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Journal of Hazardous Materials 76 (2000) vii–viii

Journal of Hazardous Materials

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Preface

Coal ash is the by-product of the coal combustion process in commercial and industrial electric power facilities. Coal ash is commonly separated into two categories, bottom ash and fly ash. Bottom ash is the residual portion of the coal ash remaining after the combustion process, whereas fly ash is the finer portion of the coal ash (typically < 0.075 mm in diameter) that is collected by electrostatic precipitators in fabric filter baghouses and hoppers during the coal burning process. The physical and chemical properties of coal and fly ashes vary significantly depending on the source of coal and the operational and collection methods of the power facility. However, fly ashes are typically classified as either class C or class F depending on the pozzolanic activity of the ash. For example, fly ash derived from sub-bituminous coal sources typically demonstrates significant pozzolanic activity and is classified as a class C fly ash, whereas fly ash derived from bituminous coal typically requires a cement or lime additive to demonstrate significant pozzoloanic activity and, therefore, is typically classified as a class F fly ash.

Fly ash is composed primarily of glassy spheres that are relatively resistant to dissolution. However, trace metals that can dissolve in the presence of liquids exist on the surfaces of these spheres. Thus, even though fly ash is usually not classified as a hazardous waste based on the standard technical definitions (e.g., corrosivity, ignitability, reactivity, and toxicity), fly ash usually is considered as a ''waste material'' with the potential to cause a significant negative impact on the environment.

Of the hundreds of millions of metric tons of fly ash that are produced annually on a worldwide basis, only a small portion (e.g., 20% to 40%) of the fly ash is re-used for productive purposes, such as an additive or stabilizer in cement. The remaining amount of fly ash produced annually must either be disposed in controlled landfills or waste containment facilities, or stockpiled for future use or disposal. As a result of the cost associated with disposing these vast quantities of fly ash, a significant economical incentive exists for developing new and innovative, yet environmentally safe, applications for the utilization of coal fly ash.

This Special Issue of the *Journal of Hazardous Materials* represents a collection of eight papers that pertain to the characterization and utilization of coal ash, in general, and fly ash, in particular. Characterization issues that are addressed include evaluating the leaching of metals from coal and fly ashes, and measuring the physical (e.g., compressibility, strength, permeability, etc.) and chemical (e.g., pH, acidity, etc.) properties of coal and fly ashes or other materials, such as soil, to which coal or fly ash has been added. The utilization aspects of the papers addressed include the application of fly ash (1) as a constituent in a waste containment liner, (2) as a material or

0304-3894/00/$ - see front matter
PII: S0304-3894(00)00206-5

constituent to immobilize phosphate or remove chlorophenols from waste streams, and (3) as a material used to improve the physical properties of other materials (e.g., soil). Collectively, the contributed papers represent an authoritative synopsis on the subject that should serve as a valuable reference for many years to come.

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