Abstract Submitted
for the SHOCK11 Meeting of
The American Physical Society

Role of stored defects on the mechanical response of shock prestrained HT-9 steel SARA PEREZ-BERGQUIST, ELLEN CERRETA, GEORGE (RUSTY) GRAY III, STUART MALOY, OSMAN ANDEROGLU, Los Alamos National Laboratory — HT-9 is a 12Cr-1Mo ferritic/martensitic steel with significant experience as cladding material in fast reactor applications. Recent investigations into precipitation of α' in HT-9 steel after irradiation at elevated temperatures suggests that it nucleates at dislocation loops. It is recognized that steel shocked below the peak shock stress for the α to ε high-pressure phase transformation results in a material with a high density of stored defects. These defects have a profound effect on subsequent mechanical properties and with additional elevated temperature exposure could serve as nucleation sites for the α' precipitate. To investigate the possibility of precipitating α' at dislocations, HT-9 steel was shocked at a peak pressure of 11 GPa and subsequently annealed at 475 $^\circ$C for up to 16 weeks. The mechanical response of shock prestrained HT-9 steel was investigated and compared to the mechanical response of the shocked and annealed material. Substructure and texture evolution due to shock loading was examined and mechanical response of shock prestrained HT-9 is rationalized in terms of these observations.

Sara Perez-Bergquist
Los Alamos National Laboratory

Date submitted: 15 Feb 2011 Electronic form version 1.4