

CLEAN COAL BY-PRODUCTS UTILIZATION IN ROADWAY, EMBANKMENTS AND BACKFILLS

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ABSTRACT

It is estimated that over 90% of the solid by-products generated from electricity production is from the use of coal-based technologies⁽¹⁾. This production is estimated to increase over the next decade in the United States. The need for reducing air emissions from coal-fueled plants, particularly use of eastern coals, has led to the use of clean coal and using advanced sulfur dioxide control technologies. Figure 1 shows clean coal technology benefits⁽²⁾.

In 1977, the concept of spray dryer absorption began receiving attention in the United States as a viable technology for removing SO₂ from flue gases⁽¹⁾. In this concept, a slurry of hydrated calcitic or dolomitic lime is atomized in a spray dryer and injected into the flue gas stream. The sulfur oxides in the gas react with the alkalies in the atomized droplets to form sulfites and sulfates as the hot flue gas dries the atomized solution. A dry by-product is produced and collected in a fabric filter or an electrostatic precipitator⁽¹⁾.

The calcium spray drying is now a commercially available flue gas desulfurization (FGD) technology that is used to control SO₂ emissions from electric utility generating stations. Currently, at least 14 power plants use this technology to reduce air emissions in United States. Although considerable attention has been given to the development of calcium spray drying within the electric utility industry, very little research concerning the utilization of this by-product in the construction industry has been done. Most of the available studies^(1,3) have provided physical properties, chemical properties and engineering data on the spray dryer by-products. Many of the chemical and physical properties of the calcium spray drying wastes are different from those of conventional fly ash and FGD scrubber sludge⁽³⁾. These differences could require changes in typical construction practices where the by-product can be potentially used as an additive in structural fills, synthetic gravels, artificial reef blocks, and mineral wool. Such changes may also impact the overall economics of the calcium spray drying technology.