and TNT. An empirical equation for TNT explosions was determined relating maximum overpressure (psi) to distance and explosive weight of the form:

$$P = 10^3 \frac{W_f^{2/3}}{R^2},$$

where W_f = weight of TNT (lbs)

and R = separation distance (ft)

It was further determined that the same equation could be employed to describe overpressures from detonation of liquid rocket propellants provided that W_f is interpreted as the weight equivalent of TNT for each type of propellant. Statistical treatment of test data showed mean weight equivalency factors of 4.5% for cryogenic fuels and 0.51% for hypergolics. Statistics were consistent with "one-sided" normal distributions with standard deviations of 5.6 and 1.2%, respectively.

These equivalence factors and variances were employed to determine peak overpressure values at the payload for the appropriate stages of the reference vehicle. Table IV-6 shows the mean, 90 percentile and 99 percentile TNT equivalence for each stage. Table IV-7 presents the calculated overpressures, the percentile values here indicating the probability of not exceeding the tabulated overpressure.

It is seen that the Centaur stage yields the predominant overpressures because of its cryogenic fuel and proximity to the payload region. The percentiles indicate the probability of not exceeding a given overpressure. Thus the probability of not exceeding 500 psi within the payload from a Centaur explosion is 0.99.