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MEMORANDUM

TO: Mr. S. D. Michaelson

Subject: Cyprus Anvil Test Work

During your telephone conversation with Mr. Taggart on May 22, 1980, he mentioned that they were making some additional tests with Vangorda ore to gain added insight to the effects of overgrinding.

I wish to point out very clearly that of all the ore types which have been described, the finely interlocked Vangorda ore would be the most difficult one to use to evaluate the effects of galena overgrinding. Since fine intergrowths of galena, sphalerite and pyrite/pyrrhotite occur to a size range finer than 10 microns in the Vangorda ore, the effects of slime losses tend to be counterbalanced by the gain of increased liberation as finer grinds are tested. A standard laboratory test will actually show that progressively finer grinds yield correspondingly better recoveries. This will occur because the standard test is made by grinding a sample in a closed jar mill with modifiers and collectors added. In addition, the quantities of reagents are usually varied to roughly match the calculated increase in surface area.

I wish to point out once again, that with this type of test, it has been possible to grind a sample for as long as 48 hours and still have a near quantitative separation of galena from gangue. Thus, the well recognized problem of slime losses in galena flotation is not one of physical size only.

The potential problem facing Cyprus Anvil is that if their circuit is set to produce an acceptable recovery on an ore such as Vangorda with a primary grind of about 50 microns, then when, over a period of a few hours or days, the ore type is a more coarsely crystalline Faro, the over-grinding losses will be substantial.

The Mitsui tests clearly demonstrate this feature. Thus, the current test program of Cyprus Anvil should be very carefully designed if meaningful results are to be expected. Grinding conditions should be as close as possible to those attainable in the planned Anvil expansion. This includes reagents, aeration, classification, etc., and is not a simple experimental procedure. The program should be established for an acceptable level of recovery on an average ore type and then these conditions should be duplicated exactly for various ore types. This is a very difficult procedure in the laboratory since the flotation test operator tends to vary his frother additions and froth removal schedule to accomodate changes. For acceptable results, a series of locked-cycle flotation tests made under conditions of a rigid, stop watch schedule will be required. Anything less than such an expensive and time consuming program will probably lead to faulty conclusions which will be unattainable in practice. The confusing results from the Lakefield pilot plant tests on Faro ore are an example of what can happen when a test program is not adequately planned with a clear objective.

At our conference on May 5, 1980, Mr. Taggart suggested that sub-sieve sizing tests with accompanying chemical analyses on various tailings samples would show at what size range losses become significant. We discussed having this done on samples from the Lakefield program as well as on Anvil mill tailings. As noted in my earlier analysis of the Mitsui report, the recovery of lead in the minus 400 mesh fraction was significantly less than in the 270/400 mesh fraction for all samples except the "graphitic." A similar study of Anvil mill tailings (i.e., lead rougher and scavenger tailings) but with the sizing range extended down to at least 10 microns probably would be quite valuable. Such analyses should be made on samples taken over a relatively short period representing mostly a single ore type as well as some daily average samples. The results from

this type of program can be much more deffinitive than those from laboratory tests, depending on the variable factors of a grade-recovery relationship in a concentrate. Furthermore, the sizing-analytical method on mill products should be much less costly.

A comparison of the Pb tailing losses by size for the Lakefield tests on Sample 2 with similar results from the Anvil mill might give a good indication of the effects of the inadvertant oxidation of the Lakefield sample. The ratio of Pb lost in the finest undersize fraction to that lost in the fractions down to 10 microns should be very much greater for a heavily oxidized sample since the lead oxide reports in the true slime fraction.

S/H. R. Spedden