Cyprus Anvil
Mill Tailings
B-0-520
006929

SILVER AND GOLD EXTRACTION

During the first twelve years of operations relatively little attention has been paid to improving the metallurgical response of the precious metals.

In the case of silver, it is known that silver and lead recoveries increase in a linear fashion. Since this suggests that most of the silver values are intimately associated with the galena, the concerted effort to improve the response of the prime metal has not been at the expense of upgrading silver recoveries.

Based upon limited data, gold values in the Faro deposit appear to be generally erratic and low. With the exception of concentrates produced from Zone II ores, concentrations of gold in the lead concentrate generally do not reach the payable limit of 0.03 ozs/DMT. Though little is known about the recovery of gold by ore type, it is likely that no significant improvement in gold recoveries could be achieved through changes in the conventional Anvil circuit. If, as some results suggest, the gold is more prevalent in ore species of lower sulphide totals then the selective flotation of pyrite and subsequent leaching will not substantially improve overall gold recoveries.

Some very preliminary work conducted by Lakefield Research (1), examined the feasibility of leaching silver and gold from the mill tailings. During this limited program it was noted that "the results of one flotation test conducted on a tailings sample ... showed little or no concentration of silver and gold". Recovery of the precious metals from the tailings could be achieved with fine grinds and high consumptions of lime and sodium cyanide. The calculations below, based upon the best recoveries obtained indicate that the operating costs of such a process would invalidate the economic viability of such a scheme.

Thus, assuming
1. 70% Au extraction and 40% Ag extraction
2. 10,000 tonnes per day plant tailing production
3. Au and Ag concentrations in the tailings of 0.12 and 10.0 g/t
4. Au and Ag prices of $4.50 U.S./oz and $10 U.S./oz respectively
5. an exchange rate of $1.23 Cdn ≡ $1.00 U.S.

daily gross revenues will be:

Au:	10,000 X 0.12 g/t X 0.7 rec X .032 X $4.50 X 1.23 =	$14,878
Ag:	10,000 X 10.1 g/t X 0.4 rec X .032 X $10 X 1.23 =	$15,901
	Total daily gross revenue	$30,779

(1) The recovery of gold and silver from a mill tailings sample February 10, 1981.

The best test results were achieved after 48 hours of leaching and using 1.82 kg/t NaCN and 4.26 kg/t CaO

thus daily reagent costs only will be:

NaCN:	10,000 t	X	1.82 kg/t	X	$1.90/kg	= $34,580
CaO :	10,000 t	X	4.26 kg/t	X	$0.229/kg	= $ 9,755
						$44,335

Thus it is evident that the extraction of gold from tailings derived from the Faro pit ores is likely to be uneconomic.

Notwithstanding the above it is desirable to learn more about the deportment of gold and silver by facies within each of the deposits. Silver and gold determinations conducted on samples derived from the most recent laboratory locked-cycle cleaner flotation tests on samples of Faro ore are shown below.

TEST	ORE TYPE	Au (ppm)				Ag (ppm)			
		Feed	Pb Conc	Zn Conc	Tail	Feed	Pb Conc	Zn Conc	Tail
20	EF	.07	.41	.1	.1	39	697	25.0	7.9
30	EF	.10	.2	.1	.03	45	669	40.5	7.9
40	A	.38	2.8	.5	.1	29	293	61.4	8.9
41	BCD	0.1	1.2	.2	.07	35	734	30.9	7.2
38	S_1 Blend	.28	2.2	.2	.1	32	613	26.7	8.9
33	S_2 Blend	.2	1.0	.2	.1	36	559	27.1	7.5
34	S_4 Blend	.2	2.0	.2	.09	34	486	27.4	7.2

S_1 Blend 35% A, 60% BCD, 5% EF

S_2 Blend 15% A, 60% BCD, 25% EF

S_4 Blend A mixture of ores metallurgically similar in response to S_1.

From the data above one could conclude that higher gold values tend to be associated with low sulphide ore types. On the other hand there appears to be a tendency for higher silver values, and improved metallurgical results when treating ores exhibiting high sulphide totals. Samples of these products have been shipped to Vancouver Petrographics for mineralogical examination by size fraction. The work will attempt to locate the silver constituting the first step on the design of a metallurgical test program. Similar samples of products generated during the testing of Grum and Vangorda ores will also be sent for analysis in the future to conduct parallel studies.