

separate the crushed material. Since the heavier fractions contain much of the sulphur, some 10-30% of the sulphur can be removed fairly easily depending on the sulphur characteristics, among other things. A variety of methods are used, including washing, shaking and mineral concentration methods.

If more than 10-30% removal of the sulphur is required, physical cleaning becomes expensive. It can be combined with other methods to advantage if an intermediate degree of removal is acceptable and if the original pyrite sulphur content is extremely high. For 90% and higher removal of sulphur in the fuel, (10% or less left in the coal), as now required in the U.S. for new plants, other methods are more cost effective.

Cost: Physical coal cleaning is probably the most cost-effective method available for reducing SO_2 emissions if a high degree of reduction is not required. A TVA study shows a cost of \$0.22 per lb of sulphur removed for cleaning and \$0.237 per lb for limestone scrubbing (2000 MW, 3.5% S coal, 29-32% removal by cleaning, and 85% by FGD). Within the limits of accuracy of the estimates, the costs are thus about the same. There are certain more or less intangible benefits to cleaning, however, that are not counted in this comparison, and that should make cleaning the clear choice if 10-30% removal is acceptable.

For lower-sulphur coals, the cost of cleaning increases rapidly with decrease in coal sulphur content. For example, at 0.7% sulphur, the cost per lb of sulphur removed is \$1.88, as compared to \$0.89 for FGD.

b) Chemical Desulphurization of Coal

A large amount of experimental effort has been expended on methods for desulphurizing coal by chemical means. The process types vary widely, from simple leaching by chemical solutions to methods that involve dissolution of the coal and reconstitution of the solids. The last of these, generally called Solvent Refined Coal (SRC), borders on a coal conversion process and is usually classed as such. However, it is also a process for cleaning the coal of ash and sulphur and producing a clean solid fuel with characteristics much like the original coal but with much reduced polluting potential.

Although much development work on chemical coal cleaning (CCC) has been carried out, there is as yet no commercial use. SRC, sometimes called a synthetic fuel, is probably the closest to commercialization. One module of a commercial-size plant is to be funded by the U.S. DOE, with final designs due by mid-1980 and start-up planned for