Abstract Submitted
for the DPP14 Meeting of
The American Physical Society

Developing a 3-shock, low-adiabat drive for high pressure material science experiments on NIF[1] CHRISTOPHER WEHRENBERG, SHON PRISBREY, Lawrence Livermore National Laboratory, PETER GRAHAM, Atomic Weapons Establishment, HYE-SOOK PARK, CHANNING HUNTINGTON, BRIAN MADDOX, ROBIN BENEDETTI, ROBERT RUDD, TOM ARSENLIS, BRUCE REMINGTON, Lawrence Livermore National Laboratory — We describe a series of experiments for basic materials science on NIF to develop a planar, 3-shock, low-adiabat drive to reach peak pressures of 5 Mbar, while keeping the physics samples well below their melt temperatures. The primary diagnostic is VISAR, which measures the compression waves as they travel through a Ta witness plate. X-ray ablation from an indirect drive launches a strong (>10 Mbar) shock through a precision fabricated "reservoir," consisting of a CH ablator, followed by layers of Al, CH(18.75%I), 350 mg/cc CRF foam, and a final layer of 10-30 mg/cc foam. This reservoir releases as plasma across a 1.5 mm vacuum gap, then stagnates on the 15 micron thick Ta witness plate, which is backed by a LiF or quartz window. The lowest density reservoir layer sets the strength of the leading shock, which needs to be controlled to keep the physics samples solid, and to control the dislocation density created by this leading shock. We will describe an extensive series of experiments done on NIF to develop this drive.

[1] S. Prisbrey, PoP 19, 056311 (2012).

[1]This work was performed under the auspices of the Lawrence Livermore National Security, LLC, (LLNS) under Contract No. DE-AC52-07NA27344.

Christopher Wehrenberg
Lawrence Livermore National Laboratory

Date submitted: 11 Jul 2014 Electronic form version 1.4