The uncertainties in the data base are similar to those discussed in Section B.2.2.1 except that the capital cost uncertainty is estimated at ± 25% and the operating cost uncertainty is estimated at no greater than ± 30%.

By-product disposal problems are basically the same as in those discussed in Section B.2.2.1 since the technologies used are the same. The only exception is that the problems are likely to be more frequent since the presently controlled smelters may have already captured much of the existing sulphuric acid market. If elemental sulphur is produced, the disposal problems are minimal, even if the sulphur has to be stockpiled.

The energy consumption is similar to that discussed in Section 2.2.1 except in the case of elemental sulphur production, which is an energy-intensive process.

B.2.2.3 Emerging Control Technology

As previously mentioned, the most common mode of collecting SO_2 in the smelting industry is to use a sulphuric acid plant. The gases from fluid-bed roasters and converters (sometimes) are high enough in SO_2 concentration for direct processing in a conventional acid plant. This is the lowest-cost approach and recovers a usable by-product. However, the 0.5 to 1.5% SO_2 average concentration in reverberatory furnace off-gas is not sufficiently high for direct processing of the gas in a conventional sulphuric acid plant. For this reason, flue gas desulphurization (FGD) systems have been incorporated at a few smelters under specific conditions. They may be classified as regenerative and non-regenerative; the former produces SO_2 as a more concentrated gas, and the latter generally converts it to a throwaway by-product.

The non-regenerative systems essentially neutralize the SO_2 and place it in a stable form which can be disposed of with minimal adverse effects on the environment. Most regenerative systems absorb the SO_2 and then regenerate it as a more concentrated stream which can then be used to make either liquid SO_2, sulphuric acid, or sulphur. In those cases where the sulphuric acid market is such that additional production is not saleable, the non-regenerative systems would seem to be the logical choice for controlling SO_2 from the smelter reverberatory furnace. In those cases where a usable by-product is desired, then several possible concentration systems have been proven feasible at full-scale operations on reverberatory furnace off-gases. The costs, however, are very high and each retrofit system must be considered on an individual basis. Of the non-regenerative throwaway systems, the one that has received the most use for collecting SO_2 is the lime/limestone gypsum system. Of all the potential regenerative (concentration) systems that have been considered, the metallurgical gas experience