

## **EBLAST - AN EMERGENCY BLAST EXPERT SYSTEM**

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This paper describes the development of an expert system designed to assist those who must take action in emergencies involving explosive hazards. Some years ago, Dewey McMillin & Associates Ltd., introduced the AirBlast expert system, which requires the input of an exact description of an explosive source, its height of burst and the atmospheric conditions. It then provides a considerable amount of information about the physical properties of the resulting blast wave. In the case of an explosive emergency, a precise description of the explosive source is rarely available, and the output physical properties of the blast wave must be translated into injury and damage criteria. Eblast is a new expert system which will accept as input imprecise or "fuzzy" information about an explosive source, and will provide information about the likely injury and damage ranges should an explosion occur.

A database has been created of the available reports of explosive incidents which have occurred since 1986, over 400 at the time of writing. The explosive sources in these incidents were grouped into ten categories, and of these the second most frequent source, and the one causing by far the largest number of deaths and injuries, was 'condensed phase detonations', i.e. solid explosives. A survey of the potential users of the expert system indicated that the types of explosive hazards of most concern were Terrorist devices and military munitions. It was therefore decided to concentrate on these two types of sources in the prototype version of Eblast.

Analysis of the database also showed that the primary causes of death and injury from explosive incidents were: direct blast effects, primary and secondary fragments, and window glass. The prototype version of Eblast therefore provides the estimated ranges for these effects. These ranges are all affected by the nature of an urban environment. An 'urban environment code' is therefore being developed, and 3-dimensional numerical modeling is being used to determine how the blast and fragment ranges are modified by the environment. These ranges can be graphically superposed onto a computer based city map showing utilities lines and special features such as stores of dangerous substances.

A demonstration of the prototype Eblast expert system will be presented.