Abstract Submitted
for the SHOCK13 Meeting of
The American Physical Society

Neutron Diffraction and Electrical Transport Studies on Magnetic Transition in Terbium at High Pressures and Low Temperatures SARAH THOMAS, JEFFREY MONTGOMERY, GEORGIY TSOI, YOGESH VOHRA, University of Alabama at Birmingham, SAMUEL WEIR, Lawrence Livermore National Laboratory, CHRISTOPHER TULK, ANTONIO MOREIRA DOS SANTOS, Oak Ridge National Laboratory — Neutron diffraction and electrical transport measurements have been carried out on the heavy rare earth metal terbium at high pressures and low temperatures in order to elucidate its transition from a helical antiferromagnetic to a ferromagnetic ordered phase as a function of pressure. The electrical resistance measurements using designer diamonds show a change in slope as the temperature is lowered through the ferromagnetic Curie temperature. The temperature of the ferromagnetic transition decreases at a rate of -16.7 K/GPa till 3.6 GPa, where terbium undergoes a structural transition from hexagonal close packed (hcp) to an α-Sm phase. Above this pressure, the electrical resistance measurements no longer exhibit a change in slope. In order to confirm the change in magnetic phase suggested by the electrical resistance measurements, neutron diffraction measurements were conducted at the SNAP beamline at the Oak Ridge National Laboratory. Measurements were made at pressures to 5.3 GPa and temperatures as low as 90 K. An abrupt increase in peak intensity in the neutron diffraction spectra signaled the onset of magnetic order below the Curie temperature. A magnetic phase diagram of rare earth metal terbium will be presented to 5.3 GPa and 90 K based on these studies.

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Date submitted: 15 Feb 2013 Electronic form version 1.4