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Safety Testing of Ammonium Nitrate Based Mixtures JASON PHILLIPS, KARMEN LAPPO, JAMES PHELAN, NATHAN PETERSON, DON GILBERT, Sandia National Laboratories — Ammonium nitrate (AN)/ammonium nitrate based explosives have a lengthy documented history of use by adversaries in acts of terror. While historical research has been conducted on AN-based explosive mixtures, it has primarily focused on detonation performance while varying the oxygen balance between the oxidizer and fuel components. Similarly, historical safety data on these materials is often lacking in pertinent details such as specific fuel type, particle size parameters, oxidizer form, etc. A variety of AN-based fuel-oxidizer mixtures were tested for small-scale sensitivity in preparation for large-scale testing. Current efforts focus on maintaining a zero oxygen-balance (a stoichiometric ratio for active chemical participants) while varying factors such as charge geometry, oxidizer form, particle size, and inert diluent ratios. Small-scale safety testing was conducted on various mixtures and fuels. It was found that ESD sensitivity is significantly affected by particle size, while this is less so for impact and friction. Thermal testing is in progress to evaluate hazards that may be experienced during large-scale testing.

Jason Phillips
Sandia National Laboratories

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