

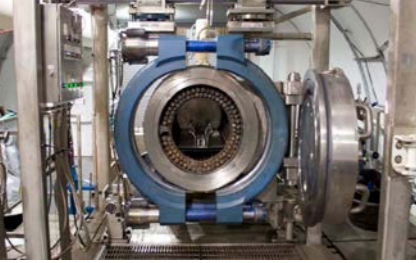





EXISTING CHEMICAL AND BIOLOGICAL WEAPONS DISABLEMENT AND DESTRUCTION SOLUTIONS

TECHNOLOGY	DESCRIPTION	CAPABILITIES	CHALLENGES
Battlefield Solutions			
Open Detonation 	Explosives access and destroy agent in a fireball.	Used on a wide variety of found/recovered munitions in hostile and non-hostile environments.	Numerous environmental and geographical factors impact ability to implement. Requires a significant quantity of explosives (>5:1 ratio of explosives to agent payload) and precise explosives placement/ configuration on the item to safely achieve desired effect. Not ideal for use in populated areas or near critical infrastructure.
Drill and Drain 	The munition containing the chemical or biological agent is drilled or cut into through the fill hole, or side of the casing. In some cases, the agent has hardened and needs to be rinsed/washed out, usually with water.	Used on a wide variety of found/recovered munitions in hostile and non-hostile environments. Disabling technology. Does not destroy agent fill.	Drilling systems may not meet size/weight/logistics constraints, secondary treatment generates large volumes of waste if performed in the field.
Explosive Destruction Solutions			
EDS (Explosive Destruction System) 	Explosive accessing of munitions followed by chemical neutralization in a sealed chamber. Munitions packed in carrier (3-6), cutting charge added, and inserted into drum chamber. Charge detonated, neutralization chemical added, drum chamber rotated to mix chemicals, system drained, munitions fragments removed and stored as hazardous waste.	Used on a wide variety of munitions, only in non-hostile environments. Can process problematic (leaking) over-packed munitions.	Does not meet size/weight/logistics constraints; requires significant set-up time and highly trained personnel; has a low through-put rate; requires handling, storage and treatment of byproducts; shell casings liquid and solid waste byproducts must be disposed of as hazardous material; not suitable for use in a hostile environment.
SDC (Static Detonation Chamber) 	Electrically heated detonation chamber with off-gas treatment	Wide range of munitions can be destroyed, large up to 155 mm sized munitions, fit in system, high higher throughput capacity than other EDTs	Size/weight/logistics constraint, not easily transported, number of trained individuals to set up and operate, heat management for certain size/heat requirements, large amount of water required for off-gas system, no non-permissive capability.
DAVINCH (Detonation of Ammunition in a Vacuum-Integrated Chamber) 	Double walled steel vacuum detonation chamber with an off-gas treatment system. Donor explosives surround agent filled munition, explosion shatters the munition, and the shockwave and heat of the explosion destroys the chemical agent and energetics.	Wide range of munitions can be destroyed.	Size/weight constraint, number of trained individuals to set up and operate, liquid waste by product, no non-permissive capability.
TDC (Transportable Detonation Chamber) 	Explosives-Imploded Contained Detonation (vented); munitions packed in explosive, loaded in chamber with bags of water, system sealed, explosive detonated.	Destruction of energetics, contained blast, air pollution control unit.	Size/weight/logistics constraint, low through put capacity, large amounts of water required, large amounts of by-product to transport/dispose of, no non-permissive capability.

TECHNOLOGY	DESCRIPTION	CAPABILITIES	CHALLENGES
Neutralization Solutions			
LITANS (Large Item Transportable Access and Neutralization System) 	Neutralizes agent from large bulk containers such as non-explosively configured bombs and ton containers filled with chemical agent. Operators are able to access and transfer agent fill to reactor without having touching the item. Operators drain waste neutralent from reactor into waste drums on reagent skid and ship waste drums to a permitted disposal facility for final treatment.	Capable of dealing with 500-1000 lb. bombs. No direct handling of materials. Large processing capacity.	Size/weight/logistics constraint, number of trained individuals to operate, no non-permissive capability.
FDHS (Field Deployable Hydrolysis System) 	Neutralizes bulk chemical warfare agents and their precursors by heating and mixing with reagents, such as water, sodium hydroxide, and sodium hypochlorite to facilitate chemical degradation resulting in destruction efficiency of 99.9%.	Processes large quantities of un-weaponized chemical agents and precursors only in non-hostile environments; is transportable and can be operated continuously.	Does not meet size/weight/ logistics constraints; requires large amounts of water reagent, power and personnel to operate; requires handling, storage and treatment of by-products; not suitable for use in a hostile environment.
Plasma Energy Solutions			
PEPS (Plasma Energy Pyrolysis System) 	Reduces waste to elements (C, H, O, N) using high heat formed by highly ionized gas. Organic compounds are gasified into syngas. Inorganics are melted and bonded to non-leaching glass slag.	1-3 tons per day capacity, 99.99999% efficacy, bulk agent destruction (no munition).	Size/Weight/Logistics Constraint, no munitions destruction, large amounts of by-product, no non-permissive capability, not cost efficient, high power and diesel energy requirements.
PAWDS (Plasma Arc Waste Destruction System) 	Uses an air plasma torch to reduce waste at greater than 2000°F. The gas is dissociated and ionized.	Up to 1 ton throughput capacity, regular munitions and bulk agent.	Size/Weight/Logistics constraint, massive amounts of electricity required, large amounts of water required, not fully developed technology, cost efficiency concerns.
Multi-Arc MARIA (Multi-Arc Reactor and Incineration Assembly) 	Uses a highly turbulent fluidized medium containing thousands of localized hot plasmas forming radicals that accelerate the oxidization rate by 2-4 orders of magnitude.	Bulk agent, mortars, projectiles, bombs, rockets, highly efficient, potential for all environments including hostile, through put of 2 tons per day.	Size/Weight/Logistics constraint currently, requires high voltage power supply, training for use, technology still under development.