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Development of the large-bore powder gun for the Nevada Test Site JAMES ESPARZA, BRIAN JENSEN, Los Alamos National Laboratory — Past fundamental work at the Nevada Test Site (NTS) U1a complex has been performed using explosively-driven flyer plates which provide high-pressure loading at the expense of some shock. In contrast, plate-impact experiments on single stage guns provide very planar loading conditions suitable for studying complex phenomena such as phase transitions and material strength, and provide important data useful for constraining and validating predictive models. The objective of the current work was to develop a large-bore powder gun capable of accelerating projectiles to moderately high velocity for impact experiments at NTS. This gun will span a performance gap between existing gun facilities and provide a means of examining phenomena over a wide range of stresses and time-scales. Advantages of the large-bore gun include the capability to load multiple samples simultaneously, the use of large diameter samples that significantly extend the time duration of the experiment, and minimal tilt. This new capability required the development of a disposable confinement system that used an explosively driven closure method to prevent contamination from moving up into the gun system. Experimental results of the qualification testing of the large-bore gun, the confinement system, and the explosively driven valve will be presented.

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