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Gas Gun Experiments to Measure the Shock Compression Behavior of an Ammonium-Perchlorate/Aluminum Based Propellant NATHANIEL SANCHEZ, RICHARD GUSTAVSEN, LEE GIBSON, DANIEL HOOKS, Los Alamos National Laboratory — Gas-gun driven plate impact experiments were performed on High Performance Propellant (HPP) to measure the shock compression behavior and Hugoniot. HPP is a proprietary blend of ammonium-perchlorate, aluminum, and plastic binder. A small amount of FeO2 gives the propellant a rust color. The primary diagnostic was embedded magnetic particle velocity gauges. The Hugoniot was determined by performing multiple experiments using different impactors and a range of impact velocities. Impact stresses ranged from 0.3 GPa to 15 GPa. Even at the highest stress no reaction was observed; none was expected. At low stress HPP exhibits viscoelastic behavior with rounded wave profiles. Hugoniot data can be described using a model based on a Murnaghan isotherm with a small amount of porosity.

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