

We Are Running Out of Fly Ash: The Nature of Regional Supply Problems

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About 1 billion tons of coal are mined each year, which produces about 90 million tons of solid by-products. Using the ACAA data for 1994, about 61% of this is fly ash, 22% is bottom ash and slag and 17% is FGD material. Of the fly ash about 10 million tons are utilized off site, of this about 7.5 million tons are used as high quality pozzolan in cement and concrete applications. Most of the rest is landfilled or ponded. This data gives the impression that the pozzolan market in the US is substantially oversupplied. However, in reality, this is not the case. Some regions of the US are oversupplied and some regions are experiencing chronic shortages. This is particularly true in the southeastern region of the US.

In our opinion there are three critical factors affecting the fly ash market. The first one is declining quality. Much of this can legitimately be blamed on NO_x control. Low NO_x burners result in increased LOI due to higher carbon carry through. In spite of the best efforts of the burner manufacturers, some increase is probably unavoidable. Changing from a hot oxygen rich flame to a cooler fuel rich flame without substantially altering the geometry of the combustion chamber must result in higher LOIs. This increase is often enough to push marginal fly ash beyond the C-618 specification for pozzolan.

The second factor is value. The industry is beginning to realize the substantial value that fly ash has as a pozzolanic cement additive. It improves the workability and pumpability of concrete, increases its density, increases its ultimate strength and improves its resistance to chlorine and sulfate attack. Chemically, fly ash makes portland cement more effective. It reacts with excess portlandite making it unavailable to react with sulfate or carbon dioxide and greatly shrinks the size of the pores in the concrete. It also displaces its equivalent weight in cement costing \$70-\$80 per ton. The price of high quality fly ash pozzolan is beginning to rise in areas where there are shortages and prices of \$25-\$30 per ton are not uncommon.

Strong demand is affecting supply, the third and most important market factor. Fly ash is consumed and marketed regionally. It is a bulky, heavy material which makes it very expensive to move. It is not unlike limestone in its economics. For example, it costs between \$0.10 and \$0.13/ton/mile to transport fly ash by pneumatically loaded trailer truck. Thus there is a limit as to how far it can be economically moved in today's market. It can go further by rail or barge, but loadout facilities and rail car availability can provide serious complications. When the variations of the building industry's activities and subsequent demand are added in, it is not at all difficult to understand how regional shortages of quality pozzolan can develop.

The marketing problem we have is one of perception. Fly ash is marketed and consumed

regionally. However, data on fly ash production and consumption is often compiled and presented on a national basis. It is true that there is a great deal of fly ash produced but much of it is not useable and most of it is not in the right place. By ignoring the market scale and focusing on the big picture we give the increasingly false impression that the market is heavily oversupplied. We believe that this helps to keep the price of high quality fly ash unrealistically low. The price of this material is set by supply and demand. When in short supply, fly ash prices begin to reflect the cost of the material it replaces and the quality it imparts to the final product.