AIRBLAST PREDICTIONS IN TUNNEL/ENTRANCE CONFIGURATIONS DUE TO HE-DETONATIONS NEAR THE TUNNEL PORTAL: DATA REDUCTION OF SMALL-SCALE TESTS, SIMILITUDE ANALYSIS AND DESIGN CHARTS

SCHLAEPFER,D.B.;BUCHER,K.M.;BINGGELI,E.;BINGGELI,F.

In the past shelters were mainly designed against the airblast effects of nuclear weapons. However, recent developments in conventional weapons technology, especially regarding the pin-point accuracy, have drastically increased the potential threat of non-nuclear weapons to protective structures. The basic knowledge of airblasts in tunnel-entrance configurations caused by such weapons is rather small compared to what is known of nuclear weapons. Therefore, the NC Laboratory Spiez of the Swiss Defense Technology and Procurement Agency has launched a program to study the one-dimensional blast wave propagation in tunnel-entrance configurations caused by HE-detonations inside and near the tunnel entrance.

This research program is primarily based on small-scale blast simulation tests with a large number of variations in geometry and yield. The objective of this study is to develop simple design charts for pressure and impulse by statistical data reduction and similitude analysis of the experimental results. The charts were developed for straight tunnels; 90o-junctions with a blind and an open end of the main branch; and straight tunnels with baffles considering detonation points in and around the entrance.

This paper describes the main steps in the data reduction and shows the conceptual ideas used to develop the simple design charts.