

Mitigating Chemical Agent Hazards with Agent Defeat Weapons

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After an attack on the city of Marea, Syria last month left residents with symptoms indicating exposure to mustard gas, the use of chemical weapons continues to concern warfighters. [1] [2] The Islamic State of Iraq and the Levant's (ISIL) ability to acquire the materials required to develop and weaponized chemical agents creates a need for countermeasures that target their chemical agent development and housing capabilities. While attacking these chemical weapon facilities might seem like a simple solution, doing so with traditional explosives can create further exposure hazards for civilians and warfighters. [3]

When traditional munitions are used to mitigate chemical weapons, the plume created by the explosion can force contaminants into the air, allowing the chemical agent to travel downwind, risking exposure to military personnel and civilians. [3] Neutralizing, or at least degrading, chemical agents is necessary to mitigate exposure hazards for ground personnel needing to enter the area for analysis. [3] [4] Mustard gas, one of the more commonly used chemical agents, can be toxic for an extended period of time. Due to prolonged toxicity, areas affected by dispersal of mustard gas and other chemical weapon agents can remain too toxic for human entry decades later. [1] [5]

In response to these dilemmas, the United States Air Force developed a range of countermeasure weapons known as Agent Defeat Weapons (ADWs) to lessen collateral damage due to dispersal of targeted chemical agents. [4] These weapons offer pre-emptive strike capabilities which leave the chemical weapons unusable for an attack. Some models, such as the BLU-119/B, also have the ability to incinerate the chemical agents entirely, effectively decontaminating the area at the same time. [4]



U.S. Army Soldiers with the 44th Chemical Company, Fort Hood, Texas, prepare to enter and clear a building of opposing forces during a simulated chemical attack at Fort McCoy, Wis., May 12, 2014. The 44th was participating in an annual Combat Support Training Exercise involving 7,000 soldiers and joint military personnel. (U.S. Army photo by Spc. Robert Farrell)

The 420 pound ADW is a high-heat incendiary blast-fragmentation warhead that combines shrapnel (to pierce chemical weapon containers and release their contents) and 400 pounds of white phosphorus (to decompose the chemical agents upon contact). [3] The shrapnel releases the chemical agents, but most agents are heavier than air, which reduces their spread to ground level, which is a benefit compared to an explosive plume situation. Once released, the chemical agents are further degraded with exposure to sunlight and air. [3] If the BLU-119/B was fired from a high enough altitude at enough terminal velocity, it could potentially destroy chemical weapon stockpiles without spreading the contaminants.

Daniel Goure, vice president of the Lexington institute, said, "When you hit something at high velocity, what you get is a flash of incredible heat in a confined area extremely fast. That can vaporize everything in small area." [4]

As with all battlefield innovations, countermeasures will be developed to make them less effective. The Air Force plans ahead against possible deterrents for the ADW programs. The Shredder, another version of the BLU-119/B, pairs the ADW with a bunker-busting bomb to destroy chemical weapons stored in deep, reinforced bunkers. [5]

Decontaminating an area from afar is advantageous as it reduces contamination risk and can be achieved without risk to additional military personnel. This means personnel will not need to enter the chemical weapons facility to decontaminate its contents. It also allows for more precise targeting with reduced chances for chemical dispersal, thereby reducing unnecessary damage to the surrounding infrastructure and population. [3] [4]

References:

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A bulk container of mustard agent is loaded on a truck outside a storage igloo as it is prepared for transport to the disposal facility. While marked as "gas," chemical agents are actually liquid in storage. Detonation would render the liquid into gas. " (Photo courtesy of the U.S. Army)



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