging steps to depress the carbonates while Calgon, sodium hexametaphosphate, is used in the cleaner to depress silica and feldspar. The conditions and results are given in Table III. Under the best conditions we might produce a 99% talc + chlorite (<5% chlorite) at a recovery of 97.5%.

In test 19 we floated 300 g wet filter cake of the second sample under the same conditions as test 18. Two more scavengers were required before extinction of talc + chlorite in the froth. The results are similar to test 18 except that the talc itself had finished floating by scavenger 4. Scavenger 5 concentrate contained about 25% talc + chlorite, but this was about 90% chlorite. Scavenger 5 tails contained about 10% chlorite and no talc. This chlorite was very coarse and generally speckled with rutile. The talc in the cleaner concentrate was much coarser and more fibrous than the first sample. The talc + chlorite assayed about 98% with about 7% chlorite. We did not examine all the products but it seems that there was more talc and chlorite in this sample than in the first. The natural pH of the pulp was 11.0.

7. ACKNOWLEDGEMENTS

Mrs. Diane Gagné Gilbert performed the tests. Mineralogical analyses were made by the Direction de l'analyse minérale. The assistance of the secretariat office is also acknowledged.