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MEMORANDUM

Date: June 7, 1977

To: R.L. Coleman

From: K.V. Konigsmann

Subject: Beneficiation of Grum Ores,Memo # 6

Products and Recoveries

Test-results obtained in recent months have confirmed the forecast submitted on April 4, 1977; only minor modifications appear necessary. Current estimates are:

	Analyses oz/t, %, ppm						Recoveries			
	<u>Au</u>	<u>Ag</u>	<u>Pb</u>	<u>Zn</u>	<u>Hg</u>	<u>As</u>	<u>Au</u>	<u>Ag</u>	<u>Pb</u>	<u>Zn</u>
Mill Feed	.025	2	4	9	100	0.3				
Pb Conc.	.15	24	55-60	6-10	90	0.2	30	<u>67</u>	<u>77</u>	
Zn Conc.			1-3	53-58	<u>650</u>	0.1				<u>86</u>
Tailings			.5-.9	.7-1.4						

*Arsenopyrite
- will decrease as
product is cleaned*

Will decrease as Zn decreases.

Ore Types

Nine ores from different locations have been tested during the period from January to May 1977. Not included in this group were the heavily oxidized B-ores. A great variation in flotation characteristics was encountered, as was expected from the results of earlier work, but fortunately the impli-

cations on flowsheet development do appear less serious than anticipated.

1. All ores could be treated following the same basic flowsheet layout(page 15 of the appended report).
2. The same reagents could be used for all types of ore, only quantities had to be varied.
3. Flotation results obtained with a composite sample were good. There was no indication at all of small quantities of oxidized or graphitic ores "spoiling" the overall mixture.

Grindability

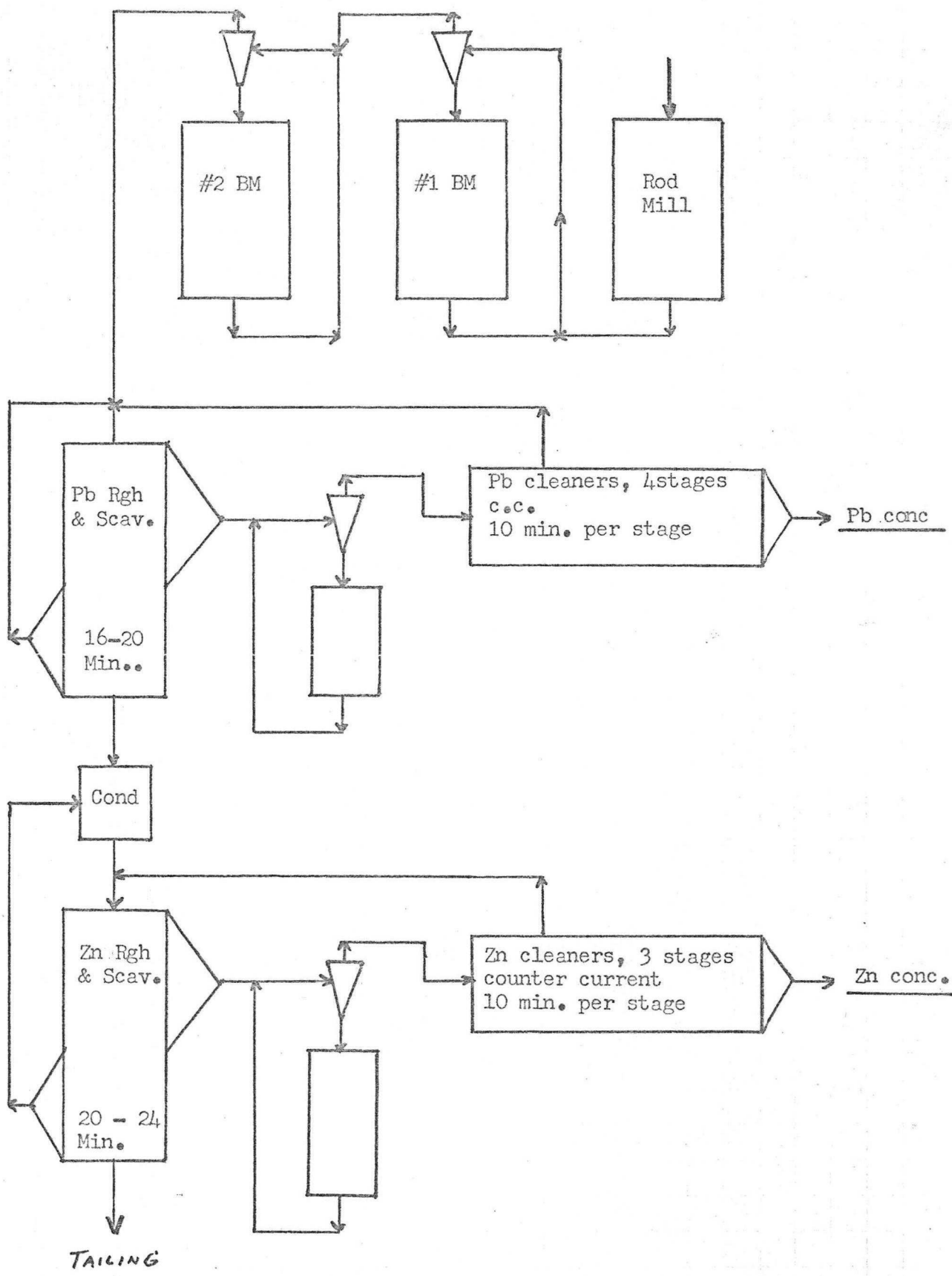
The average work index of ~~G~~rum ores is estimated at slightly below 13 KWH/T, the low sulphide ores are somewhat harder (W₁=15 KWH/T), as might be expected.

In coarse size ranges(2" to 8")most ~~G~~rum ores are friable and crush very easily. It appears unlikely that they are suitable for autogeneous grinding or the production of competent pebbles.

Currently rougher flotation tests are carried out with a fineness of grind of 65 - 70% passing 350 mesh. This would represent a power demand of 14 - 15KWH/T for the primary grinding circuit. As mentioned in the final paragraph of this memo, during the next stage of testing coarser primary grinds will be used. It appears possible to reduce power demand in grinding without seriously affecting metallurgy.

Re-grind circuits are essential for both the lead and zinc cleaner circuits. The power input into the lead regrind will be about half that of the

GRUM FLOWSHEET



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zinc cleaner circuit, the tonnage of concentrate being considerably lower for lead.

Flowsheet and Reagents

The standard flow diagram is shown on the opposite page, approximate plant flotation times are indicated.

All reagents used are those commonly encountered in lead-zinc mills. (For details see appended report) It has been found essential to control alkalinity in the lead circuit by soda ash and by lime in the zinc circuit. Sodium cyanide is also essential for pyrite depression in the lead flotation.

In zinc cleaning lime addition has to be carefully controlled, some zinc minerals tend to be depressed by high lime alkalinity.

Impurities

Mercury contents will be high in ~~Grum~~ concentrates (650 ppm). Fortunately recent results indicate that arsenic levels will be quite acceptable (<.1% As). It is expected that MgO and CaO will also be low.

Planned Work

The outlook on ~~Grum~~ metallurgy does finally hold promise of a profitable operation. A number of areas require attention.

- First and foremost it is to be avoided that unrealistic mixing of "good" ore samples taints results. Each composite should be accepted by geologists as representative.

- The extremely high unit power costs at Grum make it imperative to reduce all power demands. Laboratory testing - in preparation of pilot plant testing - will investigate the effects of coarser primary grinds.

- Recirculation of simulated lead and zinc thickener overflows or effluents will have to be given a trial in the laboratory.

- Cycle-tests with various composites are to continue.

- A pilot plant run at Lakefield Research is planned for the autumn of 1977.

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