

independently targetable reentry vehicles (MIRVs) which means that they carry more than one warhead, each of which can be specifically aimed at a distinct target. The warhead 'rides' the re-entry vehicle to the target; the lethality of the warhead, therefore, depends not only on its size, but also on the accuracy of the re-entry vehicle and the sophistication of its guidance system.

#### Yield and Equivalent Megatonnage (EMT)

The megatonnage or yield of a warhead provides a measure of its explosive energy yield. Due to the nature of the blast, however, destructive power and the yield of a warhead do not grow proportionately. When an explosion takes place, a great deal of the energy released as blast and shock is concentrated in the centre vertical plane of the explosion, as opposed to expanding equally outwards in the shape of a sphere. As the yield of a weapon increases the energy "lost" to the concentration effect in the centre also increases, but not in a one-to-one relationship to the increase in yield. Equivalent megatonnage (EMT) expressed as  $Y^{2/3}$  (Y=yield) reflects this distribution of energy and provides a better measure of overall destructiveness than yield alone.<sup>6</sup> EMT is generally used to measure weapons effects against 'soft' urban and industrial targets. On balance, it can be seen from the table that the lower the yield of a weapon, the relatively greater its destructive efficiency expressed in EMT. Large warheads, therefore, are not necessarily a sign of a greater destructive capability. For example, 2 warheads of 0.5 Mt. have an EMT of 1.26; 4 warheads of 0.25 Mt. have an EMT of 1.59 Mt.. In each case, total yield is 1Mt.

A useful example of the way in which the distinction can be applied is provided by a recent letter to the New York Times by Frank Gaffney, presently the US Deputy Assistant Secretary of Defense. Gaffney wrote:

<sup>6</sup> For further discussion, see Kosta Tsipis, Nuclear Explosion Effects on Missile Silos (Center for International Studies, Massachusetts Institute of Technology, February 1978)