


Alternatives to Burning

Ending Open Air Burning, Detonation and Incineration of Hazardous Waste Explosives



The Military is the largest generator of toxic waste in the United States.¹ The Government Accountability Office estimates that 557,000 tons of old surplus munitions will need to be disposed of over the next few years.² Many of the ingredients in these munitions are dangerous to human health, causing cancer, birth defects, reproductive problems, and other health problems.³ We have a responsibility to ensure that these waste munitions are destroyed without releasing toxic chemicals into the environment.

The military has tried many methods to destroy old munitions. After World War I and until 1970, the United States, like many other countries, routinely dumped its chemical weapons into the ocean.⁴ Open burning or open detonation of conventional munitions has long been the preferred disposal method. However, the legislation on hazardous waste (Resource Conservation and Recovery Act) outlaws the open burning of hazardous waste, with an exception for military explosive waste for which there is no alternative disposal method. In the past the military has opened burned chemical weapons. The military has also burned both chemical weapons and conventional munitions in incinerators.

What's wrong with burning?

When hazardous waste is burned either through open burning/open detonation or with an incinerator, not all of the hazardous material is destroyed. Some of hazardous chemicals go into the air and disperse into the environment, contaminating soil and water and affecting human health. Some of the hazardous material remains in the ash and must be disposed of in a hazardous waste landfill. Even worse, as the hot gases cool, new chemicals called *Products of Incomplete Combustion* form and are dispersed into the environment; some of these new chemicals are even more dangerous and persistent in the environment than the original hazardous material.⁵

Are there alternatives?

Advanced treatment technologies to disposal of military munitions have been available for several years. Thanks to the hard work of communities across the country who opposed the incineration of chemical weapons in their communities, the United States has invested hundreds millions of dollars⁶ in researching and developing new technologies that are much safer and are able to destroy military hazardous waste more effectively, without creating new dangerous chemicals and releasing them to the environment.

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Alaska Community Action on Toxics
Blue Ridge Environmental Defense League
California Communities Against Toxics
California Safe Schools
Camp Lejeune Community Assistance Panel
Center for Health, Environment & Justice
Center for Public Environmental Oversight
Central Trades & Labor Council of Shreveport and Vicinity, AFL-CIO
Citizens Action New Mexico
Citizens for Safe Water Around Badger
Citizens Task Force
Crawford Stewardship Project
Defense Depot Memphis Tennessee
Concerned Citizen Committee
Environmental Patriots of the New River Valley
Environmentalists Against War Food and Water Watch
Fort Ord Community Advisory Group (FOCAG)
Frederick Citizens for Bio-lab Safety
Friends United for a Safe Environment (FUSE, Inc.)
GAIA (Global Alliance for Incinerator Alternatives)
Greenaction for Health and Environmental Justice
Hoosier Chapter of the Sierra Club
International Dialogue on Underwater Munitions
Kentucky Environmental Foundation
Louisiana Bucket Brigade
Louisiana Environmental Action Network
Louisiana Progress Action
Lower Mississippi Riverkeeper
Midwest Environmental Advocates
Midwest Environmental Justice Organization
Moms Clean Air Force Tennessee
Moms Clean Air Force Virginia
Nukewatch/The Progressive Foundation
Peaceful Skies Coalition
Philadelphia Right To Know Committee
Physicians for Social Responsibility-WI
Protect All Children's Environment
Sierra Club (national)
Tennessee AFL-CIO Labor Council
Tewa Women United
Texas Campaign for the Environment
Tribal Environmental Watch Alliance
Veterans for Common Sense
Vidas Viequenses Valen
Virginia Chapter Sierra Club
Valley Watch
Voluntary Cleanup Advisory Board
Volunteers for Environmental Health and Justice
Watauga Group of the Tennessee Chapter Sierra Club
Waukesha County Environmental Action League
Wisconsin Environmental Health Network

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Gas Phase Chemical Reduction

Gas Phase Chemical Reduction uses hydrogen and heat to break down toxic chemicals into their basic components. Because hydrogen is used for the reduction reaction and no oxygen is present, no harmful chlorinated byproducts can be formed. This technology was used to destroy PCBs and obsolete pesticides in Australia.⁷ It was specifically developed for the Assembled Chemicals Weapons Destruction program.⁸



Supercritical Water Oxidation

Supercritical Water Oxidation uses the unique forces of supercritical fluids to breakdown the chemical bonds which form munitions, propellants, and energetics. Supercritical Water Oxidation uses super pressurized, heated water to tear apart the chemical bonds in toxic organic compounds, breaking them down into basic components such as water, carbon dioxide, and nitrogen gas.⁹ The lower temperature (compared to combustion) and the high pressure of the water keep harmful byproducts from being formed.¹⁰



Detonation Chambers with 'Hold, Test, and Release'

There are several types of detonation chambers that can be used to safely destroy waste munitions. These detonation chambers are much safer than open burning or incineration because they hold and test the gases to ensure all the toxic components have been destroyed before releasing them. One kind of detonation chamber, the DAVINCH chamber, detonates explosives in a vacuum. Without the presence of oxygen, harmful products of incomplete combustion cannot be formed.¹¹



¹ <http://www.truth-out.org/news/item/2377:military-hazardous-waste-sickens-land-and-people#1>

² <http://www.guns.com/2014/04/30/report-finds-1-billion-in-forgotten-ammunition-to-be-scrapped-by-military/>

³ <http://www.truth-out.org/news/item/2377:military-hazardous-waste-sickens-land-and-people#1>

⁴ <https://www.fas.org/sgp/crs/natsec/RL33432.pdf>

⁵ http://www.no-burn.org/downloads/Greenpeace_Incineration_HumanHealth.pdf

⁶ <http://www.acq.osd.mil/parca/docs/2011-ida-rca-acwa-p-4677.pdf>, http://www.globalsecurity.org/military/library/budget/fy2013/sar/18_chemdemil-acwa.pdf

⁷ https://clu-in.org/download/partner/vjigen/NATO_EcologFactSheet_3.pdf

⁸ <http://www.nap.edu/read/5274/chapter/8>

⁹ Howell, John R. (NAE), Chair, Committee to Assess Supercritical Water Oxidation System Testing for the Blue Grass Chemical Agent Destruction Pilot Plant, 2013.

Assessment of Supercritical Water Oxidation System Testing for the Blue Grass Chemical Agent Destruction Pilot Plant. Board on Army Science and Techogy, National Research Council.

¹⁰ "Supercritical water oxidation for the destruction of toxic organic wastewaters: A review" Veriansyah Bambang and Kim Jae-Duck. Supercritical Fluid Research Laboratory, Korea Institute of Science and Technology- Department of Green Process and System Engineering. Journal of Environmental Sciences 19(2007) 513-522.

¹¹ <https://www.epa.gov/sites/production/files/2015-03/documents/9545947.pdf>