

Fog bank

1. The public theoretical and experimental literature on radiation implosions shows that there is an optimal driving radiation power curve required at the secondary to achieve extremely high compressions. This curve is an exponentially increasing power curve. In inertial confinement fusion systems this power curve is approximated by a series of shaped pulses, the net profile is one of a relatively long period of low power followed by a very rapid ramp-up at the end. It seems likely that the “natural” radiation emission profile from the primary does not closely match the desired optimal power curve.

It is also well known that pre-heating of the secondary fuel by neutrons emitted by the primary interferes with high compression. In a compact light-weight system, limiting neutron pre-heating would be a challenge.

Based on these general design considerations it could be anticipated a priori that there is some set of design features – a structure – in the most compact nuclear explosive systems that has the role of modulating the transmission of energy from the primary to the secondary, both the thermal photon and neutron emissions. (In fact I concluded this in the mid 1990s, before I ever heard of the existence of the interstage.)

It can be surmised then that the interstage is this postulated energy modulation structure. The use of beryllium (almost certainly the undesirable “toxic, brittle material” of the RRW slide) and possibly lithium hydride suggests that the interstage absorbs neutron energy, thus reducing pre-heating. The complexity of FOGBANK suggests a material (possibly an aerogel) with an exacting complex structure, perhaps a material of graded density, which could shape the flow of radiation particularly when the power is relatively low.

By the way, aerogels have some other remarkable properties besides just very low densities, such as a very low speed of sound transmission, high sound attenuation, superb thermal insulating properties, very high strength-to-weight ratios, etc. that could be valuable structural properties in the warhead. Thus aerogels may be used for more than one purpose, or may have multiple benefits in a single application.

— Carey Sublette · Mar 10, 11:11 AM ·