Abstract Submitted
for the DPP06 Meeting of
The American Physical Society

Integrated LiH Debris Shields for Warm PRS Loads[1] R.E. TERRY, J.W. THORNHILL, R.W. CLARK, A. DASGUPTA, Plasma Physics Division, Naval Research Laboratory — Plasma radiation sources can profitably employ thick LiH debris shields integrated into the return current surface. Shield material selection demands the highest specific enthalpy $\mathcal{H}_m$ to vaporization or decomposition in an attenuation length $\lambda(E_{prs})$ at the k-shell transmission energy of interest. As a figure of merit then, $\mathcal{E} \equiv \mathcal{H}_m\rho/\mathcal{M}\ \lambda(E_{prs})[\frac{kJ}{cm^2}]$ can order candidate materials. LiH is the best possible material for this purpose, offering $\mathcal{E}$ values of ≈ 130 for the 13 keV k-shell lines of Kr. In a level comparison, Be offers only 47 and pure Li, 77.5. For the Ti k-shell lines, a similar ordering is: LiH, 22.44; Be, 3.08; Li, 10.40. Early studies[2] of these designs showed promise even for the more opaque Ar and Ti k-shell radiation. Here we examine the much easier problem for a Kr k-shell PRS and consider the influence of l-shell and m-shell radiation on the hydrodynamic flows developed in the LiH and its decay products. The radiation loading of the LiH shield is computed self consistently within the more generous trade space of stagnation energy, machine current, implosion time, and delivered mass for drivers capable of useful Kr k-shell yield.

[1]Work sponsored by Defense Threat Reduction Agency
[2]R.E.Terry, NRL Memo Report 6720–96-7868.

Robert Terry
Plasma Physics Division, Naval Research Laboratory

Date submitted: 26 Jul 2006 Electronic form version 1.4