



Course Learning Outcomes for Unit I

Upon completion of this unit, students should be able to:

1. Articulate the developmental history of weapons of mass destruction (WMD) technology in World War I and World War II.
 - 1.1 Discuss the development and use of specific WMD (black powder and advanced explosives) during the World Wars.
2. Summarize the development, scope, and principles of international law regulating WMD proliferation.
 - 2.1 Discuss how international law has controlled the production, distribution, use of, and access to WMD.
5. Analyze terrorist threats, suspects, and counterterrorism operations concerning WMD, and compare and contrast past events.
 - 5.1 Examine the implications and repercussions of the use of a WMD during WWII.

Reading Assignment

Chapter 1:

Terrorism and WMDs

Unit Lesson

What are WMD?

The term *weapons of mass destruction* (WMD) describes munitions or agents with the capacity to kill or destroy on a massive scale (Howard & Forest, 2008).

According to the Federal Bureau of Investigation (FBI), WMD are defined by U.S. law (18 USC §2332a) as follows:

- any explosive, incendiary, or poison gas device similar to any of the following items:
 - bomb or grenade,
 - rocket (explosive or incendiary charge four ounces or more),
 - missile (explosive or incendiary charge one-quarter ounce or more), or
 - mine;
- any weapon(s) causing death or serious bodily injury through the release of toxic or poisonous chemicals;
- any weapon that can have a disease organism; or
- any weapon able to release a radioactivity level that can be dangerous to human life (FBI, n.d.).

WMD is also used to describe a set of weapons (chemical, biological, radiological, nuclear, and explosive) that impact people, property, and/or infrastructure on a large scale (FBI, n.d.).

WMD generally refer to chemical, biological, radiological, nuclear, or explosive weapons (CBRNE), which includes all forms of explosives, improvised explosive devices (IEDs), low-grade explosives (black powder), high explosives, and military explosives (FBI, n.d.).

Explosives/Devices

Explosives (improvised explosive device [IED] or homemade, commercial grade, and military explosives) are chemically produced, yet they are separated from chemical weapon descriptions that relate to reactions to chemical exposure rather than the explosive nature of that device. Four types of explosive devices are described below:

Mechanical explosive devices: Although a form of an IED, this includes only those devices relying on some form of rapidly burning propellant, such as black powder or other propellant, which is typically relied upon to create pipe bombs with the use of a standard cannon fuse or some form of a blasting cap. This IED form is a very simple device that includes a commercially produced iron or PVC pipe. The pipe is typically filled with a propellant (black powder, smokeless powder, Pyrodex, Triple Seven, Black Mag3, Pyrodex pellets, and Triple Seven Pellets) and sealed with end caps either screwed on or chemically bonded onto the end of the pipe. A standard cannon fuse is slipped through a drilled hole in the device to serve as the detonation device. The fuse serves to ignite the propellant, which rapidly burns, creating expanding gases that pressurize the pipe enclosure to the degree that the pipe bursts into multiple pieces of varying sizes (shrapnel). An advanced version of this device relies on the inclusion of a blasting cap, which may be remotely or hard-wire detonated in addition to the typical fuse detonation. The addition of the blasting cap increases the rapid burning effect of the propellant to the degree that the explosion velocity becomes similar to that of a high explosive. Other forms of mechanical explosion include detonation of chemical storage tanks or other devices that encapsulate the rapidly expanding gases from the ignited propellant (Pichtel, 2011).

IEDs: These relate to homemade bombs ranging from simple black-powder pipe bombs to high explosives, including varying forms of detonation such as contact-switch, remote-controlled, motion-switch, pressure-switch, altitude-switch, proximity-switch detonations, or numerous others. Typically, IEDs are delivered in the form of (a) physical placement in the ground, such as inside a dead animal, on the body of a live animal, concealed in a container, or inside a building; (b) body-borne IED (BBIED); or (c) vehicle-borne IED (VBIED). IEDs are crudely constructed devices that include homemade, commercial-grade, or military-grade explosive devices (Pichtel, 2011).

Commercial-grade explosives: These include aluminum powder (ANAL), ammonium nitrate-fuel oil (ANFO), black powder/smokeless propellants, dynamite, nitroglycerin, trinitrotoluene (TNT), and urea nitrate (UN). Such explosives are typically used in the demolition and removal of commercial structures or by mining operations. These explosives can be used to produce various forms of BBIED, VBIED, or in-place IED (Pichtel, 2011).

Military-grade explosives: These include any form of a specifically designed and manufactured explosive for military use and take the form of a special explosive such as C-4 (plastic explosive), high melting explosive (HMX) or octagon, pentaerythritol tetranitrate (PETN), royal demolition explosive (RDX), and Semtex. These explosives are used in various forms of military explosive devices or by the explosive ordinance demolition (EOD) members of the U.S. military. Many military-grade IEDs simply use existing military explosive devices (e.g., aerial bombs, mortars, artillery projectiles, grenades) and add a form of detonation to connect and simultaneously detonate each specific explosive or a progressive explosion, depending on the desired effect of the blast. These forms of detonation initiation vary widely (Pichtel, 2011).

Chemical Weapons

Chemical weapons use toxic properties of chemical substances to cause physical or psychological harm to an enemy (Howard & Forest, 2008). There are many different types of chemical weapons causing harm that are discussed during the course. Some examples of chemical agents are given below:

- blood agents: arsine (SA), hydrogen cyanide (AC), and cyanogen chloride (CK);
- choking: chlorine and phosgene;
- blister: mustard, lewisite, and phosgene-oxime (nettle agent); and
- nerve: sarin, soman, tabun, cyclo-sarin, and V-series (VX, VR) (Howard & Forest, 2008).

Biological Weapons

Biological weapons disseminate agents, infectious diseases, pathogens, or toxins to harm or kill others. Biological weapon key considerations include virulence, toxicity, incubation periods, transmissibility, lethality,

stability, and infectivity. Biological agents are cost-effective and easily produced. Some examples of biological weapons are listed below:

- bacteria: anthrax, brucellosis, plague, and tularemia;
- virus: smallpox, yellow fever, and Marburg;
- rickettsia;
- fungi;
- toxins: ricin, saxitoxin, or botulinum; and
- infectious pathogens: avian influenza, malaria, HIV, or TB (Pichtel, 2011).

Radiological Weapons

A radiation emission device (RED) or radiological dispersion device (RDD), also known as a *dirty bomb*, creates mass panic. The purpose of a RED or RDD is to cause disruption through the dispersion of a detonation of conventional explosives. An area contaminated could become uninhabitable for years.

Typical radioactive materials include cesium 137, cobalt 60, strontium 90, plutonium oxide, and uranium oxide. Other radioactive sources include medical facilities, medical educational facilities, atomic waste storage, or nuclear waste (Pichtel, 2011).

Nuclear Weapons

Nuclear weapons are typically derived from nuclear fission: splitting the nucleus of an atom into two or more parts by bombarding it with neutrons, causing a chain reaction. The following are nuclear weapon types:

- *Gun-type*: The gun-type uses highly enriched uranium (HEU) as a fissile material.
- *Implosion*: Implosion devices use plutonium for fissile material.
- *Fusion boosted fission weapons*: Boosted weapons are implosion devices that introduce fusion materials like deuterium and tritium gas.
- *Thermonuclear weapons (Hydrogen bombs)*: Thermonuclear bombs yield explosions in the megaton range (Pichtel, 2011).

History of WMD

Before modern war:

- 430 B.C.—Leucippus and his pupil Democritus, were credited with the theory of atoms and motion of atoms.
- 1346—The Tartars used catapults during the siege of Kaffa to throw plague-infested dead bodies over the city walls to spread a plague (biological warfare).
- 1518—The Aztec people were exposed to smallpox by Hernando Cortes's army.
- 1530s—The Inca tribes were exposed to smallpox by Spanish explorers.
- 1704—Isaac Newton proposed a mechanical universe with small solid masses in motion.
- 1710—Russian troops used plague victim cadavers against the Swedish to provoke an epidemic.
- 1767—British general, Sir Jeffery Amherst, gave blankets infected with smallpox to Indians during the French and Indian War (Rebehn, 2003).

World War I: With WWI came an arsenal of new weapons, including submarines, airplanes, machine guns, tanks, long-range artillery, and high explosive shells (Christianson, 2010). About 124,000 tons of chemical weapons were used during WWI, causing over a million casualties and about 90,000 fatalities (Howard & Forest, 2008).

- Tear gas
 - 1914: The French attacked Germans with tear gas (Xylyl bromide). The Germans retaliated by firing shells with a chemical irritant designed to induce sneezing.
 - Early 1915: The Germans used tear gas against the Russians. Both German attempts in 1914 and 1915 were considered failures (Pichtel, 2011).

- Chlorine gas
 - April 22, 1915: Germans released 5,730 pressurized cylinders of chlorine gas, over 168 tons of deadly yellowish-grey chlorine gas, against the French in Ypres, Belgium. French and Algerian soldiers described the gas as a foul scent like pepper and pineapple that caused people to drown to death on their own fluids. The first gas attack killed 5,000 Allied soldiers, and many more were injured (Pichtel, 2011).
 - Consider the effects of chlorine gas entering the lungs of a soldier during WWI (e.g., headaches, pain in the lungs, coughing up a greenish substance) as such a fiendish way to die (Christianson, 2010).
 - September 24, 1915: The British mounted their own chlorine gas attack with 400 gas canisters. The attack went terribly wrong when the wind changed and turned back on the British (Christianson, 2010).
- Phosgene and diphosgene
 - Both were used by the Germany military during WWI.
 - Phosgene typically causes death in 24–48 hours.
 - The body converts diphosgene into phosgene with the same effects.
 - Phosgene was responsible for about 80% of all deaths from chemical gas in WWI (Pichtel, 2011).
- Mustard agent
 - September 1917: This was introduced by Germany against the Russians at Riga.
 - It is not an effective killing agent, but remains active for much longer because it is much more persistent than blood and choking agents.
 - Mustard agent blistered the skin of victims, causing blisters on the eyes and inside the lungs, and internal and external bleeding where it was bound to different areas of the body (Pichtel, 2011).
- Fritz Haber (1868–1934)
 - University Karlsruhe Professor for Physical-Chemistry, Director of the Kaiser Wilhelm Institute for Physical-Chemistry, and Nobel Prize in Chemistry winner Fritz Haber was the main contributor to the development of chemical warfare for Germany during WWI.
 - 1918: Haber won the Nobel Prize for development of chlorine gas (Pichtel, 2011).

World War II: Chemical weapons were extensively used during WWI, so the fear of use resonated during WWII. The escalation of technology during WWII was greater than any other period in human history. World War II was the beginning of the Nuclear Age.

Germany's use of WMD during WWII: American and British nuclear physicists feared falling behind their German counterparts, and they feared that Hitler's forces would have the first atomic arms. These fears were based on the following considerations: Russia and Germany's control of Europe's only uranium mine in Czechoslovakia and the prewar stop of uranium exports (Pichtel, 2011).

Japan's use: Japan used cholera, dysentery, typhoid, plague, anthrax, and paratyphoid on Chinese troops (Pichtel, 2011).

Italy's use: Italy used mustard gas against Ethiopians (Pichtel, 2011).

United States: On August 6, 1945, an American B-29 bomber, *Enola Gay*, deployed the first atomic bomb over the city of Hiroshima. Three days later, a second B-29 bomber dropped another atomic bomb over Nagasaki (Howard & Forest, 2008).

Cold War: The development of Soviet-American conflict over the political future of Eastern Europe was a major cause of the Cold War. In February 1945, President Franklin Roosevelt, Prime Minister Winston Churchill (United Kingdom), and Premier Joseph Stalin (Soviet Union) met at the Yalta Summit to discuss post-war issues and the future of Poland. This meeting was the onset of the Cold War, which lasted from 1945 to 1991. The Cold War was an arms race between the United States and the USSR. The Cold War also led to other proxy wars such as the Vietnam and Korean conflicts (Pichtel, 2011).

Intercontinental ballistic missiles: In the 1960s, the development of the intercontinental ballistic missile (ICBM) ushered the idea of a new nuclear strategy. The only attack method prior to this was by long-range bomber planes like the attacks used on Nagasaki and Hiroshima. The development of ICBMs created the ability to launch a nuclear weapon anywhere in the world. The development of a submarine-launched ballistic missile (SLBM) decreased the delivery time (Pichtel, 2011).

Mutually assured destruction: Mutually assured destruction (MAD) is the theory of concurrent annihilation of two opposing nuclear powers like the United States and USSR (Davis, 1974). In other words, if the USSR would have launched a nuclear strike against the United States, then the United States would receive the warning and launch against the USSR, causing MAD. Society had a fear of MAD.

Cuban Missile Crisis: On October 14, 1962, a U-2 American spy plane photographed missile launch sites under construction in Cuba. The Cuban Missile Crisis was also known as the Caribbean Crisis by the Russians and the October Crisis by the Cubans. This crisis lasted 13 days before Soviet Premier Nikita Khrushchev announced the dismantling of the program. A medium-range ballistic missile (MRBM) would have the capability to strike as far as New York City. The United States responded to the crisis by deliberately flying 7,000 megatons of weapons towards Soviet targets (Davis, 1974). This is considered the first and only direct conflict between the superpowers (Davis, 1974).

Agent Orange: Between 1961 and 1972, the United States disseminated 19 million gallons of an herbicide called Agent Orange over 4.5 million acres of Vietnam, the borders of Laos, and the borders of Cambodia in what was code named "Operation Ranch Hand." The United States did not realize the potential health effects, including tumors, cancer, birth defects, and psychological impairments caused by Agent Orange. U.S. service members and the Vietnamese population have suffered from the long-term effects of the agent. Forty years after the spraying in Vietnam, second and third generations of victims exposed to dioxin are still being born with birth defects (Brown, 2013).

Post-Cold War, Gulf War, rogue states, and terrorist organizations:

1. World Trade Center Bombing (1993)
2. Aum Shinrikyo Religious Sect (1993 and 1995): In 1993, this terrorist organization attempted to disperse anthrax in an area around the Imperial Palace in Tokyo and the Japanese Parliament. In 1995, Aum Shinrikyo released sarin (nerve agent) in the Tokyo subway system, killing 12 and injuring over 5,000 (Howard & Forest, 2008).
3. McVeigh, Nichols, and Fortier (1995): Timothy McVeigh and crew orchestrated a domestic terrorist attack using explosives on the Alfred P. Murrah Federal Building in Oklahoma City. It destroyed or damaged 324 buildings in a 16 block radius, shattered the glass in 258 buildings outside the radius, killed 168 people, and injured 680 individuals (Howard & Forest, 2008).
4. 9-11 Attacks (2001)
5. U.S. anthrax attacks (2001): Letters containing anthrax were sent to the *NBC News* offices, *The New York Post* offices, and American Media Inc., and affected the U.S. Postal Service and workers (James Martin Center for Nonproliferation Studies, 2008).

Summary

The history of WMD spans the ages of humanity, from the use of poison arrows to the use of highly developed airborne biological agent releases. WMD are defined as having a large-scale impact on people, property, and/or infrastructure. The focus of the course is to define the main types of WMD, to discuss present and future threats, and to understand the political and sociological implications of WMD use.

References

- Brown, D. (2013, July 23). Four decades after war ended, Agent Orange still ravaging Vietnamese. *Miami Herald*. Retrieved from <http://www.miamiherald.com/2013/07/22/3514489/4-decades-after-war-ended-agent.html>
- Christianson, S. (2010). *Fatal airs: The deadly history and apocalyptic future of lethal gases that threaten our world*. Santa Barbara, CA: Praeger.
- Davis, L. E. (1974). *The Cold War begins: Soviet-American conflict over East Europe*. Princeton, NJ: Princeton University.
- Federal Bureau of Investigation. (n.d.). Weapons of mass destruction. Retrieved from https://www.fbi.gov/about-us/investigate/terrorism/wmd/wmd_faqs

Howard, R. D., & Forest, J. (2008). *Weapons of mass destruction and terrorism*. New York, NY: McGraw-Hill.

James Martin Center for Nonproliferation Studies. (2008). Chronology of major events in history of biological and chemical weapons. Retrieved from <http://cns.miis.edu/cbw/pastuse.htm>

Pichtel, J. (2011). *Terrorism and WMDs: Awareness and response*. Boca Raton, FL: CRC Press.

Rebehn, M. (2003, February 7). The long history of weapons of mass destruction. Retrieved from https://www.opendemocracy.net/theme_9-wmd/article_964.jsp

Suggested Reading

The following source discusses the chronology of major events in the history of biological and chemical weapons. You are encouraged to view this information.

James Martin Center for Nonproliferation Studies. (2008). Chronology of major events in history of biological and chemical weapons. Retrieved from <http://cns.miis.edu/cbw/pastuse.htm>

The following source discusses the development and use of the German V-2 missile during WWII. You are encouraged to view this information.

Welcome to V2Rocket.com—Created for those around the world that share an interest in the infamous German V-2 missile. (n.d.). Retrieved from <http://www.v2rocket.com/>

The following source discusses the development and use of chemical, biological, and nuclear weapons during WWI and WWII. You are encouraged to view this information.

Children in History. (2013). World War II: Weapons of mass destruction. Retrieved from <http://histclo.com/essay/war/ww2/air/gas/w2-cbw.html>

The following website from the Department of Homeland Security provides a historical reference to help you identify WMD, especially improvised explosive devices.

Department of Homeland Security. (n.d.). Bomb-making materials awareness program. Retrieved from <http://www.dhs.gov/bomb-making-materials-awareness-program>

Learning Activities (Non-Graded)

The following video discusses Germany's first use of a WMD. Watch the video, and then write a one-page synopsis on this WMD.

History.com (2015). WWI: *The first modern war - The Germans release the first WMD* [Video file]. Retrieved from <http://www.history.com/shows/wwi-the-first-modern-war/season-1/episode-2/the-germans-release-the-first-wmd>

Non-graded Learning Activities are provided to aid students in their course of study. You do not have to submit them. If you have questions, contact your instructor for further guidance and information.