Florida Department of Transportation Research

Development of Standard Operating Procedure for Analysis of Ammonia Concentrations in Coal Fly Ash

April 2015

Project Number
BDV31-977-10

Project Manager
Michael Bergin
FDOT Materials Office

Principal Investigator
Tim Townsend
University of Florida

Current Situation

Fly ash produced when pulverized coal is burned in electrical generators can be used as a concrete additive with many benefits. However, fly ash can have a high ammonia content, which is released when used in concrete, potentially exposing workers to unsafe levels of ammonia. To assure that workers are protected, the amount of ammonia in fly ash must be measured.

Research Objectives

University of Florida researchers, working with the Hinkley Center for Solid and Hazardous Waste Management, sought to develop a standard procedure for measuring ammonia in fly ash.

Concrete pours from truck to mold. Workers often work closely with concrete, possibly for hours at a time, increasing exposure to potentially harmful ammonia.

Project Activities

The researchers first assessed current methods for ammonia analysis in coal fly ash. Then, industries and agencies in and out of Florida were surveyed regarding which of these methods they used. Based on survey results, the researchers identified desirable qualities of a method for determination of ammonia. The method should require low cost equipment and supplies and should be relatively quick, reliable, and verifiable.

There is no standardized method for extraction of ammonia from fly ash – an essential step in many methods for measuring ammonia. The researchers tested several extraction techniques and identified the most effective ones, considering concerns expressed by survey participants, balancing speed, simplicity, and cost against reliability. Standard analytical methods for measurement of extracted ammonia were examined in detail for speed, cost, ease of use, reliability, etc. In the end, a method for measuring ammonia in fly ash which does not require extraction – the gas detection tube – was preferred because it avoids extraction issues and better meets the expectations expressed by potential users. In comparison among all the tested methods, the gas detection tube also produced the most consistent results.

The selected method was documented in a draft standard operating procedure (SOP) and provided to two survey participants who agreed to beta test it. Based on their experiences, a final SOP using the gas detection tube was produced.

Project Benefits

A standard method for measuring ammonia in fly ash could assist suppliers and inspectors in assuring that workers are protected from damaging workplace exposure to ammonia.

For more information, please see dot.state.fl.us/research-center