USE OF INDUSTRIAL BY-PRODUCTS IN SUSTAINABLE CONSTRUCTION PRACTICE

By Rudolph N. Kraus, Tarun R. Naik, and Yoon-moon Chun

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Department of Civil Engineering and Mechanics
College of Engineering and Applied Science
THE UNIVERSITY OF WISCONSIN - MILWAUKEE
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By

Rudolph N. Kraus, Researcher, and Assistant Director,
UWM Center for By-Products Utilization
P.O. Box 784
Milwaukee, WI 53201
(414) 229-4105
Fax: (414) 229-6958
E-mail: rudik@uwm.edu

Tarun R. Naik, Professor, and Program Director
UWM Center for By-Products Utilization
(414) 229-6696
Fax: (414) 229-6958
E-mail: tarun@uwm.edu

and

Yoon-moon Chun, Post-Doctoral Research Associate
UWM Center for By-Products Utilization
(414) 229-4105
Fax: (414) 229-6958
E-mail: ymchun@uwm.edu

ABSTRACT

In the U.S., significant quantities of industrial by-products are generated each year, with most being sent to landfills. It is estimated that over 10 million tons of foundry by-products, three million tons of wood ash, and over 73 million tons of coal combustion by-products, are sent to landfills at a considerable cost. Tipping fees and transportation costs average $30 per ton and there is an unknown long-term environmental risk associated with landfiling. These materials are being thrown away, while aggregates continue to be mined, cement continues to be manufactured or imported, and energy is consumed in the processing of virgin materials. There would be a substantial savings if by-products are used. The emphasis behind recycling is the conserving resources for future generations and preserving the environment.

This paper briefly describes the uses of coal ash, wood ash, and used foundry sand, in concrete. Typically, one of the first questions that an engineer, architect, or owner will ask when considering using by-products in lieu of virgin materials are the effects on mechanical properties and environmental impact in use of these materials. Test results from concrete are detailed, and the savings associated with the use of these by-products over the use of virgin materials are also described. Test results given include
compressive strength, splitting tensile strength, drying shrinkage, flexure, and other properties. Mixture proportions and fresh properties of concrete are also summarized.