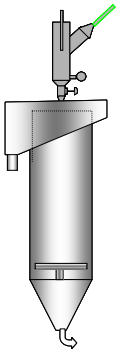
Locating Sample and Sample Preparation For Feasibility Studies Applied to Crushing/Grinding/Flotation Plants



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1 Introduction

This brief presentation is to provide a mining company a procedure to start a test program geared towards generating sufficient data for a feasibility study for a crush/grind/flotation plant. This presentation only focuses on sample preparation. There are more presentations available that deal solely with:

- Grinding Test Procedures
- Flotation FKT/SKT and Batch column flotation procedures
- Sedimentation Procedures

2 Purpose of Testwork

The main purpose in feasibility studies to do testwork is to deliver design parameters to the designers. In addition, it is important to determine the project's consumables in the process. For mineral processing plants such as grinding and flotation, and extractive metallurgy, the outline below will deliver the following:

- Ore hardness characteristics (SPI, JK, Wi, Abrasion Index)
  - Grinding circuit design
  - Mass Balance of grinding circuit
  - Energy consumption, liner/ball consumptions
- Flotation characteristics
  - Mineral kinetics[1] of ores
  - Kinetics as a function of grind
  - Kinetics as a function of %solids, pH, head grades
  - Circuit configuration, equipment sizing and mass balances
  - Optimum reagents
  - Reagent dosages (Including lime)
  - Regrind and Cleaner section variables
  - Ultimate Concentrate grades
  - Consumptions: reagents, energy
  - Final concentrate rheology and moistures.
- Leaching Characteristics
  - Mineral leach kinetics
  - Kinetics as a function of particle size
  - Chemical consumptions
- Settling characteristics
  - Tailing
  - Concentrates
  - Flocculant type and optimum dosage

[1] Note: kinetics of flotation, leaching, etc refers to the speed in which minerals are recovered (i.e. the reaction rate constant) and the maximum recovery that can be achieved in theoretical infinite time of reaction, referred to as Rmax.

3 Samples

Sourcing the samples for a feasibility test program is of utmost importance. A poor sample, regardless of how good the testwork was, will render the test program results useless and, further more, misleading. We seek to have samples represent a 3D picture of the orebody. For this, the best way to approach it is by generating sample from drill cores. The samples should be picked by random selection of drill core intervals. Bulk sampling is not suitable for feasibility testwork as it represents a single sample in space.

In metallurgy, it is necessary to recognize the dependency of a process on ore characteristics. For instance, in grinding testwork, ore hardness has not been successfully linked a specific ore type, and is independent of ore type. However, flotability of minerals is ore dependent, not only because of interaction of diverse minerals in ores, but for their mineral content. The same applies to leaching; a primary ore leaches differently than an oxidized ore; for this, it is obvious that in leach programs, leach samples are selected by ore types.

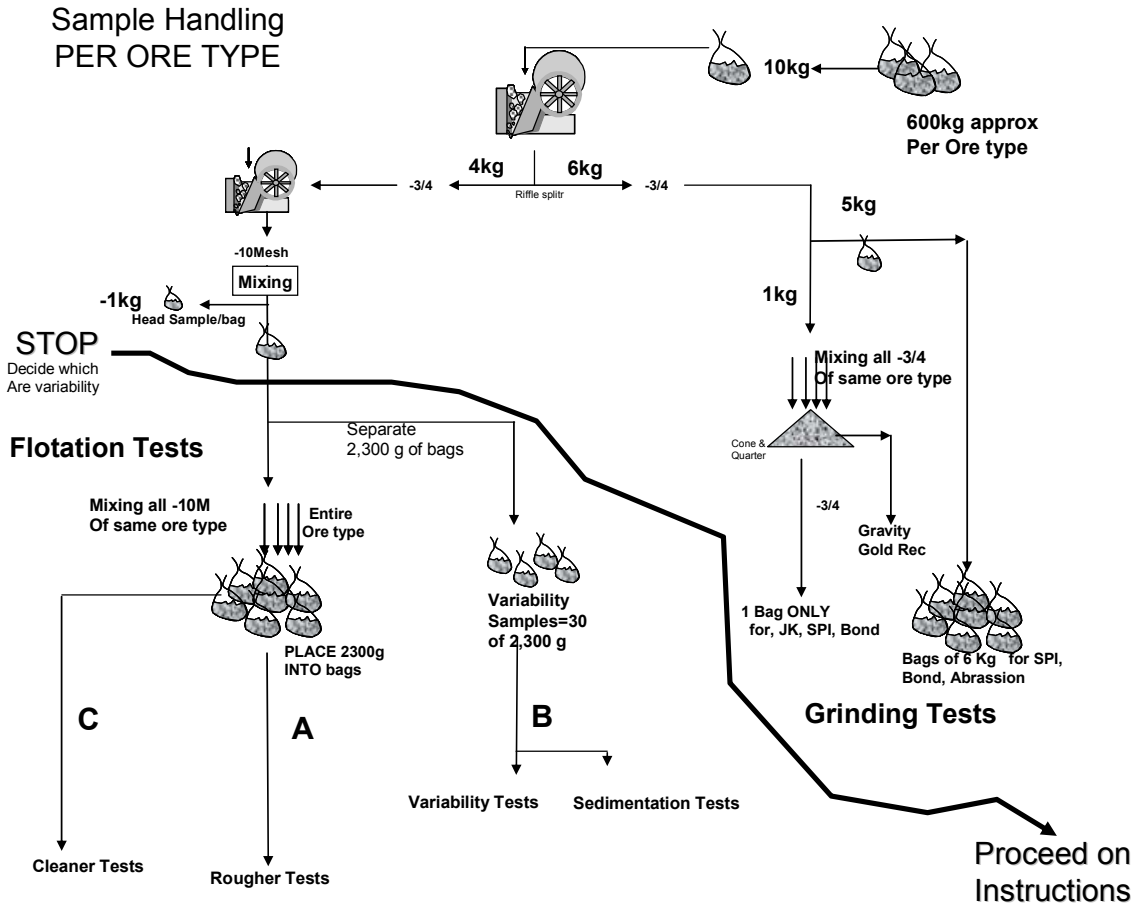
The geologists are the best qualified to define ore types of a deposit. When selecting them, it is important to determine their abundance. Efforts should be made to keep the number of ore types under seven. Often a MISC ore is introduced to represent a variety ores with a composite abundance of under 15%. Most often, 4 or 5 ore types are found in a deposit.

4 Sample Selection and Shipment

When samples are selected from drill core, core intervals are split, leaving behind ½ or ¼ of the drill core. From 2” drill core, the smallest size recommended, an entire interval is placed in a bag for shipment. This bag must bear the drill hole identification, the depth of the interval taken (Example: Drill hole AR-2345-2006, from 155m to 160m, South deposit) and ore type. The sample bag should also contain the fines from when the drill core was split. If possible, samples sent for testwork should be placed in drums depicting a single ore type or a single drill hole. The bags need to be airtight. Drums need to be sealed and labeled. Inside the drum, a plasticized sheet must be available at the top of the indicating the contents of the drum. These contents will be confirmed by the testing laboratory prior to sample preparation.

5 Sample Preparation

In receiving a shipment of samples, the receiver will confirm the receipt of the samples and weight the bags (if no weight is available). The following procedure has been developed for a grinding-flotation plant.



The above procedure can be adjusted to suit sample size for any test. For instance, if gold recovery plays an important role in the feasibility, the weights can be partitioned in such manner as to provide more samples to the GRG test.

Samples of -10 Mesh should be kept sealed in plastic bags. Sealing samples can be done under vacuum in a similar fashion used to vacuum seal meats in supermarkets.