

EVALUATION OF INDUSTRIAL PLANT HARDNESS TECHNIQUES"

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Two identical factories were located 51.8 m (2.07 MPa) from a 110 ton ANFO explosion (Misers Bluff, Phase 11, Event 1). One factory with its associated equipment, was hardened to resist the blast while the other was not hardened. The range was selected so that catastrophic failure of the unprotected factory would occur while the protected equipment would have a good chance of survival. Duplicate, instrumented machines, including lathes, grinders, mills, drill presses, ovens, oscilloscopes and calculators, were placed within the factories. Slightly different Mining techniques were used on each machine in the hardened building to evaluate the effects of backpacking, and fixed versus detached mountings.

The hardened building was backfilled with soil to a height of nine feet and bermed on the Outside at a 3 to 1 slope. Twenty seven channels of instrumentation including pressure, strain and acceleration were recorded. In addition high speed Cameras located both inside and outside the unhardened building recorded shock wave interactions.

The shock wave completely cleared the concrete slab of the unhardened building, destroying all of its contents except for the two high speed camera containers. The hardened building was sheared off at the top of berm as expected. The hardened machinery was operated post test and compared to pretest conditions. The results indicated that 90 percent of the equipment was operational with little or no repair. A major conclusion drawn from this test was that simple hardening techniques will protect industrial machinery to much higher levels than previously assumed by the targeting community.