

“Effects of Higher Carbon Levels on Ash Utilization”

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As utilities switch coals and install equipment such as low NO_x burners, this has usually been accompanied by an increase in fly ash LOI. Carbon levels have always been important for ash marketing as well as combustion efficiency considerations. The most widespread application for coal ash continues to be for cement replacement in ready-mix concrete. However, increases in carbon content can make the fly ash unsuitable for this high value market. The ASTM C618 specification limits LOI (loss on ignition) to 6%, largely because the higher LOI levels often result in discoloration, poor air entrainment, and segregation of mix components. Air entraining agents (AEA) are used to stabilize the small air bubbles which provide freeze-thaw resistance in concrete. The presence of higher carbon levels can adsorb these surfactants, often resulting in the need for undesirable large AEA dosages.

Reduced ash marketability obviously leads to greater quantities which must be disposed at an ever-increasing cost. Another cost is the loss of disposal capacity, which is difficult to replace, since permits for new facilities are also more difficult to obtain.

The utility industry has been active on several fronts in addressing issues related to higher LOI, including:

- Improvements in the ability to accurately and quickly track LOI, in order to respond with boiler operation and ash handling adjustments. EPRI has sponsored comprehensive evaluations of several commercial on-line carbon-in-ash monitors at Southern Company plants.
- Maintaining existing markets requiring high quality ash materials by beneficiating ash to reduce carbon levels. Several technologies are being actively marketed which use various methods to remove or separate carbon – including combustion, froth flotation, and triboelectric. Related work is pursuing carbon *treatment* (rather than *separation*) to render the carbon less active in its adsorption of AEA. Still another approach has under development an AEA which would not be sensitive to effects of carbon.
- Development of ash utilization applications where higher quality material (i.e. lower LOI) is not required. Extensive development and demonstration has been completed for uses such as agriculture/horticulture, autoclaved aerated concrete, and flowable fill.