



Ordnance Environmental Program

Environmental Quality Technology Pollution Prevention Program

Purpose: Sustain Warfighter training capabilities and reduce the environmental impact of manufacturing, use and disposal of ordnance by developing more sustainable energetic materials for ammunition, pyrotechnics and rockets/missiles.

Requirement: The Army requires the capability to sustain Warfighter training and the testing, production, storage and demilitarization of munitions by preventing or controlling their environment, safety and occupational health (ESOH) impacts. Hazardous materials contained in ordnance may affect human health and the environment at various points throughout their lifecycle (research, development, test and evaluation, manufacturing, storage, use, demilitarization and cleanup of unexploded ordnance (UXO) or munitions constituents on ranges). This impacts all Army ammunition plants, live-fire ranges, static test facilities and most arsenals and depots. Novel energetic materials must maintain energetic performance and meet all Insensitive Munitions requirements.

Technical Approach:

- Conventional Ammunition: Synthesize, characterize, test and scale-up secondary explosives as alternatives to RDX and TNT
- Pyrotechnics: Develop, test and transition
 - Perchlorate-free formulations for signals, flares and fuzes
 - Environmentally benign white, black, red, violet and yellow smokes
 - Biodegradable smoke grenade casings
- Rockets and missiles: Develop alternatives to ammonium perchlorate, hydrazine and lead in rocket propellants
- Publish ASTM standard E2552-08 for phased approach to assessing ESOH impacts of novel energetics and implement process through OSD and Army core energetics S&T programs

Benefit to the Warfighter:

- Soldiers at Camp Edwards resumed live fire training activities that had been halted in 1997 due to RDX, perchlorate and lead contamination in the primary aquifer
- Transitioned seven environmentally sustainable training items (with ten additional items in pipeline), reducing 10 tons/year of perchlorate use on training ranges
- Responded to needs of Maneuver Center of Excellence by transitioning technologies to PM Close Combat Systems that will reintroduce colored smoke training capabilities previously lost due to ESOH concerns
- Ensured future availability of binder materials by developing and qualifying alternatives to sole-source baseline that was subject to increasingly strict environmental regulation
- More sustainable novel explosives will halt growth of fines, lawsuits and cleanup bills from releasing RDX during production and training (GAO estimates current Army bill at more than \$15 billion)



Evaluating more environmentally sustainable, insensitive high explosive fills as alternatives to RDX



More environmentally sustainable colored smokes

Perchlorate-Free Munitions Transitioned to the Soldier:

- M116A1 Hand Grenade Simulator and M115A2 Ground Burst Projective Simulator
- M117/M118/M119 Booby Trap Simulators
- M126 Red Star Parachute and M158 Red Star Cluster Hand Held Signal
- M274 2.75" Smoke Composition Warhead (Anticipated 2015)