

December 12, 1977
 Noranda

The Pilot Plant Composite

Twelve bulk samples were taken from the Grum deposit in July 1977. They were shipped to Lakefield, Ontario and the different types of ore were blended for pilot plant testing in the following proportions.

<u>Sample No.</u>	<u>% of Composite</u>
A-2	5%*
B-5	10%*
C-4	10%
D-4	5%
FV-4	5%*
FQ-4	5%*
G-4	10%
H-4	10%
J-76-1	15%*
K-68-1	10%*
K-76-1	5%*
K-80-1	10%*

(*) massive disseminated sulphide

This composite contains a high percentage of finely disseminated sulphides. It was deliberately blended in such a ratio that a conservative and realistic approach to metallurgical evaluation and plant design would ensue.

The agreement between the results of the laboratory cycle tests and the pilot plant continuous runs has been excellent. Therefore, the metallurgical results when treating ores from all the individual sections of the Grum deposit may be predicted with confidence from careful analyses of the laboratory testing.

The last pilot plant tests were completed by mid-December, some five months after the samples had been mined and three months after fine crushing. There have been indications of slow oxidation, the most noticeable being a gradual increase in soda ash consumption from 3 lbs/ton in October to 5 lbs/ton in December to maintain the same pH value (9.0) in the grinding circuit. Fortunately, this change had no undue influence on metallurgical results. Oxidation should be a minor problem for the Grum milling operations.

The metal content of the pilot plant composite was:

Au	0.03 oz./t	Cd	0.012%
Ag	2.8 oz./t	Ni	0.003%
		Co	0.007%
Cu	0.13%	CaO	0.85%
Pb	5.8%	MgO	0.27%
Zn	10.1%	As	0.23%
		Hg	82 ppm
Insol	28.2%	Ge	0.001%
SiO ₂	25.3%	Mn	0.05%
Fe	20.5%	Ti	0.05%
S	27.0%	Cr	0.01%

Grinding

The hardness of Grum ores varies considerably, but even the hardest can be broken satisfactorily. No difficulties were encountered in crushing any Grum sample. In primary grinding, the work indices vary from less than 6 KWH/T to over 15 KWH/T. The pilot plant composite had a work index of 11.4 KWH/T.

For sulphidic ores (P.P. composite) a fineness of grind is required of 90 per cent passing 200 mesh. At coarser grinds, tailings losses increased rapidly and all circuits became overloaded with middlings products. (See also paragraph on flotation.)

For plant design a power input of 14.5 KWH/T had been estimated prior to pilot plant testing. This design criterion has been modified to be 15 KWH/T from now on. Total installed HP should thus be 6000 HP, 2000 HP in the rod mill and 2000 HP in each of the ball mills.

Regrinding

The lead and zinc rougher concentrates will be of lower grade than normal because they will contain an unusually large quantity of middlings. Regrinding is definitely required in both circuits for production of saleable products at acceptable recoveries. The lead concentrate will have a fineness of 95 per cent passing 20 micron, the zinc concentrate 85 to 90 per cent passing 20 micron. Classification efficiency must be very high for both circuits to prevent slime losses.

For the initial lay-out, prior to pilot plant testing, it had been assumed that both circuits would be equipped with a 400 HP regrind mill. The total power consumption of 800 HP will be maintained but the distribution of regrind power will be altered to allow about 300 HP for lead and 450 HP for zinc regrinding, final choice depending perhaps on availability of used mills.