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Title: Revolutionary Insensitive, Green and Healthier Training Technology with Reduced Adverse Contamination (RIGHTTRAC) Technology Demonstrator Program


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Topic Addressed: Energetic

Relevance to Conference theme: RIGHTTRAC is a five-year technology demonstration project aiming to show that green and insensitive munitions have better properties than current munitions and that it is feasible to implement a safer weapon solution that would ease the environmental pressure on ranges and training areas, and decrease the health hazards for the users. Most weapon system developments in the last decades often aimed to minimize direct acquisition costs and to optimize the performance. The long-term effects of the munitions on the environment, especially when fired on local training areas, were not considered as a priority. We think that it is possible to consider those aspects right at the beginning of the weapon system development cycle and we propose that it can be cost-effective in the long run. If this assumption proves true, it will help shape the future of weapon system development.

Objective of presentation: The objectives are to present more than ten years of work that lead to the creation of such a project and that explain its existence, and to report on the progress made during the first year of the technology demonstration project.

Abstract: It is well known that normally functioning munitions only spread a very small amount of energetic residues in the environment. Therefore, most of the contamination in impact areas comes from unexploded ordnances (UXOs) that are cracked open by the detonation of an incoming round, by incomplete (low-order) detonations, by the destruction of duds or by the corrosion of UXOs. In addition, UXOs pose safety problems for the troops, both in domestic training and in operations, and have to be
removed from ranges and training areas (RTAs) through regular surface clearance operations. Unexploded or deflagrated RDX does not degrade in soil and, because of its solubility in water, migrates easily to groundwater and frequently off military property. This triggers a serious environmental problem and becomes a public health concern if the groundwater is used as drinking water. Another health hazard arises from the incomplete combustion of gun propellant and from the burning of excess gun propellant bags at firing positions. Propellants contain significant amounts of carcinogenic and toxic components, recently forbidden in Europe, which could have a health impact on soldiers. Many RTAs firing points were contaminated with concentrations of energetic residues above the preliminary guidelines, sometimes by many orders of magnitude. This is an important issue because military personnel have to train to keep their state of readiness. Therefore, the prevention of contamination becomes essential to keep RTAs operational.

The weapon system chosen for RIGHTTRAC is the 105-mm artillery round. The demonstration program will: a. Improve the fuze system to help eliminate UXOs by introducing a self-destruct mechanism which will ensure the complete detonation of munitions, thereby reducing the dud rate and the potential safety hazards at RTAs; b. Replace the main explosive charge and the propellant charge with green, insensitive (IM) and/or recyclable compounds and eliminate the use of highly mobile contaminants (RDX) and other toxic and carcinogenic compounds, thereby reducing the environmental impact at RTAs. In addition, steps will be taken to minimize or eliminate the excess propellant burned at firing positions; c. Evaluate the effectiveness of the modifications through testing on existing ranges, and determine the transferability of the modifications to other calibers.