

It was pointed out that considerable progress has been made in assembling range-yield-effects data for nuclear detonations applicable to a variety of burst conditions and that tentative though incomplete biomedical criteria have been formulated for assessing the hazards of exposure to blast as well as ionizing and thermal radiations. Even so, it was noted that great care must be taken if meaningful concepts are to come from a combined use of the physical and biomedical data.

In emphasis of this fact, the physically and biologically oriented problem areas were presented and discussed. Also, survival data for the Hiroshima explosion were used to show that the conditions of exposure more than any other factors determined immediate survival and more than anything else was responsible for keeping the casualty figures as low as they were.

A major deterrent in applying the experience in Japan to a more generalized situation is the lack of information about the differences between "free-field" parameters and environmental variations that will actually occur at the locations of people immediately following the burst.

The relevant problems are complex and difficult and there has been neither widespread appreciation of the need to "move out of the streets and into exposure locations" nor with one exception much progress in translating "free-field dose" to "exposure dose" at locations of interest.

The exception is the Ichiban I Program being carried out cooperatively by personnel from Oak Ridge National Laboratory and the Atomic Bomb Casualty Commission.

A second difficulty in generalizing across the range-yield spectrum of effects is the fact that, all other things being the same, the ratios of the major effects parameters to one another change with yield; viz. , the rangeyield-effects curves for thermal and ionizing radiation and for blast are not parallel with one another.

Even so, tentative biomedical criteria can be combined with range effects data for different yields and burst conditions to define the ranges inside which and the areas over which specified potential hazards exist.

Also, given a completely flat terrain, the absence of structures and all people exposed in the open, casualty estimates for such "free-field" exposure conditions might perhaps be credible. In the presence of terrain variations and the many types of buildings in cities and urban complexes, there can be no satisfactory predictions until positional, geometric and orientational factors along with others defining the conditions of exposure have been recognized and assessed.

The state of art currently does not include this sophistication and any but the grossest estimation of nuclear casualties is hardly possible today.