

NONAUDITORY AND AUDITORY DAMAGE-RISK ASSESSMENT FOR SIMULATED WEAPONS FIRED FROM AN ENCLOSURE

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A test apparatus was fabricated to simulate the blast environment to establish the damage risk from the reverberant wave produced during the firing of an antitank weapon from an enclosure. The simulation was accomplished by detonating C-4 explosive charges outside a 18.2 m all-steel chamber. The blast wave was introduced into the chamber through a 20cm 1.D. tube and was reflected off the back Wall and subsequently throughout the chamber. The resulting waveform at the target locations closely approximated that generated by a Carl Gustav antitank weapon fired from a room of about the same volume. The nonauditory threshold was first established by exposing anesthetized sheep to various intensities of this reverberant wave environment. A series of 1 -shot, 3 -shot and 12-shot (2.5 min apart) exposures were done. The results indicated that multiple shots have a strong additive effect decreasing the subthreshold levels. The sub-threshold for a ,single exposure was estimated to be below a maximum peak pressure of 48 kPa and below a minimum peak of 44 kPa for three exposures. The subthreshold for 1 2 exposures was not found. The auditory limit for the 1- and 3-shot exposures was then investigated. Using at least 60 human volunteers, a temporary change in hearing level was used as the primary measure of blast effect. Other parameter measured were performance assessment, stool gnaics, tympanometry, physical well being, and otoacoustic emissions. Each subject wore a RACAI muff, modified so it simulated leaks typical of a poorly fitted muff. The exposures were started at levels of approximately 1/64 of the energy of the final condition The final conditions were set at the nonauditory threshold limits. Providing no effects occurred, the exposure energy was doubled for the next exposure, i.e., the second exposure was 1/32 of the energy of the final condition, until the nonauditory level was reached. No auditory effects occurred. Thus, nonauditory considerations set the sate limit for firing a Carl Gustav-type weapon from an enclosed bunker.