

### B.2.3 ALTERNATIVE PRODUCTION PROCESSES

#### Processes that Provide Gases More Amenable for SO<sub>2</sub> Control

Many existing smelters have equipment such as multiple-hearth roasters and reverberatory furnaces which produce gases too low in SO<sub>2</sub> for direct processing to sulphuric acid. The multiple-hearth roasters can be replaced by fluid-bed roasters, and thus up to 45% of the sulphur can be produced in an SO<sub>2</sub> concentration high enough for sulphuric acid production. An even greater improvement can be achieved by replacing both multiple-hearth roasters and reverberatory furnaces by flash smelting units which can produce 60% or more of the sulphur as high-strength SO<sub>2</sub> gas.

Conventional converting in most smelters is a batch operation that produces a gas stream of variable SO<sub>2</sub> content which is difficult to process into sulphur by-products. Continuous smelting processes such as the Mitsubishi process and the Noranda process produce a continuous high-strength gas. However, these processes have been proven only for certain "clean" copper concentrates.

#### Processes That Eliminate SO<sub>2</sub> Formation

Hydrometallurgical processing of nickel sulphide concentrates has been practised by one Canadian company for 20 years and the hydrometallurgical processing of copper and zinc concentrates are in various stages of research and development. While these processes do not produce SO<sub>2</sub> gas, they have not been widely used owing to factors including high costs, problems with recovery of precious metals, high energy consumption and lack of adequate development.

#### Processes that Reduce Sulphur Input to the Metallurgical Processes

In some cases, it is possible to modify the ore beneficiation processes to reject a greater amount of sulphide minerals than normal. This is practised, for example, in the nickel industry where part of the pyrrhotite is rejected in the milling and concentration stage thus reducing the sulphur to metal ratio of the concentrate entering the smelter. Some metal values (including nickel, cobalt, platinum, etc.) are lost with the rejected pyrrhotite, and a compromise is made between metal values lost and sulphur rejected.