PCA

Portland Cement Association

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Fly Ash in Concrete—Benefits of Use and Impacts of its Designation as a Hazardous Waste

Benefits:

Fly Ash Makes Concrete Infrastructure Stronger and Longer-Lasting. Fly ash helps to make the concrete denser and stronger and less permeable to water carrying salts that could corrode the steel reinforcing bars inside the concrete bridge infrastructure. This will extend the lives of concrete bridges up to 75-100 years, instead of the typical average of 42 years. This means fewer bridge replacements and repairs.

Fly Ash Fights Alkali-Silica Reactivity. Alkali-silica reactivity (ASR) is a chemical reaction that sometimes occurs when the silica in certain concrete aggregates reacts with alkalies in cement. It can be tremendously damaging to the performance of concrete. When present, ASR can abbreviate the lifespan of otherwise sound pavements to 20 or even less than 10 years.

Fly Ash Reduces Greenhouse Gas Emissions. The use of fly ash in the place of some cement in the concrete mixture reduces the carbon footprint of the cement industry. In 2002, an estimated 12.6 million tons of fly ash were used as a replacement for portland cement in the United States alone. The coal ash industry set a goal to increase this replacement level to 20 million tons by 2010. The EPA estimated that there would be a direct reduction of 6.5 million tons of greenhouse gases if this fly ash replacement goal were realized.[1]

Fly Ash Reduces High Heat During the Strength Gain of Concrete. To minimize cracking and enhance durability, industry guidelines place upper limits on the maximum temperature that concrete can reach as it hardens (cures). This is particularly important for large concrete elements, such as dams, large bridge foundations, and buildings. To keep these temperatures in check, fly ash is typically added to the mixture. By slowing the rate of temperature gain, fly ash helps ensure structurally sound, durable, and long-lasting concrete structures.

Impacts if Fly Ash is Designated a Hazardous Waste With Beneficial Re-Use Exemption:

Perceptions of Fly Ash Will Be Negatively Impacted. When a material is deemed hazardous, there is no worse designation in the public's mind. Granting an exemption will not remove the emotional and mental stigma attached to the material.

Fly Ash Storage/Handling By Concrete Producers Could Be Affected. Concrete producers, including all ready-mix and precast facilities, might have to incur the expense of adding special silos and handling practices to store and use fly ash in concrete. Each company/plant may need to hire a staff environmental engineer to address regulatory compliance. It is also possible that workers handling fly ash could be required to wear hazardous material handling suits and apparatus, which could add significantly to operating expenses.

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[1] EPA-FHWA-ACAA-USWAG, Using Coal Ash in Highway Construction: A Guide to Benefits and Impacts", #EPA-530-K-05-002, April 2005.

Questions of Legal Liability Could Arise About Concrete With Fly Ash. The past, present, or future use of fly ash, if classified as a hazardous waste, could expose Federal, state, local agencies and industry to significant legal liabilities, particularly if impacts to human health and safety and/or environmental issues are linked to its use, including federal Superfund authority.

Specifiers Could Stop Using Fly Ash. Because of the public perceptions and the stigma about using a material classified as a hazardous waste, Federal Agencies. State Departments of Transportations, Municipal Authorities, Airport Authorities, Home Builders, School Boards and businesses could demand that fly ash not be used in their concrete dams, runways, highways, bridges, levees, pipelines, and schools. Specifiers would not want to risk public outcry due to public perceptions and news coverage stating they are using hazardous wastes.

Increased Greenhouse Gas Emissions. Fly ash utilization reduces concrete's carbon footprint. Without the use of fly ash in concrete mixtures, these greenhouse gas savings will not be realized.

Reduced Durability. Fly ash used in certain concrete applications makes it last longer and stronger. If less is used, the durability of these concrete applications may decrease.

Less Tools to Fight Alkali-Silica Reactivity and High Temperature Gain Effectively. Fly ash is a critical tool to help owners control ASR in their concrete structures that can cause concrete to crack. Fly ash in concrete also slows down the rate of temperature gain as concrete cures. There are other tools to achieve these end points, but few as plentiful, effective, and economical.