BLAST WAVE FORMATION IN THE FOULNESS NUCLEAR BLAST SIMULATOR

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The development of the blast wave profile from helically wound Cordtex has been studied by a detailed examination of the pressure time waveforms at various points along the tunnel. The origins of the various shocks recorded at the tunnel walls of the 1.8m section are identified and compares with measurements from similar charges fired in free air. The waveshapes generated from the end of the helix are discussed and various features which govern the waveshape developed in the 2.4m dia and 4.9m dia sections
are identified.

In order to avoid second shock phenomena, it is important to generate a Friedlander tape waveform well within the 1.8m dia section, since the change in tunnel diameter to the 2.4m dia section magnifies irregularities on the pressure-time profile, which can then form unwanted secondary shocks.

The shape and decay rate of the blast wave arriving in the 4.9m dia section may controlled by varying the pitch of the helix. A Friedlander type wave form is generated by using a short pitch; a waveshape with a slower initial decay is obtained by using a longer pitch, providing the charge weight is sufficient for any secondary shocks to overtake and merge with the main shock front before it arrives at the test section.
It has previously been reported that blast waves of adequate duration could not be produced with a peak overpressure less than 14 kPa (2 psi). Recently, however, pressure-time profiles with the overpressure ranging from 3 kPa to 10 kPa and a positive duration of 200 ms have been produced in the 4.9m dia section of the simulator by firing the helical charge immersed in high expansion water foam in the 1.8m dia section. The foam attenuates the peak overpressure to a much greater extent than it affects the positive duration. When using foam the magnitude of the pressure developed in the 4.9m dia section and the waveshape may be controlled by varying the pitch, whereas the positive duration and impulse are a function of the total charge weight.