

# PROJECT FACTS

UNIVERSITY OF KENTUCKY CENTER FOR APPLIED ENERGY RESEARCH

## PARTICIPANTS

UK Center for Applied Energy Research

UK Dept. of Plant & Soil Sciences

Applied Chemical Technology, Inc.

Terra Industries, Inc.

## SPONSORS

National Institute of Hometown Security

## PROJECT VALUE

NIHS-\$835,765

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## POWER GENERATION & UTILITY FUELS

### Reducing the Explosion Potential of Ammonium Nitrate by Coating with Low-Cost, Coal Combustion By-Products

Ammonium nitrate (AN) mixed with fuel oil creates a powerful explosive, ANFO, whose destructive power has been graphically demonstrated in a number of malicious attacks including the Alfred P. Murrah Federal building in Oklahoma City. Despite its beneficial and critical role in American agriculture, AN is a weapon of choice for acts of terrorism.

Prior attempts to apply desensitizing agents or add diluents to AN have been unsuccessful due to a combination of ineffectiveness, cost, and undesirable side effects. Our approach entails coating AN with a coal-combustion by-product (CCB) that is generated during electric-power production. CCBs are inexpensive, available in large quantities, and can be beneficial to agriculture as a pH adjustment agent, soil ameliorant, or a source of plant nutrients (e.g., Na, K, trace elements).

Our research shows that:

- Coating AN with a CCB at 15% or more by weight is effective in preventing the detonation of AN from propagating.
- There is no significant difference in crop yields or plant uptake/soil migration of hazardous elements for CCB-coated versus uncoated ammonia or nitrate.
- The process used to produce durable coatings is simple and inexpensive. The technology offers a practical and cost-effective way to eliminate the threat of ammonium nitrate fertilizer while reducing the amount of CCBs now being discarded.



Explosion cloud from 200-lb charges 10-ms after detonation: 20% coated AN (top); 100% ANFO (bottom).

VIDEO