

cheap ammonium nitrate. By the distances of the drill holes and the amount of explosives the particle size of the broken ore can be influenced within certain limits. The exploitation by blasting is done in a way that a series of benches are formed which winds down into the open pit. The benches are used as working areas and haul roads. The rocks are then transported by truck or conveyor to a central crushing and milling plant. In modern mines the locations of the blasting holes are defined by GPS (Global Satellite System).



Figure 5.1.1: Structure of an Open Pit mine: Chuquicamata in Chile (Source: B. Langner)

Second Step: Particle Size Reduction (Comminution) As the copper ore is grown together with the gangue, the rocks from blasting have to be crushed and milled to a size where its copper mineral grains are separated from the non-copper-minerals grains. Furthermore, the particle size also has to be optimized for the subsequent flotation separation process. This is done in several steps. In the first step the material is crushed with a jaw or a Gyratory crusher to a particle size of about 20 cm. This material is then fed to secondary crusher where it is crushed down to a size of a walnut. The next step is a wet grinding process by adding about 20 % water in rotating ‘tumbling mills’ where abrasion, impact and compression all contribute to breaking the ore. This is normally