U.S. ARMY EXPLOSIVES SAFETY TEST MANAGEMENT PROGRAM

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ABSTRACT

This paper presents the U.S. Army Technical Center for Explosives Safety development and implementation of an Explosives Safety Test Management Program for the U.S. Army. The primary objective of this new program is to oversee, assist and support all explosives safety testing conducted by the U.S. Army with the purpose of validating, establishing, or modifying explosives safety standards. In the past, the U.S. Army has had no single, central organization to accomplish this function leading to testing duplication, inefficient testing, and ineffective and inefficient utilization of test results. The U.S. Army Explosives Safety Test Management Program has recently been implemented (1992) to address these past problems, and ensure the U.S. Army explosives safety testing resources are optimally utilized.

INTRODUCTION

The U.S. Army Explosives Safety Management Program development was directed by the Executive Director for Explosives Safety, General Fred G. Hissong, in October 1989. The purpose of this program is, "To effectively oversee the U.S. explosives safety policy."

The U.S. Army Explosives Safety Test Management Program comprises several components. First, as the Army member to the DOD Working Group, we participate in selecting/promoting explosives safety test projects. After completion of testing, the recommendations and test results which may validate, establish or modify DOD explosives safety policy are presented to the Military Service Explosives Safety Council (MSESC) and the Department of Defense Explosives Safety Board (DDESB) for evaluation and consideration of policy changes. Once the recommendations are approved, the DOD Ammunition and Explosives Safety Standard is updated. Secondly, we are a member of the Safety and Hazard Classification Panel of the Joint Army, Navy, NASA, Air Force (JANNAF) Propulsion Systems Hazard Subcommittee (PSHC). This panel deals mainly with insensitive munitions (IM) and Hazard Classification (HC) issues. Thirdly, we are a member of the Tri-Service Symposium. The purpose of the symposium is to provide a broad overview of all various explosives testing activities within DOD and provide an arena for follow-on interaction within the explosives testing community. Fourthly, we are a member of the Munitions Vulnerability Assessment Panel. Here we provide support in consolidation of insensitive munitions and hazard classification testing. The goal is to save valuable Army resources by not duplicating explosives testing. Additionally, we review and approve insensitive munitions test plans developed by the U.S. Army test centers. Finally, we are involved in supporting the NATO Standardization Agreement (STANAG) for explosive safety by reviewing explosives safety design

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requirements.

All these elements are consolidated under the U.S. Army Explosives Safety Test Management Program to provide a single, centralized oversight for U.S. Army explosives safety testing by the U.S. Army Technical Center for Explosives Safety.

SCOPE

The long range plan for the U.S. Army Explosives Safety Test Management Program is to provide management oversite, assistance, and support for all explosives safety testing conducted by the U.S. Army with the purpose of validating, establishing, or modifying DOD or U.S. Army explosives safety standards. Presently a major part of the U.S. Army Explosives Safety Test Management Program is comprised of nine funded projects being accomplished under the direction and funding of the Program Manager for Underground Ammunition Storage Technologies (PMUAST). The PMUAST has labeled these nine funded projects as the Supporting Studies for Explosives Safety (SSES) Program.

The SSES Program received funding in July 1993 and was formally introduced and initiated in a meeting with representatives of the DDESB and Tri-Services in September 1993. At this meeting, PMUAST briefed representatives on the opportunity to consider funding worthy explosives safety studies or projects. Based on funding time constraints, a project solicitation deadline of mid-November 1993 was established. Eighteen projects were submitted to PMUAST for funding consideration, of which, nine projects were funded based on PMUAST prioritization and available funding. These nine projects have been underway since November 1993 and all are scheduled to be completed in September 1994 to meet the funding time constraints. Upon completion, test results and project reports will be transitioned into the U.S. Army Explosives Safety Test Management Program for assistance and support in validating, establishing, or modifying explosives safety standards based on the studies and test results. A short description, objective, and goal for each of the nine projects currently in progress follows:

1. "Test Program to Evaluate Hazards from Stacks of HD 1.2 Ammunition". This project is being conducted by the Naval Surface Warfare Center (NSWC) with management oversite by the DDESB, United Kingdom (UK) and PMUAST. $250K in funding was provided by PMUAST with $725K in funding provided by others. The objective is to determine the effects of explosives type, round caliber and packaging on the type and severity of reactions in stacks of HD 1.2 ammunition. This is the first in a series of tests which are programmed by the DDESB with the goal of validating or modifying the DOD HD 1.2 Explosives Safety Standards.

2. "Investigation of Heat-Activated HD 1.2 Explosion Events". This project is being conducted by the U.S. Army Engineers Waterways Experiment Station (USAEWES) with $300K in funding provided by PMUAST. The objective is to characterize heat-activated explosion events and rates as a function of time, number of samples, and cook-off thermal environment. The goal is to validate or modify the DOD HD 1.2 Explosives Safety

Standards. Additional benefits to be derived from this study are improved HD 1.2 safety standard consistency, improved HD 1.2 facility siting criteria, and improved HD 1.2 modeling capability.

3. "Acceptor Sensitivity Criteria". This project is being conducted by the Naval Facilities Engineering Services Center (NFESC) and the Army Research Laboratories (ARL) with funding of $205K from PMUAST and $37K from others. The objective is to establish the sympathetic reaction of selected critical acceptor munitions and validate prediction models. The goal is to validate or modify current explosives safety standards. Additional benefits to be derived from this study are expanded quantity distance (QD) considerations, enhanced QD applications, enhanced prediction models, and improved asset protection.

4. "Sympathetic Detonation Criteria for Concrete Debris Loading". This project is being conducted by the NFESC with funding of $45K from PMUAST and $25K from others. The objective is to determine the critical conditions of impact loading by concrete debris which produces sympathetic detonation of selected acceptor munitions. The goal is to validate or modify current explosives safety standards. Additional benefits to be derived from this study are expanded QD considerations, enhanced QD applications, improved asset protection, and appropriate QD requirements.

5. "Performance Criteria for 12-Inch Reinforced Concrete Dividing Walls". This project is being conducted by the U.S. Army Corps of Engineers, Huntsville Division, with funding of $60K from PMUAST and $65K from others. The objective is to develop a consistent and rational basis for determining 12-inch substantial dividing walls capability for safe separation and operational shield applications. The goal is to validate or modify the current explosives safety standards. Additional benefits to be derived from this study are to improve explosives safety in operational facilities and enhance the consistency of explosives safety standards.

6. "Vulnerability Assessment for Underground Magazines". This project is being conducted by U.S. Army Engineers Waterways Experiment Station, U.S. Air Force, and Defense Nuclear Agency with $100K funded by PMUAST and $500K funded by others. The objective is to determine the vulnerability of underground magazines to conventional, air-delivered weapons. The goal is to validate the explosives safety standards for underground ammunition storage. Additional benefits to be derived from this study are enhanced underground storage safety, improved underground entrance protection, improved asset protection, and enhanced post-attack response capabilities.

7. "Geogrid Soil Reinforcement Tests". This project is being conducted by the U.S. Army Engineers Waterways Experiment Station with funding of $25K provided by the PMUAST. The objective of this project is to evaluate the ability of geogrid reinforced soil to mitigate blast effects from nearby explosions. The goal is to establish or modify explosive safety standards for underground explosives storage utilizing geogrid protection. Additional benefits to be derived from this study are reduced QD requirements, reduced acceptor damage, improved survivability, and reduced soil erosion.

8. "HDAS Capability Improvements for Explosives Testing". This project is being conducted by the U.S. Army Engineers Waterways Experiment Station with funding of $300K provided by the PMUAST. The objective of this project is to develop HDAS instrumentation capabilities for shock/pressure measurements in explosives and internal cases, multi-axis accelerations, transmitting location for post-test recovery, and telemetry transmission of recorded data. The goal is to enhance the data measuring and recording capabilities for explosives testing. Additional benefits to be derived from this study are improved explosives safety testing and measurement capabilities, enhanced explosives post-test data recovery capabilities, and improved explosives safety test data.

9. "Enhance DYNA-3D for Reinforced Concrete Analysis". This project is being conducted by the U.S. Army Engineers Waterways Experiment Station and the U.S. Army Corps of Engineers, Omaha Division, with funding of $200K by PMUAST and $20K by others. The objective of this project is to enhance the capabilities of the DYNA-3D computer program to simulate large strain and rotational dynamic response levels of reinforced concrete structures. The goal is to validate the current explosives safety standards. Additional benefits to be derived from this study are expanded QD applications and enhanced structural analysis capabilities.

SUMMARY

The U.S. Army Technical Center for Explosives Safety has developed and implemented an Explosives Safety Test Management Program for the U.S. Army as directed by the U.S. Army Executive Director for Explosives Safety, General Fred G. Hissong, in 1989. The primary objective of this program is to provide U.S. Army oversight, assistance, and support for explosives safety testing conducted for the purpose of validating, establishing, or modifying explosives safety standards. Several organizations and components are utilized to provide the essential oversight of U.S. Army explosives safety testing. The initial and primary focus of the U.S. Army Explosives Safety Test Management Program is currently on the Supporting Studies for Explosives Safety Program, which consists of nine projects funded by the Program Manager Underground Ammunition Storage Technologies. A brief description of each of these nine projects which are currently in progress and are scheduled to be completed in September 1994, is provided to inform the DOD explosives safety community on the overall U.S. Army program and the current projects in progress.

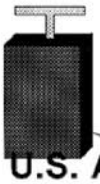
Summary

Army Explosives Safety Test

PRESENTED TO:

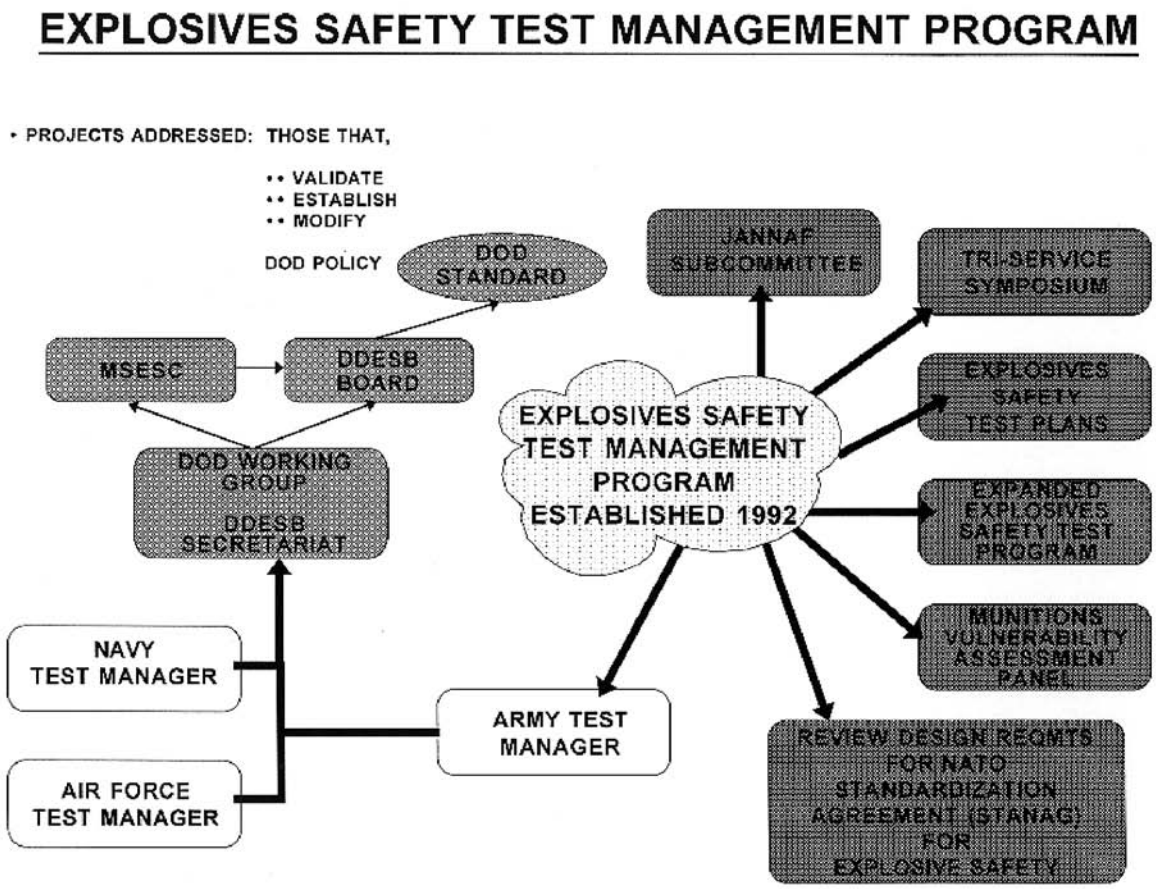
THE 26TH DOD EXPLOSIVES SAFETY SEMINAR

MIAMI, FLORIDA
18 AUGUST 1994



PRESENTED BY:
MR. WILLIAM P. YUTMEYER
SAFETY ENGINEER
U.S. ARMY TECHNICAL CENTER FOR EXPLOSIVES SAFETY

Explosives safety Test Management Program



Supporting Studies for Explosives Safety (SSES) Program

U.S. ARMY TECHNICAL CENTER FOR EXPLOSIVES SAFETY

SUPPORTING STUDIES FOR EXPLOSIVES SAFETY (SSES) PROGRAM

- BACKGROUND

  - PM UNDERGROUND AMMUNITION STORAGE TECHNOLOGIES (PMUAST) PHASE 3 FUNDING - JULY 1993

  - SSES PROGRAM BRIEFED TO TRI-SERVICE REPRESENTATIVES AND DDESB - SEPTEMBER 1993

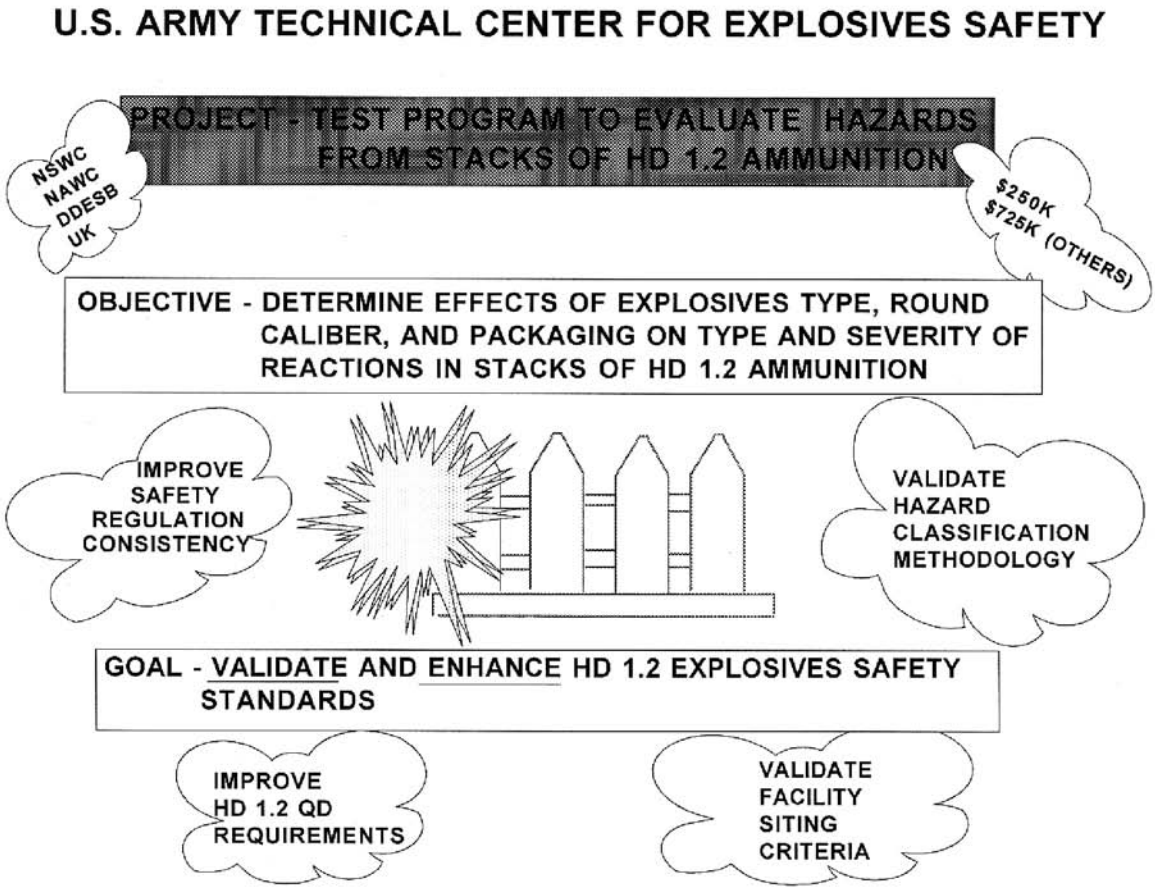
  - DOD PROJECT SOLICITATION - SEPTEMBER - NOVEMBER 1993

  - PMUAST PROJECT REVIEW AND PRIORITIZATION (18) - NOVEMBER 1993

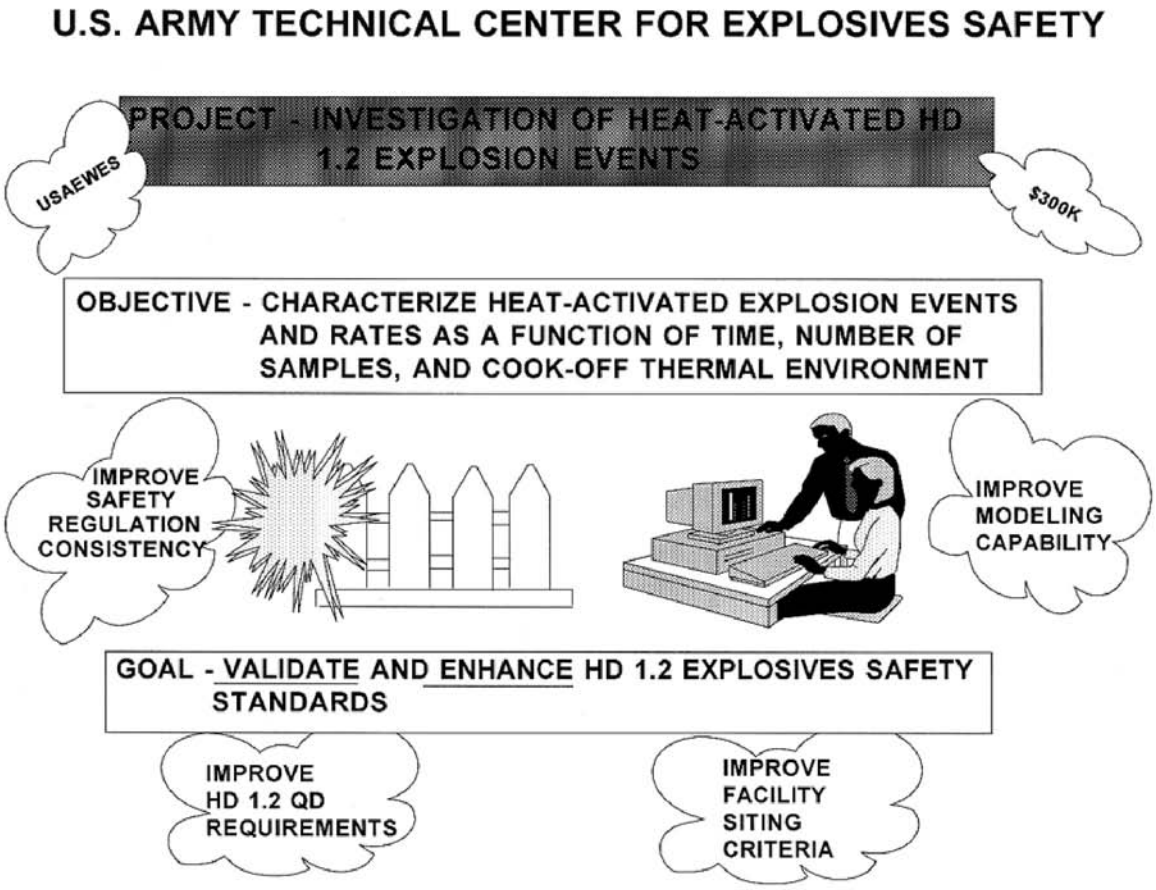
  - NINE PROJECTS FUNDED - NOVEMBER 1993

  - PROJECT COMPLETION - SEPTEMBER 1994

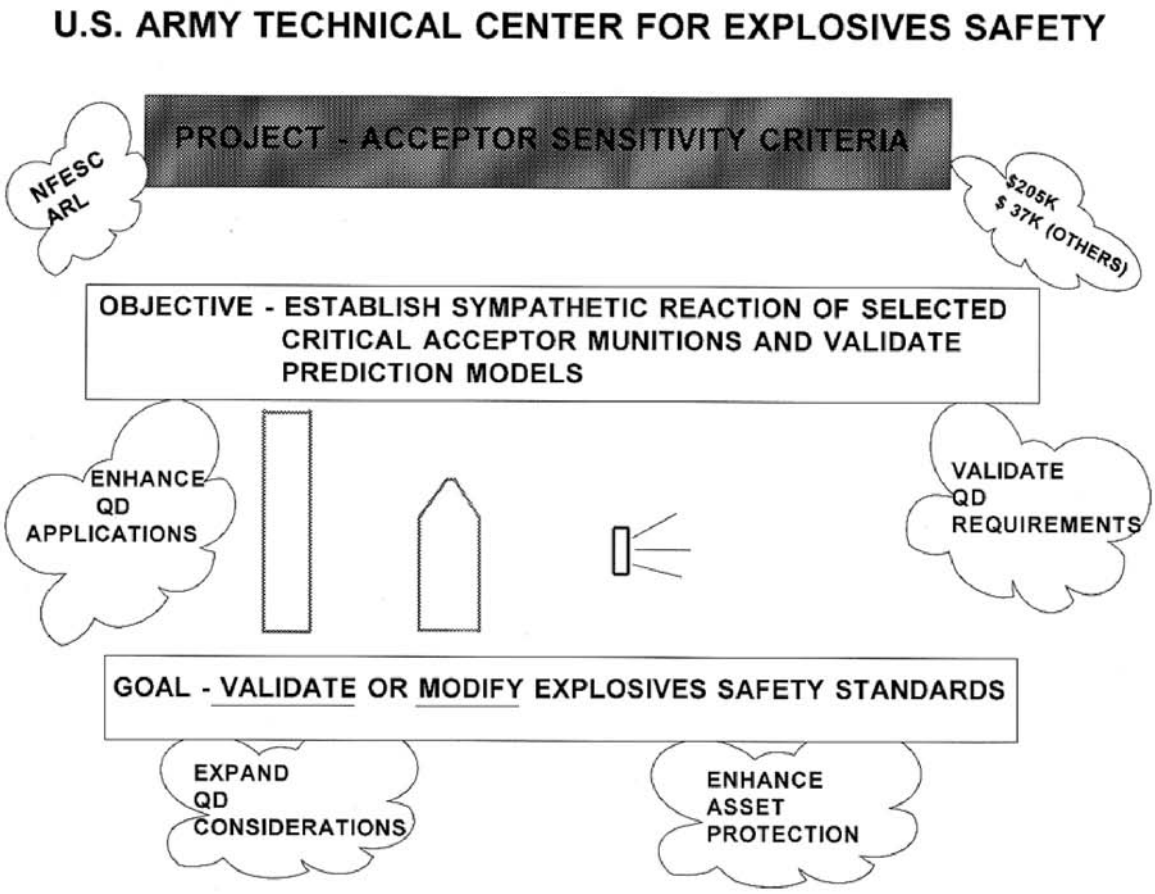
Project - Test Program to Evaluate Hazards from Stacks of HD 1.2 Ammunition



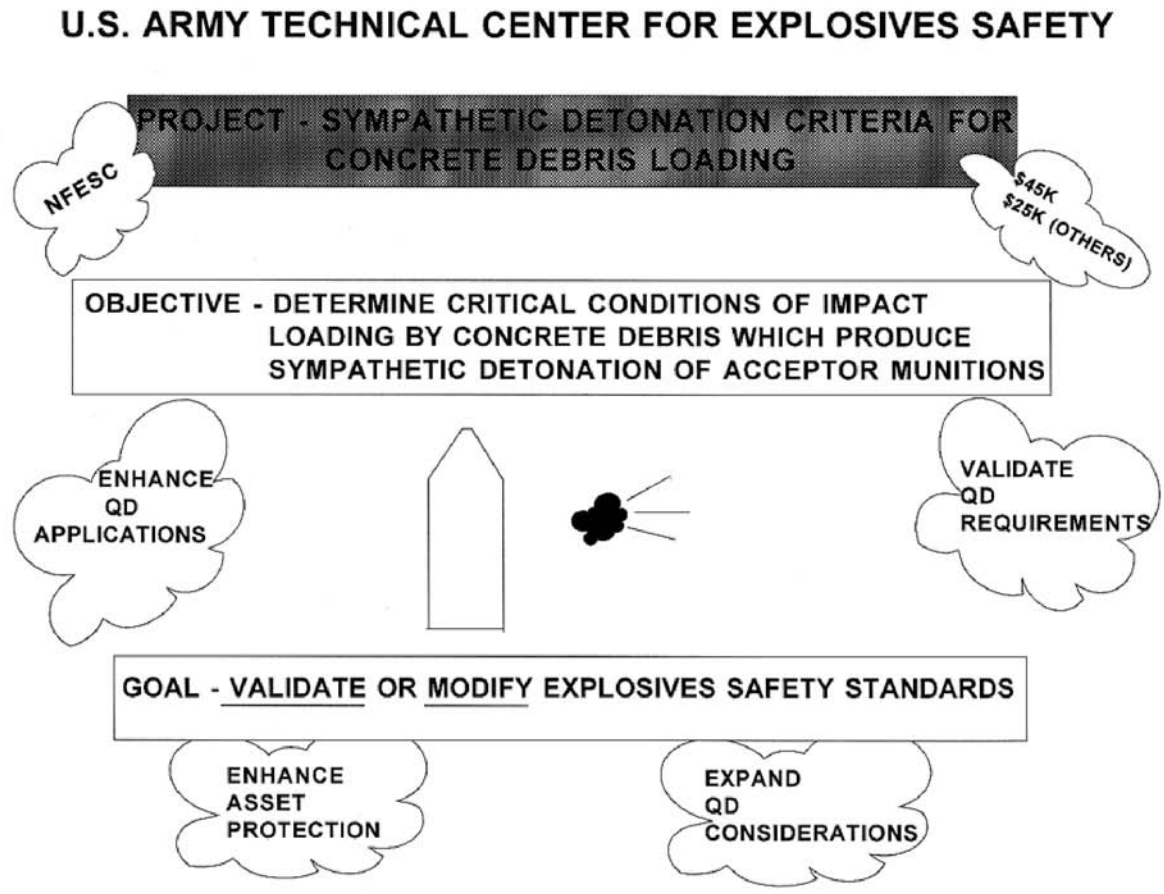
Project - Investigation of Heat-Activated HD 1.2 Explosion Events



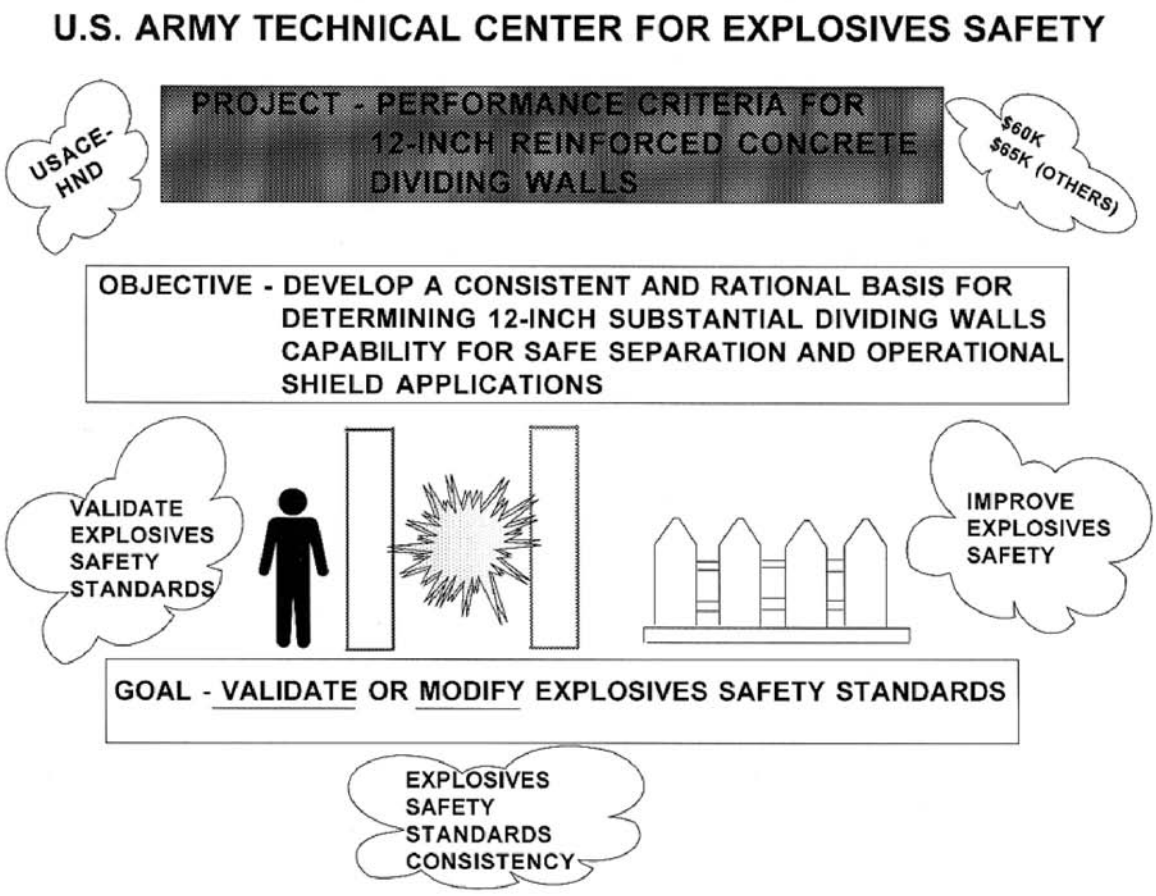
Project - Acceptor Sensitivity Criteria



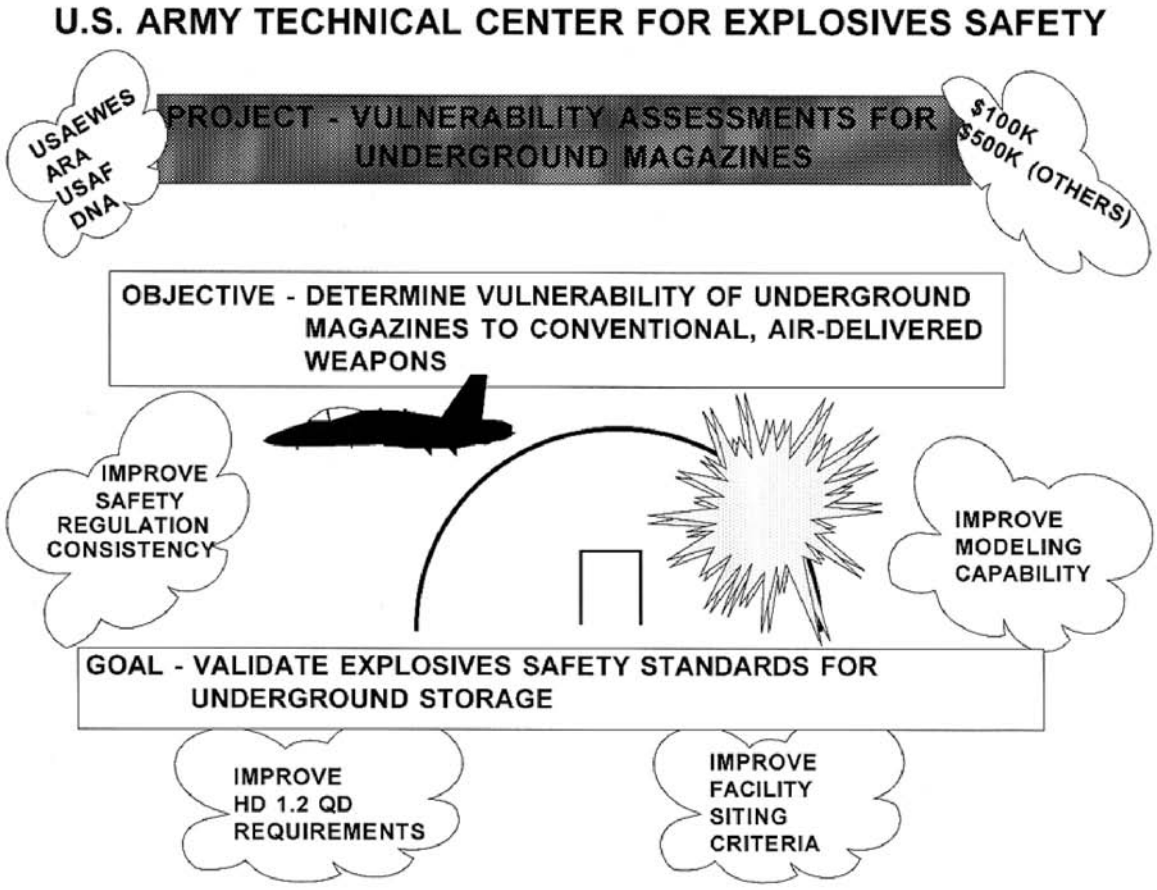
Project - Sympathetic Detonation Criteria for Concrete Debris Loading



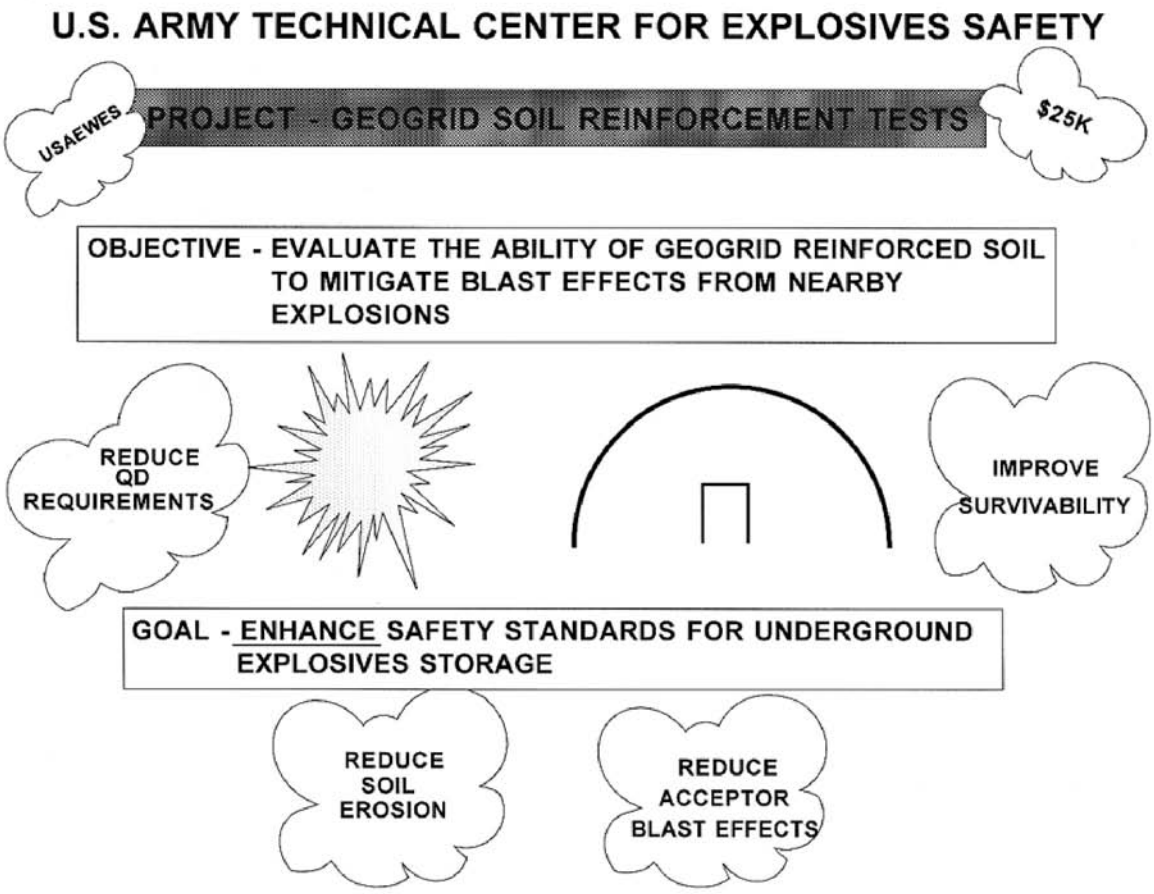
Project - Performance Criteria for 12-Inch Reinforced Concrete Dividing Walls



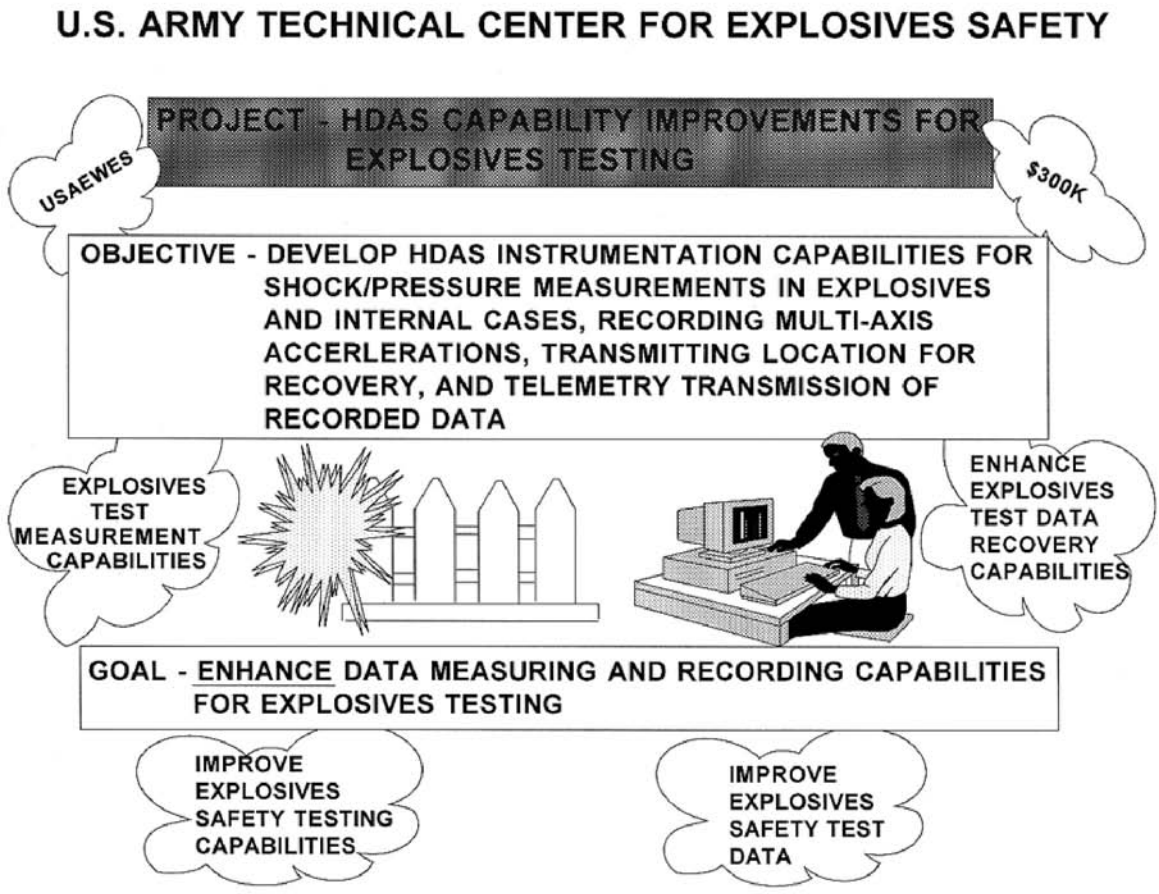
Project - Vulnerability Assessments for Underground Magazines



Project - Geogrid Soil Reinforcement Tests



Project - HDAS Capability Improvements for Explosives Testing



Project - Enhance DYNA-3D for Reinforced Concrete Analysis