

**New York State
Environmental Investment Program
Research Project Summary
Taylor Concrete Products Inc.**

Project Background

Taylor Concrete Products, Inc. has made masonry products in Watertown, since the late 1920's. Taylor offers a full line of masonry units and accessory products for any job, from small residential projects to giant commercial and industrial developments, which are available in a variety of shapes, colors, and sizes. Additionally Taylor Concrete offers the technical expertise of its six professional staff.

Project Description

Taylor's customer-focused approach has helped the business stay successful for almost a century, but like many companies today it is looking for ways to improve competitiveness and increase market share. If Taylor could substitute for a portion of the approximately \$120 per ton cement going into its concrete products with an alternative, environmentally-friendly material, it could not only reduce costs but also promote its products as green and help earn LEED points for its clients.

This research project employed the expertise of Dr. Narayanan Neithalath from Clarkson University's Center for Advanced Materials Processing to assess the viability of substituting high-carbon fly ash being generated and managed as a waste at a nearby power plant in Ft. Drum for up to 20% of the cement used to make Taylor's block products. Class F-type fly ashes, which sell for \$20 - \$45 per ton, have been proven beneficial in this application, but are not readily available in the Northeast. It was uncertain whether the 200 tons of high-carbon fly ash generated daily at Black River Power Generation could be used in this application. Dr. Neithalath would first determine the physical and chemical characteristics of the high-carbon fly ash. Then, he would assess the impacts of substituting varying doses of the ash byproduct on the workability, air content, setting and hardening

behavior, and temperature development of cement concretes to ultimately measure the effects of the substitution on the mechanical properties of the masonry products.

Project Results

Detailed studies on the use of high-carbon fly ash in cement pastes and concretes were carried out. The reaction products that formed in high-carbon fly ash systems were different because of the presence of greater amounts of sulfate. For up to 20% replacement of cement with high-carbon fly ash by mass, required air contents could be achieved through proper proportioning. The compressive strength, split tensile strengths, and modulus of elasticity of high-carbon fly ash modified cement pastes and concretes were found to be higher than those of Class F fly ash modified mixtures of the same replacement levels. Transport properties (moisture and ionic) of concretes were adversely impacted because of the incorporation of high-carbon fly ash, implying that the use of high-carbon fly ash be limited to building interiors until measures that could limit moisture ingress are developed. The results from this study can be extended to other high carbon, high sulfate fly ashes from Circulating Fluidized Bed Combustion (CFBC) processes.

Unfortunately, by the time the study was completed, operations at the power plant in Ft. Drum had been suspended. So Taylor Concrete continues to examine avenues of obtaining similar fly ash from other New York sources. As a result of the study findings, other concrete product manufacturers with a source of fly ash similar to the one reported in this study could also use high-carbon fly ash in their products.

Contractor: Taylor Concrete Products, Inc.
County: Jefferson County
ESD Region: North Country
ESD Contact: 518/292-5340

NYS EIP Investment: \$183,335
Contractor Match: \$ 78,907
Total: \$262,242
Completion Date: July, 2011