LTRC RESEARCH PROJECT CAPSULE

MARCH 2009

09-1C

TECHNOLOGY TRANSFER PROGRAM

Evaluation of Fly Ash Quality Control Tools

JUST THE FACTS

Start Date:
March 1, 2009

Duration:
12 months

End Date:
March 1, 2010

Funding:
Federal SPR Funds

Principal Investigator:
Tyson D. Rupnow, Ph.D.
Concrete Research Engineer
225-767-9148

Administrative Contact:
Zhongjie "Doc" Zhang, Ph.D., P.E.
Associate Director, Research
225-767-9124

Technical Contact:
Tyson D. Rupnow, Ph.D.
Concrete Research Engineer
225-767-9148

SPECIAL POINTS OF INTEREST:

- Problem Addressed
- Objectives of Research
- Methodology Used
- Implementation Potential

PROBLEM

Many entities currently use fly ash in Portland cement concrete (PCC) pavements and structures. Although the body of knowledge is great concerning the use of fly ash, several projects per year are subject to poor performance where fly ash is named as the culprit. Generally the "bad" projects arise due to one of two commons errors: (1) poor understanding of what fly ash is and how it affects concrete pavement construction and performance or (2) a switch of fly ash sources midstream during the construction project.

From information cited by the American Concrete Institute (ACI) and others, there is general agreement that the use of fly ash is associated with improved workability and finish ability, increased time of setting, unpredictable change in time between initial and final set, strength gain, a temperature rise in mass concrete, reduced permeability in mature concrete, increased resistance to sulfate, chloride attack improvement, freeze thaw resistance, modulus of elasticity, resistance to de-icing salts, and resistance to corrosion of reinforcing steel.

OBJECTIVES

The objective of this research is to identify tools available for quality control (QC) of class C fly ash delivered to a construction site. It is anticipated that a quality control tool for class C fly ash can be specified and developed.

METHODOLOGY

Each of the 11 sources of class C fly ash on the Qualified Products List (QPL) will be tested for chemistry, set time, and coffee cup (with and without admixtures) for two samples per week for a period of 10 weeks totaling 20 samples per source. The non-combined samples are taken from production by the ash companies and delivered to LTRC.

Each of the samples will be evaluated by the following proposed QC tests:

1. A quick calorimetry test (coffee cup test) for use in QC of fly ash delivered to the construction site
2. An investigation of penetration type devices, such as the Gillmore Needle, Vicat Needle, and pocket penetrometer, for use in characterization fly ash
3. An ASTM FC 618 chemical analysis for each fly ash source included in the study

Figure 1
Quick calorimetry test equipment

IMPLEMENTATION POTENTIAL

It is foreseen that the results of this study will greatly assist in determining potential tools for QC of class C fly ash as delivered to construction sites. It is envisioned that incorporation of these QC tool combinations will economically benefit the state by reducing a perceived risk when utilizing class C fly ash.