

PROJECT FACTS

UNIVERSITY OF KENTUCKY CENTER FOR APPLIED ENERGY RESEARCH

PARTICIPANTS

UK Center for Applied Energy Research

EKU College of Law Enforcement

EI Dorado Chemical, Inc.

SPONSORS

National Institute of Hometown Security

PROJECT VALUE

NIHS-\$124,280

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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 to the Marriott Hotel in Jakarta. Despite its beneficial and critical role in American agriculture, AN is a weapon of choice for acts of terrorism and is an ominous threat to modern society.

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 has entailed 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 has shown that:

- Coating AN with a CCB at 15% or more by weight is effective in preventing the detonation of AN from propagating.
- The bulk density, particle size distribution, and nutrient-nitrogen release rate of CCB-coated AN appear for agricultural applications.
- 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](#)