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Chemical Weapons Disposal

In 429 B.C. Spartans burned a mixture of pitch and sulfur, producing a toxic cloud that descended upon a town, driving out their Athenian enemies (Taylor I). While the spears and shields used 2,500 years ago in the Peloponnesian War have been replaced by modern missiles and armored tanks, chemical agents still exist today as a weapon of mass destruction. These chemical weapons have taken on forms far deadlier than could ever have been imagined by the Spartans of old. Chemical weapons stockpiles have played as active a role in deterrence as the atomic bomb. With the collapse of the mighty Soviet Union, the storage of chemical weapons has become a risk no longer worth taking. Our nation's leaders have decided the time has come to dispose of our nation's vast stockpiles of chemical and biological weapons, but one vital question remains. How do we dispose of these weapons?

The destructive powers of chemical and biological agents have been utilized as weapons for centuries. During the colonization of the North American continent, British soldiers gave out blankets, purposely taken from small pox hospitals, to unfortunate Indians. In the American Civil War dead horses were used to contaminate enemy wells, imitating a practice first used by Roman soldiers 2000 years earlier (Piller 29). Yet, the use of chemical weapons did not emerge as an accepted weapon until World War I. On April 22, 1915, German soldiers launched the first major chemical attack of the war. A billowing yellow cloud was released from 6,000 canisters, containing 160 tons of chlorine gas (Taylor 25). The death fog slowly enveloped French and Algerian positions. Blinded men scurried for cover, but found none. The dying soldiers coughed up yellow puddles of blood that were once their lungs (Piller 29-30). Over 5,000 men were killed, and another 10,000 were wounded by the attack (Taylor 25). Chlorine gas along with a very similar phosgene gas were used for the duration of the war. Yet, the effects of these chemicals were insignificant in comparison to the destructive power of the newly discovered dichloroethyl sulfide, commonly known as mustard gas (Piller 30).

Mustard gas became the "king" of World War I. Unlike other forms of gases, which a person could be protected from by using a gas mask, mustard gas was absorbed through the pores. Mustard gas used in artillery shells would release acrid fumes that could penetrate several layers of clothing. At first the effects of the gas were not noticed, but within several hours, blindness, choking, and puss filled blisters up to a foot long formed over the victims' bodies (Piller 30). Victims unfortunate enough to have inhaled the horrible gas would most likely die, while others might wish they were dead. Mustard gas would remain active in an area for up to a week after it was released (Charles 22). The attributes of mustard gas made it the most feared weapon of the war.

The effects of chemical weapons in World War I were never decisive in strategy, only destructive to humanity. By the end of the war, 91,000 men lay dead, and another 1.3 million had been injured by the 113,000 tons of poison gas that had been used (Piller 30). The carnage caused by these weapons remained in the minds of

all who had witnessed their terrible results. The horrors of chemical warfare were especially clear in the mind of one young soldier named Adolf Hitler.

The future leader of the Third Reich realized how futile the use of chemical weapons had been. They had been unable to give any country in World War I more than a momentary advantage. Hitler himself had been temporarily blinded by a mustard gas attack in the final days of World War I, and he had no desire to enter into chemical warfare with the Allies.

In 1937, German chemist Gerhard Schrader invented a new chemical weapon (Piller 32). Hitler felt for certain the Allies must have already discovered the same gas, and because of this, he never used it as a weapon. With the fall of Germany the Allies made a discovery that surprised and terrified them. They found a new weapon the likes of which the Allies had never seen. Germany had stockpiled 70,000 to 250,000 tons of the new chemical, and could produce 12,000 tons of poison gas a month (Taylor 43). Yet, amazingly it had never been used. This revolutionary chemical was called nerve gas.

There are four types of nerve gas used today. Tabun (GA), sarin (GB), and soman (GD) were developed by the Nazis during World War II; while the extremely potent, VX nerve gas, was developed at a later time. Although there are different forms of nerve gas, they all cause death in the same manner. "They kill by blocking the action of a crucial enzyme called acetylcholin-esterase. This enzyme breaks down and removes acetylcholine, which transmits nerve signals to a variety of muscles, such as those controlling breathing and the digestive system" (Charles 22). As the build up of acetylcholine starts to occur, the unfortunate victim begins to notice the preliminary signs of a nerve gas attack: sudden sweating, a cramped feeling in the chest, and an urge to vomit (Charles 22). When the electronic nerve impulses to the victim's muscles become too rapidly irregular, the horrible "death throes" associated with nerve gas emerge. In a ghastly display the victim loses all control of his/her nervous system, causing drooling, urination, diarrhea, violent convulsions, total respiratory failure, and finally death (Gavaghan 38).

Unlike Hitler, the United States has had no qualms about using chemical and biological weapons in the sake of "national defense". Between 1965 and 1971 the U.S. unleashed 10,000 tons of chemical and biological agents on the North Vietnamese (Piller 69). The primary chemical weapon used during the Vietnam War was tear gas, which can cause painful irritation of the eyes and respiratory tract, temporary blindness, blistering, and violent vomiting (Piller 69).

Herbicides were used to defoliate trees and attack Vietnamese agricultural land. The herbicides were code-named Agents Blue, White, and the infamous Agent Orange (Piller 70). The agents destroyed 44 percent of the nations upland forests, and another 8 percent of their agricultural land. The agents contained carcinogens, teratogen (causes birth defects), and dioxin (one of the most toxic substances known to man) (Piller 70). The chemical and biological warfare waged against the Vietnamese caused incalculable suffering and death while, reminiscent of World War I, it was unable to change the outcome of the war.

The United States has not always held the same opinion, of chemical and biological weapons, that it displayed during the Vietnam War. After World War I the use of these weapons was considered to be not only ineffective, but immoral as well. Yet, by the late 1940's most U.S. military "experts" considered chemical and

biological weapons to be an ideal complement to nuclear weapons, which were still unreliable. With the refinement of nuclear weapons in the following years, the mood of "experts" began to shift. It no longer made sense to stockpile such a socially unacceptable weapon when the "ultimate" strategic weapon had been perfected. By 1950 the budget for chemical and biological weapons had fallen to a mere $7 million. For the next ten years the chemical budget averaged only $19 million per year (Piller 42-43).

In 1960 a group of representatives from the military's chemical and biological division, Chemical Corps, made the first estimates to Congress of Soviet chemical and biological weapons strength. It was reported that one-sixth of the Soviet arsenal consisted of chemical weapons. This estimation startled congress and by 1964 chemical and biological budgets had soared to $158 million (Piller 43). Chemical weapons once again regained their place as a compliment to America's nuclear arsenal.

Estimates of Soviet chemical weapons ranged from 30,000 tons to an incredible 700,000 tons, making it very difficult for the U.S. to determine a reliable number to base their deterrent force against. The official U.S. estimate of Soviet strength became 350,000 tons, simply because it was the average of the top and bottom figure (Piller 59). In the effort to counter the highly inflated estimate of Soviet tonnage, hundreds, if not thousands of open-air tests were performed by the Chemical Corps. These tests were of biological weapons known to cause diseases in humans and animals (Piller 45). This reckless, and secretive conduct of the U.S. Chemical Corps continued to flourish for years in the sake of "national defense".

During the Reagan years the cold war began to thaw. It became apparent to both sides that the storage of chemical and biological weapons were more detrimental to the maker than the enemy. As Bush entered office the atmosphere was finally right to dispose of the highly dangerous weapons. The U.S. and U.S.S.R agreed to destroy their stockpiles by 1997 (Bearosley 48). It was disclosed that the Soviet Union had 50,000 tons of chemical weapons, and the U.S. had just under that amount (Gavahan 38). These figures were a far cry from the estimated 350,000 tons that had driven chemical and biological development for years.

In 1987 the U.S. began to implement the first stage of the plan to dispose of all chemical and biological weapons. Reagan agreed to remove all chemical shells from Germany by 1992. This deadline was later moved up, by Bush, to September 30, 1990 ("Nervous" 28). A highly secretive route was planned by the U.S. military to avoid possible terrorist attacks, yet it was impossible to transport the weapons without endangering populated areas. The 100,000 shells containing 400 tons of VX, and Sarin nerve gas were moved from Clausen, West Germany in convoys of trucks to the city of Miesau, West Germany (Ewing 689). They were then moved by rail to the port city of Nordenham, were they were shipped to the only chemical disposal facility in existence, at Johnston Atoll in the Pacific (Anderson "Destruction" 21).

Johnston Atoll is a small "aircraft-carrier-shaped sliver of coral" 800 miles away from Honolulu, Hawaii. The only functional chemical weapons incinerator located there occupies several acres, and is operated by 1,300 soldiers and civilians (Lord 17). The building is hurricane proof, and kept at negative pressure (i.e. the pressure outside the building is greater than that inside). Any escaping chemicals would supposedly be detected by the 106 air monitors located around the island capable of locating chemicals in parts per trillion with their 29,000 samples a day (Lord 17). Despite the elaborate safeguards contained in the facility, environmentalists

claim it is unsafe (Shulman 5). It is true the track record of the incinerator has been far from perfect. The facility was 32 months behind schedule, and almost $200 million over budget. The plant worked only 20 out of 85 planned days (Lord 17). The government claims that these setbacks were not because of containment problems, but with the past history of cover-ups in the chemical weapons industry, environmentalists are unconvinced. Pacific nations were outraged with the prospect of the U.S. incinerating dangerous weapons in their back yard, and along with environmental groups, tried to get the incineration stopped in court, but a technicality was discovered by the government, and the disposal continued (Anderson "Protests" 21).

Under agreements signed by the United States government 98 percent of the U.S. stockpile must be destroyed by 1997, with the remaining 2 percent to be destroyed by 2007 (Anderson "Protests" 18). The disposal of our chemical weapons is estimated at $3.4 billion and could easily reach $5 billion, which is 50 times what the production of the weapons originally cost (Bearosley 48). The complaints of the many pacific nations lead the U.S. to agree to only use Johnston Atoll for the disposal of the German chemical weapons, and 7 percent of the U.S. mainland stockpiles. This has lead to a colossal problem. How do we dispose of the remaining 91 percent of chemical and biological weapons by the 1997 deadline?

On one side of the problem is the United States government who is obligated to dispose of it's stockpile within 5 years. On the other side are the environmentalists who do not feel an acceptable method for their disposal has yet been found. The only way the problem can possibly be solved is through a compromise between these two opposing sides. The method agreed on for the disposal of our chemical and biological stockpiles must take into account time, safety, and cost.

A vast number of solutions have been proposed by various groups. Some of the wildest ideas include blowing up the chemical weapons in an underground nuclear explosion, or even use rockets to launch them into the sun. Another proposal was incinerating the chemicals inside of the munitions, right at their storage site, with a oxyacetylene flame (Gavaghan 38). While these methods would be relatively quick and effective, their cost and the question of their safety is highly debatable.

Environmental groups have suggested four safer methods of disposal. Chemical neutralization, photodegradation, electrochemical procedures, and biodegradation have all been proposed (Ewing 689). Chemical neutralization would be achieved by mixing the weapons with other chemicals to form a "nontoxic reactant mass". Electrochemical procedures would hopefully also be able to produce some sort of "nontoxic mass". The Soviets have even held dreams of transforming the chemical "nontoxic mass" into a fertilizer (Dickerson 1001). However, few people would feel comfortable eating food grown with former chemical weapons!

Biodegradation, and photodegradation would both attempt to dispose of the chemicals through natural means. Photodegradation would be achieved by bombarding the chemicals with powerful frequencies of light. This would break the bonds holding the chemical weapon compounds together, and thereby transform them into a nontoxic substance. Biodegradation would attempt to achieve the same results by allowing the bonds to naturally break in time. While all of the methods suggested by the environmental groups would be extremely safe,

photodegradation and biodegradation would take far too long, and chemical neutralization and electrochemical procedures could become incredibly expensive if used on our entire stockpile.

The army's solution to the disposal problem consists of building 8 incinerators on the U.S. mainland. These facilities would be located in Maryland, Kentucky, Alabama, Indiana, Oregon, Arkansas, Colorado, and Utah (Anderson "Protests" 18). Our main stockpiles are already located in these states and would make the transportation less dangerous. However, the construction of these facilities has been delayed by the protests of environmental groups who feel if the incinerator at Johnston Atoll was too unsafe for a secluded island 700 miles from the nearest population, how can the construction of similar incinerators on the U.S. mainland be considered safe?

It can be seen that none of the proposed solutions clearly stands out as the best way to dispose of our 50,000 ton chemical and biological weapon stockpile. Each method has it's benefits, along with it's drawbacks. This is why it seems best to dispose of our arsenal in a way that would utilize several different methods of disposal.

It is imperative that we find a solution soon because procrastination may result in a poor decision made out of desperation. We should therefore initiate the disposal process as quickly as possible on a portion of our stockpiles. The best method for disposing of our weaker chemical weapons, such as mustard gas, is incineration.

Incineration has the benefit of being the only method that has been thoroughly tested. It has already been used on Johnston Atoll to destroy 7 percent of our stockpile, and would be relatively quick, cost effective, and safe if used on the less deadly weapons. The process used for incinerating chemical weapons involves computer-controlled machines that drain the poisonous chemicals from shells. Next any fuel or explosives are removed from the weapons and the casings are chopped into pieces. Finally the metal casings scraps, explosives and propellants, toxic agents, and contaminated packing material are all incinerated separately (Bearosley 48). The chlorine, fluorine, phosphorus, sulphur is then removed from the exhaust gases (Gavaghan 38) This process would supposedly leave no trace of the hemical weapons, and because the chemical makeup of the incinerated pieces are known so exactly scientists claim the exhaust gases would be cleaner than those of garbage incinerators (Shulman 5).

While the incineration is taking place, at the sites recommended by the army, the process for the disposal of our other much more deadly chemical weapons should be considered. Methods must be thoroughly researched and tested to see if any disposal method seems superior. Based on the current information the best option seems to be using chemical neutralization, and electrochemical procedures to transform the chemicals, such as nerve gas, into a "nontoxic reactant mass." The newly formed mass would then be transported to the incineration plants where it would be burnt in the same manner previously outlined. While the cost of this method would greatly exceed that of incinerating the chemicals directly, it would bring the safety of their incineration up to a very acceptable level. It may be possible to find a better way of disposing of our nerve gases while the mustard gas is being incinerated. This flexibility is one of the greatest strengths of the plan, for it gives our leaders options they may not have if the disposal method is debated too long.

Chemical weapons have played a pivotal role in the history of mankind. They have shaped the world we live in through their destructive power. They have been the most feared of weapons, and at the same time the most indecisive of weapons. No modern army has ever found victory with their use, yet their aid in deterrence has been unsurpassed. In over 70 years of combat the troops of the United States have never had poison gas used on them (Lord 17). Yet, broad changes are sweeping our planet. The cold war, which drove the production of these weapons, is over. The time of chemical and biological weapons has passed, and we must dispose of them before they become an open wound on our nation. Although their disposal is risky, their destruction is safer than letting them sit in our aging stockpiles. Despite their importance on the world stage, no one will be unhappy to see them go.

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