COLLATERAL EFFECTS OF CONFINED BLAST EVENTS

MYERS,D.

Customary safety considerations of explosive events are focused primarily on the prompt hazards associated with blast, thermal and fragmentation. However, other, more subtle, collateral effects from the explosion may result from the release of hazardous material to the atmosphere and the subsequent transport. In a realistic military scenario, we may be concerned with the release of toxic materials associated with the production or storage of weaponry. In a blast trial, we may be concerned with the transport of simulated toxic materials or simply with atmospheric pollutants which may be a nuisance in the neighborhood of the test. In this paper, we explore those event Parameters which are most significant for collateral effects.

We consider a range of explosive charges within confined facilities of varying internal volumes and with a variety of openings to the atmosphere. The focus here is to estimate the plausible range of plumes released to the atmosphere. For this we use the quasi-steady blowdown model SBJP, developed for DNA. We characterize the released contaminant mass, plume dimensions, plume duration and other parameters. In parallel, we consider the atmospheric transport and sur-face deposition sensitivities to plume parameters, as well as to the background meteorology. Here, we use the DNA-sponsored SCIPUFF atmospheric transport model. We consider both local and long-range effects. Through these parametric calculations, the most significant parameters for collateral effects are determined.

Based upon the calculation findings, the most important plume parameters are isolated and approximate correlations with blast event conditions are derived. This provides a quick estimation tool for use in estimating downwind collateral effects hazards.