

Grigory Borodavkin.

A short history of weapons of mass destruction.

A weapon of mass destruction (WMD) is a weapon which can kill large numbers of humans, animals and plants, and/or cause great damage to man-made structures (e.g. buildings) or natural structures (e.g. mountains). The term covers several weapon types, including nuclear, biological, chemical (NBC) and, increasingly, radiological weapons. There is controversy over when the term was first used, either in 1937 (in reference to the aerial bombardment of Guernica, Spain) or in 1945 (with reference to nuclear weapons). Following the atomic bombings of Hiroshima and Nagasaki, and progressing through the Cold War, the term came to refer more to non-conventional weapons. The phrase entered widespread usage in relation to the U.S.-led 2003 invasion of Iraq. Terms used in a military context include **atomic, biological, and chemical warfare (ABC warfare), nuclear, biological, and chemical (NBC) after the invention of the hydrogen bomb, and chemical, biological, radiological, and nuclear (CBRN), recognizing the threat of subcritical radiological weapons.**

Even though the term is relatively modern, the idea of using certain means in order to kill many numbers of people is old as the World. The perfect example of a WMD that went out of control in history is the plague. The plague has a long history as a biological weapon. Historical accounts from ancient China and medieval Europe detail the use of infected animal carcasses, such as cows or horses, and human carcasses, by the Xiongnu/Huns, Tartars, and other groups, to contaminate enemy water supplies. Han Dynasty General Huo Qubing is recorded to have died of such a contamination while engaging in warfare against the Xiongnu.

The Tartars chased Genoese merchants to their fortified town (now Feodosiya, Ukraine, then Kaffa) on the Crimean coast. The besieging army soon was ravaged by the plague and decided to leave. As a parting shot, the Tartars used catapults to hurl plague-infected corpses over the city walls. Some residents died almost immediately; the others dashed for their galleys (a type of oar-propelled ship) and fled, taking the disease with them. Sicily and then the rest of Italy were the earliest European victims of the plague. It would spread through almost all of Europe, wiping out entire villages and decimating towns and cities. Historians argue that this could have led to the deadly epidemic that swept through China, Europe and Africa in the middle ages from 1347 to 1351. It may have reduced the world's population from 450 million to between 350 to 375 million. It is still referred to as the "Black Death". China, where it originated, lost around half of its population (from around 123 million to around 65 million), Europe around 1/3 of its population (from about 75 million to about 50 million) and Africa approximately 1/8th of its population (from around 80 million to 70 million). This makes the Black Death the largest death toll from any known non-viral epidemic. Although accurate statistical data does not exist, it is thought that 4.2 million died in England (1/4 of the population), while an even higher percentage of Italy's population was likely wiped out.

"Neither physicians nor medicines were effective. Whether because these illnesses were previously unknown or because physicians had not previously studied them, there seemed to be no cure. There was such a fear that no one seemed to know what to do. When it took hold in a house it often happened that no one remained who had not died. And it was not just that men and women died, but even sentient animals died. Dogs, cats, chickens, oxen, donkeys, sheep showed the same symptoms and died of the same disease. And almost none, or very few, who showed these symptoms, were cured. The symptoms were the following: a bubo in the groin, where the

thigh meets the trunk; or a small swelling under the armpit; sudden fever; spitting blood and saliva (and no one who spit blood survived it). It was such a frightful thing that when it got into a house, as was said, no one remained. Frightened people abandoned the house and fled to another." -Marchione di Coppo Stefani

On the other hand, Northeastern Germany, Bohemia, Poland and Hungary are believed to have suffered less, and there are no estimates available for Russia or the Balkans. The Black Death continued to strike parts of Europe sporadically until the 17th century, each time with reduced intensity and fatality, suggesting an increased resistance due to genetic selection. Some have also argued that changes in hygiene habits and efforts to improve public health and sanitation had a significant impact on the falling rates of infection.

The plague that was used as a weapon spiraled out of control and brought about one of the worst disasters of history upon three continents and millions of people. But as years passed the weapons became more controllable- chemicals and poison gasses started to be used on the battlefield.

In 1672, during his siege of the city of Groningen, Christoph Bernhard van Galen, the Bishop of Münster, employed several different explosive and incendiary devices, some of which had a fill that included belladonna, intended to produce toxic fumes. Just three years later, August 27, 1675, the French and the Germans concluded the Strasbourg Agreement, which included an article banning the use of "perfidious and odious" toxic devices. In 1854, Lyon Playfair, a British chemist, proposed a cacodyl cyanide artillery shell for use against enemy ships as way to solve the stalemate during the siege of Sevastopol. The proposal was backed by Admiral Thomas Cochrane of the Royal Navy. It was considered by the Prime Minister, Lord Palmerston, but the British Ordnance Department rejected the proposal as "as bad a mode of warfare as poisoning the wells of the enemy." Playfair's response was used to justify chemical warfare into the next century:

"There was no sense in this objection. It is considered a legitimate mode of warfare to fill shells with molten metal which scatters among the enemy, and produced the most frightful modes of death. Why a poisonous vapor which would kill men without suffering is to be considered illegitimate warfare is incomprehensible. War is destruction, and the more destructive it can be made with the least suffering the sooner will be ended that barbarous method of protecting national rights. No doubt in time chemistry will be used to lessen the suffering of combatants, and even of criminals condemned to death".

Later, during the American Civil War, New York school teacher John Doughty proposed the offensive use of chlorine gas, delivered by filling a 10 inch (254 millimeter) artillery shell with 2 to 3 quarts (2 to 3 liters) of liquid chlorine, which could produce many cubic feet (a few cubic meters) of chlorine gas. Doughty's plan was apparently never acted on, as it was probably presented to Brigadier General James Wolfe Ripley, Chief of Ordnance, who was described as being congenitally immune to new ideas. A general concern over the use of poison gas manifested itself in 1899 at the Hague Conference with a proposal prohibiting shells filled with asphyxiating gas. The proposal was passed, despite a single dissenting vote from the United States. The American representative, Navy Captain Alfred Thayer Mahan, justified voting against the measure on the grounds that "the inventiveness of Americans should not be restricted in the development of new weapons."

Chemical weapons were used again in World War I in the form of different gases which were considered to be a major military break-through of the time. The gases ranged from disabling chemicals, such as tear gas and the severe mustard gas, to lethal agents like phosgene. This

chemical warfare was a major component of the first global war and first total war of the 20th century. The killing capacity of gas was limited — only 4% of combat deaths were due to gas — however, the proportion of non-fatal casualties was high, and gas remained one of the soldiers' greatest fears. Because it was possible to develop effective countermeasures to gas attacks, it was unlike most other weapons of the period. In the later stages of the war, as the use of gas increased, its overall effectiveness diminished. This widespread use of these agents of chemical warfare, and wartime advances in the composition of high explosives, gave rise to an occasionally expressed view of World War I as "the chemists' war"

The use of gas on the battlefield started in 1914 with mere tear gas (ethyl bromoacetate) and went on to deadly agents such as chlorine, mustard gas and phosgene. The gas itself did not take the lives of many people, but it had left its victims forever crippled and disabled. The first to use gas during the war were the French, but it was the Germans and Austro-Hungarians who became notorious for it. By 22 April 1915, the German Army had 168 tons of chlorine deployed in 5,730 cylinders opposite Langemark-Poelkapelle, north of Ypres. At 17:00, in a slight easterly breeze, the gas was released, forming a gray-green cloud that drifted across positions held by French Colonial troops who broke ranks, abandoning their trenches and creating an 8,000 yard (4.5 km) gap in the Allied line. However, the German infantry were also wary of the gas and, lacking reinforcements, failed to exploit the break before Canadian and British reinforcements arrived. In what became the Second Battle of Ypres, the Germans used gas on three more occasions; on 24 April against the Canadian 1st Division, on 2 May near Mouse Trap Farm and on 5 May against the British at Hill 60. The British Official History stated that at Hill 60:

"90 men died from gas poisoning in the trenches; of the 207 brought to the nearest dressing stations, 46 died almost immediately and 12 after long suffering."

Chlorine is a powerful irritant that can inflict damage to the eyes, nose, throat and lungs. At high concentrations and prolonged exposure it can cause death by asphyxiation.

The British expressed outrage at Germany's use of poison gas at Ypres but responded by developing their own gas warfare capability. The commander of British II Corps, Lt.Gen. Ferguson (officially) said of gas:

"It is a cowardly form of warfare which does not commend itself to me or other English soldiers.... We cannot win this war unless we kill or incapacitate more of our enemies than they do of us, and if this can only be done by our copying the enemy in his choice of weapons, we must not refuse to do so."

However, the British Army embraced gas with enthusiasm and mounted more gas attacks than any other combatant. This was due partly to the British spending most of the latter years of the war on the offensive.

The most widely reported and, perhaps, the most effective gas of the First World War was mustard gas, a vesicant, which was introduced by Germany in July 1917 prior to the Third Battle of Ypres. The Germans marked their shells yellow for mustard gas and green for chlorine and phosgene, so they called the new gas *Yellow Cross*. It was known to the British as *HS (Hun Stuff)*, while the French called it *Yperite* (named after Ypres).

Mustard gas was not intended as a killing agent (though in high enough doses it was fatal) but instead was used to harass and disable the enemy and pollute the battlefield. Delivered in artillery shells, mustard gas was heavier than air, settled to the ground as an oily sherry-looking

liquid and evaporated slowly without sunlight. Once in the soil, mustard gas remained active for several days, weeks or even months, depending on the weather conditions.

The polluting nature of mustard gas meant that it was not always suitable for supporting an attack as the assaulting infantry would be exposed to the gas when they advanced. When Germany launched Operation *Michael* on 21 March 1918, they saturated the Flesquières salient with mustard gas instead of attacking it directly, believing that the harassing effect of the gas, coupled with threats to the salient's flanks, would make the British position untenable.

Gas never reproduced the dramatic success of 22 April 1915; however, it became a standard weapon which, combined with conventional artillery, was used to support most attacks in the later stages of the war. Gas was employed primarily on the Western Front — the static, confined trench system was ideal for achieving an effective concentration — however, Germany made use of gas against Russia on the Eastern Front, where the lack of effective countermeasures would result in deaths of thousands of Russian infantry, while Britain experimented with gas in Palestine during the Second Battle of Gaza.

The skin of victims of mustard gas blistered, their eyes became very sore and they began to vomit. Mustard gas caused internal and external bleeding and attacked the bronchial tubes, stripping off the mucous membrane. This was extremely painful and most soldiers had to be strapped to their beds. It usually took a person four or five weeks to die of mustard gas exposure.

One nurse, Vera Brittain, wrote: "I wish those people who talk about going on with this war whatever it costs could see the soldiers suffering from mustard gas poisoning. Great mustard-colored blisters, blind eyes, all sticky and stuck together, always fighting for breath, with voices a mere whisper, saying that their throats are closing and they know they will choke."

Near the end of the war, the United States began large scale production of an improved vesicant gas known as Lewisite, for use in an offensive planned for the spring of 1919. By the time of the armistice on November 11, a plant in Ohio was producing 10 tons per day of the substance, for a total of about 150 tons. It is uncertain what effect this new chemical would have had on the battlefield, however, as it degrades in moist conditions.

In the 1920s generals reported that poison had never won a battle. The soldiers said they hated it and hated the gas masks. Only the chemists spoke out to say it was a good weapon. In 1925, sixteen of the world's major nations signed the Geneva Protocol, thereby pledging never to use gas in warfare again.

Since then chemicals were beginning to be banned by nations concerned whether it was humane to use these in warfare (although warfare itself is not humane at all, if you ask me). Although gases were still somewhat used during World War II by the Nazi's to exterminate population, and war prisoners, these chemicals were almost never drawn again.

The Second World War marked, however, the beginning of a new age of Weapons of Mass Destruction. This age was brought about with the invention of the Nuclear Bomb- the most destructive man-made force ever created.

A nuclear weapon derives its destructive force from nuclear reactions of fusion or fission. As a result, even a nuclear weapon with a small yield is significantly more powerful than the largest conventional explosives, and a single weapon is capable of destroying an entire city.

The first nuclear weapons were created in the United States by an international team, including many displaced scientists from central Europe, which included Germany, with assistance from the United Kingdom and Canada during World War II as part of the top-secret "Manhattan Project". While the first weapons were developed primarily out of fear that Nazi Germany would develop them first, they were eventually used against the Japanese cities of Hiroshima and Nagasaki. The Hiroshima bomb was made from highly-enriched uranium-235. This was prepared by diffusion enrichment techniques using the very small differences in mass of the two main isotopes: U-235 (originally 0.7% in the uranium) and U-238, the majority. As UF_6 , there is about a one percent difference in mass between the molecules, and this enables concentration of the less common isotope. About 60 kilograms of highly-enriched uranium was used in the bomb which was released over Hiroshima, Japan's seventh largest city, on 6 August 1945. Some 90% of the city was destroyed. The explosive charge for the bomb detonated over Nagasaki three days later was provided by about of 8 kilograms of plutonium-239 (>90% Pu-239), and its preparation depended on the operation of special nuclear reactors. These bombings resulted in the immediate deaths of around 120,000 people from injuries sustained from the explosion and acute radiation sickness, and even more deaths over time from long-term effects of radiation. The use of these weapons was and remains controversial. The Soviet Union developed and tested their first nuclear weapon in 1949, based partially on information obtained from Soviet espionage in the United States. Both the U.S. and USSR would go on to develop weapons powered by nuclear fusion (hydrogen bombs) by the mid-1950s leading to an arms race between the two superpowers- The Cold War.

Means of WMD delivery.

A major aspect of nuclear weaponry is the means of it's delivery to the target. The first nuclear weapons were gravity bombs, such as the "Fat Man" weapon dropped on Nagasaki, Japan. These weapons were very large and could only be delivered by a bomber aircraft. This method is usually the first developed by countries as it does not place many restrictions on the size of the weapon, and weapon miniaturization is something which requires considerable weapons design knowledge. It does, however, limit the range of attack, the response time to an impending attack, and the number of weapons which can be fielded at any given time. But with time the means of delivery became more sophisticated- nuclear weapons mounted onto a missile, which can use a ballistic trajectory to deliver a warhead over the horizon. While even short range missiles allow for a faster and less vulnerable attack, the development of intercontinental ballistic missiles (ICBMs) and submarine-launched ballistic missiles (SLBMs) has allowed some nations to plausibly deliver missiles anywhere on the globe with a high likelihood of success. More advanced systems, such as multiple independently target able reentry vehicles (MIRVs) allow multiple warheads to be launched at several targets from any one missile, reducing the chance of any successful missile defense. Today, missiles are most common among systems designed for delivery of nuclear weapons. Making a warhead small enough to fit onto a missile, though, can be a difficult task.

The means of WMD delivery have been developed and shaped to meet modern-day standards of swift deadliness, but the most dangerous carriers are these:

A ballistic missile is a missile that follows a sub-orbital, ballistic flight path with the objective of delivering a warhead to a predetermined target. The missile is only guided during the relatively brief initial powered phase of flight and its course is subsequently governed by the laws of orbital mechanics and ballistics. To date, ballistic missiles have been propelled during powered flight by chemical rocket engines of various types. A ballistic missile trajectory consists of three parts: The powered flight portion, the free-flight portion which constitutes most of the flight time, and the re-entry phase where the missile re-enters the Earth's atmosphere. Ballistic missiles

can be launched from fixed sites or mobile launchers, including vehicles, aircrafts, ships and submarines. The powered flight portion can last from a few tens of seconds to several minutes and can consist of multiple rocket stages. When in space and no more thrust is provided, the missile enters free-flight. In order to cover large distances, ballistic missiles are usually launched into a high sub-orbital spaceflight; for intercontinental missiles the highest altitude reached during free-flight is about 1200 km. The re-entry stage begins at an altitude where atmospheric drag plays a significant part in missile trajectory, and lasts until missile impact. Ballistic missiles have different range- Short-range ballistic missile (SRBM): range less than 1000 km, Medium-range ballistic missile (MRBM): range between 1000 and 2500 km, Intermediate-range ballistic missile (IRBM): range between 2500 and 5500 km, Intercontinental ballistic missile (ICBM): range greater than 5500 km, broken down into: Limited range intercontinental ballistic missile (LIRCBM): range between 5500 and 8000 km. LIRCBMs are also known as Long-range ballistic missiles (LRBM). Full range intercontinental ballistic missile (FRICBM): range between 8000 and 12,000 km. Short to medium range missiles are often called theatre or tactical ballistic missiles (TBM). Long and medium range ballistic missiles are generally designed to deliver nuclear warheads because their payload is too limited for conventional explosives to be efficient. About 40 states possess ballistic missile technology, but only the 5 NPT member-states have long-distance ICBM's with a nuclear payload.

A cruise missile is a guided missile which carries an explosive payload and uses a lifting wing and a propulsion system, usually a jet engine, to allow sustained flight; it is essentially a flying bomb. Cruise missiles are generally designed to carry a large conventional or nuclear warhead many hundreds of miles with high accuracy. Cruise missiles pose perhaps the gravest delivery system proliferation threat. They are inexpensive to build and can, therefore, overwhelm current defenses by sheer numbers. They can be designed to be small with low-thrust engines and can penetrate radar and infrared-detection networks. The technology to build them is simple and available to any country that builds even rudimentary aircraft. Finally, since cruise missiles are unmanned, they require no flight crew training, expensive upkeep programs, special hangars for housing, or large air bases for basing. These factors make it especially difficult to collect intelligence on the development of indigenous cruise missiles and to anticipate the developing threat. Countries can achieve a cruise missile capability by simply buying existing cruise missiles from supplier states and modifying them to meet a particular need, or they can make a complete system from readily available parts. European aerospace firms, the FSU, and the Chinese have all sold many cruise missiles of one description or another to customers in proliferant and industrialized countries. In most cases, the performance of missiles is range limited and, in some cases, even payload limited, and their use as a carrier of WMD is probably confined to tactical applications. With the introduction of new guidance technologies, particularly the GPS, future cruise missiles will be more accurate and attractive to proliferates.

An **unmanned aerial vehicle (UAV)**, sometimes called an **unmanned air-reconnaissance vehicle**, is an unpowered aircraft. UAVs can be remote controlled or fly autonomously based on pre-programmed flight plans or more complex dynamic automation systems. UAVs are currently used in a number of military roles, including reconnaissance and attack. They are also used in a small but growing number of civil applications such as firefighting where a human observer would be at risk, police observation of civil disturbances and scenes of crimes, and reconnaissance support in natural disasters. They are also potential carriers for various forms of WMD's.

Non-Proliferation, Disarmament and the Threat.

As soon as the first nuclear bombs went off, showing the awesome destructive power of this weapon, conscious people understood that the “nuke” should never again be used for war. This is why many scientists that were working on the Manhattan Project later became spies in order to help the Soviet Union acquire the Bomb. They thought that a monopoly on nuclear weaponry would lead to an international hegemony that would disrupt efforts for peace. The Soviet Union tested their first nuclear weapon in 1949 thus ushering in the era of the Cold War. The arms race between the two super-powers almost led to nuclear war during the Cuban Crisis of 1962-1963, but was resolved peacefully before any of the sides made a fatal mistake. But even though the World was a step away from a nuclear apocalypse, the arms race of the super-powers kept the World from deteriorating to total war because of the threat of complete annihilation if one of the sides was dragged in to it. This balance of power also kept states from using nuclear weapons in minor conflicts.

But the balance of power was still not enough to prevent the threat of nuclear war, so ever since 1968 measures have been taken to stop the spreading of dangerous arms in to the wrong hands.

The NPT- Treaty on the Non-Proliferation of Nuclear Weapons, also Nuclear Non-Proliferation Treaty (NPT or NNPT) is an international treaty to limit the spread of nuclear weapons, opened for signature on July 1, 1968. There are currently 189 countries party to the treaty, five of which have nuclear weapons: the United States, the United Kingdom, France, Russia, and the People's Republic of China. The NPT process was launched by Frank Aiken, Irish Minister for External Affairs, in 1958. It was opened for signature in 1968, with Finland the first State to sign. By 1992 all five then-declared nuclear powers had signed the treaty, and the treaty was renewed in 1995 (and followed by the Comprehensive Test Ban Treaty in 1996). Several NPT signatories have given up nuclear weapons or nuclear weapons programs. South Africa undertook a nuclear weapons program, allegedly with the assistance of Israel in the 70s, and may have conducted a nuclear test in the Atlantic Ocean in 1979, but has since renounced its nuclear program and signed the treaty in 1991 after destroying its small nuclear arsenal. Several former Soviet Republics destroyed or transferred to Russia the nuclear weapons inherited from the Soviet Union.

The treaty is based on three major pillars that designate its functions:

First pillar: non-proliferation

Five states are recognized by the NPT as nuclear weapon states (NWS): France, the People's Republic of China, the Soviet Union (obligations and rights now assumed by Russia), the United Kingdom, and the United States. The U.S., UK, and Soviet Union were the only states openly possessing such weapons among the original ratifiers of the treaty, which entered into force in 1970. These five nations are also the five permanent members of the United Nations Security Council. These five NWS agree not to transfer "nuclear weapons or other nuclear explosive devices" and "not in any way to assist, encourage, or induce" a non-nuclear weapon state (NNWS) to acquire nuclear weapons (Article I). NNWS parties to the NPT agree not to "receive," "manufacture" or "acquire" nuclear weapons or to "seek or receive any assistance in the manufacture of nuclear weapons" (Article II). NNWS parties also agree to accept safeguards by the International Atomic Energy Agency (IAEA) to verify that they are not diverting nuclear energy from peaceful uses to nuclear weapons or other nuclear explosive devices (Article III). This is why the recently proposed US-India nuclear energy deal has come under (legal) controversy as it threatens to undermine the global nuclear non-proliferation regime exploiting the loophole granted by the nature of dual-use technology, as has the Russia-Iran uranium deal.

The five NWS parties have made undertakings not to use their nuclear weapons against a non-NWS party except in response to a nuclear attack, or a conventional attack in alliance with a Nuclear Weapons State. However, these undertakings have not been incorporated formally into the treaty, and the exact details have varied over time. The U.S. also had nuclear warheads targeted at North Korea, a non-NWS state, from 1959 until 1991. The previous United Kingdom Secretary of State for Defense, Geoff Hoon, has also explicitly invoked the possibility of the use of the country's nuclear weapons in response to a non-conventional attack by "rogue states". In January 2006, President Jacques Chirac of France indicated that an incident of state-sponsored terrorism on France could trigger a small-scale nuclear retaliation aimed at destroying the "rogue state's" power centers.

Second pillar: disarmament

The NPT's preamble contains language affirming the desire of treaty signatories to ease international tension and strengthen international trust so as to create someday the conditions for a halt to the production of nuclear weapons, and treaty on general and complete disarmament that liquidates, in particular, nuclear weapons and their delivery vehicles from national arsenals. The NPT's Article VI elaborates on the preamble's language, urging all State Parties to the NPT, both nuclear-weapon states and non-nuclear-weapon states, "to pursue negotiations in good faith on effective measures relating to cessation of the nuclear arms race at an early date and to nuclear disarmament, and on a treaty on general and complete disarmament under strict and effective international control."

On the one hand, the wording of Article VI arguably imposes only a vague obligation on all NPT signatories to move in the general direction of nuclear and total disarmament. Under this interpretation, Article VI does not strictly require all signatories to actually conclude a disarmament treaty. Rather, it only requires them "to negotiate in good faith."

On the other hand, some governments, especially non-nuclear-weapon states belonging to the Non-Aligned Movement, have interpreted Article VI's language as being anything but vague. In their view, Article VI constitutes a formal and specific obligation on the NPT-recognized nuclear-weapon states to disarm themselves of nuclear weapons, and argue that these states have failed to meet their obligation. Some government delegations to the Conference on Disarmament have tabled proposals for a complete and universal disarmament, but no disarmament treaty has emerged from these proposals. Critics of the NPT-recognized nuclear-weapon states sometimes argue that what they view as the failure of the NPT-recognized nuclear weapon states to disarm themselves of nuclear weapons, especially in the post-Cold War era, has angered some non-nuclear-weapon NPT signatories of the NPT. Such failure, these critics add, provides justification for the non-nuclear-weapon signatories to quit the NPT and develop their own nuclear arsenals.

Third pillar: peaceful use of nuclear energy

Since very few of the nuclear weapons states and states using nuclear reactors for energy generation are willing to completely abandon possession of nuclear fuel, the third pillar of the NPT under Article IV provides other states with the possibility to do the same, but under conditions intended to make it difficult to develop nuclear weapons.

The treaty recognizes the inalienable right of sovereign states to use nuclear energy for peaceful purposes, but restricts this right for NPT parties to be exercised "in conformity with Articles I and II" (the basic nonproliferation obligations that constitute the "first pillar" of the Treaty). As the commercially popular light water reactor nuclear power station uses enriched uranium fuel, it

follows that states must be able either to enrich uranium or purchase it on an international market. Mohamed ElBaradei, Director General of the International Atomic Energy Agency, has called the spread of enrichment and reprocessing capabilities the "Achilles heel" of the nuclear nonproliferation regime. As of 2007 13 states have an enrichment capability.

Countries that have signed the treaty as Non-Nuclear Weapons States and maintained that status have an unbroken record of not building nuclear weapons. However, Iraq was cited by the IAEA and sanctioned by the UN Security Council for violating its NPT safeguards obligations; North Korea never came into compliance with its NPT safeguards agreement and was cited repeatedly for these violations, and later withdrew from the NPT and tested a nuclear device; Iran violated its NPT safeguards obligations; and Libya pursued a clandestine nuclear weapons program before abandoning it in December 2003.

In some regions, the fact that all neighbors are verifiably free of nuclear weapons reduces any pressure individual states might feel to build those weapons themselves, even if neighbors are known to have peaceful nuclear energy programs that might otherwise be suspicious. In this, the treaty works as designed.

The NPT, however, is not the only treaty banning WMD development, testing and deployment. In the late 20th century other treaties were ratified by different Global players to try to insure the safety of weapon stockpiles, nuclear power-plants and disposable, but potentially dangerous materials. Such as:

The Missile Technology Control Regime (MTCR), drafted by Dr. Richard H. Speier, is an informal and voluntary partnership between 34 countries to prevent the proliferation of missile technology.

The Missile Technology Control Regime (MTCR) was established in April of 1987 by Canada, France, Germany, Italy, Japan, Great Britain, and the United States. The MTCR was created in order to curb the spread of unmanned delivery systems for nuclear weapons, specifically delivery systems that could carry a minimum payload of 500 kg a minimum of 300 km. The scope of the MTCR was expanded in 1992 to include nonproliferation of UAV's for all weapons of mass destruction, making the payload/range threshold much less rigid than the original 500kg/300km. Prohibited materials are divided into two Categories, which are outlined in the MTCR Equipment, Software, and Technology Annex. Membership has grown to 34 nations, with 3 additional nations, including Israel, adhering to the MTCR Guidelines unilaterally. In 2002, the MTCR was supplemented by the International Code of Conduct against Ballistic Missile Proliferation (ICOC), also known as the Hague Code of Conduct, which calls for restraint and care in the proliferation of unmanned delivery systems, regardless of range or payload, and has 119 members, thus working parallel to the MTCR with broader restrictions and a greater membership. Since its establishment, the MTCR has been successful in helping to slow or stop several ballistic missile programs, according to the Arms Control Association: "Argentina, Egypt, and Iraq abandoned their joint Condor II ballistic missile program. Brazil, South Africa, South Korea, and Taiwan also shelved or eliminated missile or space launch vehicle programs. Some Eastern European countries, such as Poland and the Czech Republic, destroyed their ballistic missiles, in part, to better their chances of joining MTCR." In October 1994, in order to make the enforcement of MTCR Guidelines more uniform, the member states established a "no undercut" policy, meaning if one member denies the sale of some technology to another country, then all members must adhere. The ICOC, initiated by members of the MTCR, took the principles of the regime, expanded upon them, and offered membership to all nations. Thus, 117 nations now enforce export controls to curb the proliferation of UAV's.

The **Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on their Destruction** (usually referred to as the **Biological Weapons Convention**, abbreviation: **BWC**, or **Biological and Toxin Weapons Convention**, abbreviation: **BTWC**) was the first multilateral disarmament treaty banning the production of an entire category of weapons (with exceptions for medical and defensive purposes in small quantities). It was the result of prolonged efforts by the international community to establish a new instrument that would supplement the 1925 Geneva Protocol.

The BWC was opened for signature on April 10, 1972 and entered into force March 26, 1975 when twenty-two governments had deposited their instruments of ratification. It currently commits the 158 states that are party to it to prohibit the development, production, and stockpiling of biological and toxin weapons. However, the absence of any formal verification regime to monitor compliance has limited the effectiveness of the Convention. (Note: As of August 2007, an additional 16 states have signed the BWC but have yet to ratify it)

The scope of the BWC's prohibition is defined in Article 1 (the so-called **general purpose criterion**). This includes all microbial and other biological agents or toxins and their means of delivery. Subsequent Review Conferences have reaffirmed that the general purpose criterion encompasses all future scientific and technological developments relevant to the Convention. It is not the objects themselves (biological agents or toxins), but rather certain purposes for which they may be employed which are prohibited; similar to Art.II, 1 in the Chemical Weapons Convention (CWC). Permitted purposes under the BWC are defined as prophylactic, protective and other peaceful purposes. The objects may not be retained in quantities that have no justification or which are inconsistent with the permitted purposes.

As stated in Article 1 of the BWC:

"Each State Party to this Convention undertakes never in any circumstances to develop, produce, stockpile or otherwise acquire or retain:

- (1) Microbial or other biological agents, or toxins whatever their origin or method of production, of types and in quantities that have no justification for prophylactic, protective or other peaceful purposes;
- (2) Weapons, equipment or means of delivery designed to use such agents or toxins for hostile purposes or in armed conflict."

The convention also has several articles clearly addressing the requirements of the members:

- **Article I:** Never under any circumstances to acquire or retain biological weapons.
- **Article II:** To destroy or divert to peaceful purposes biological weapons and associated resources prior to joining.
- **Article III:** Not to transfer, or in any way assist, encourage or induce anyone else to acquire or retain biological weapons.
- **Article IV:** To take any national measures necessary to implement the provisions of the BWC domestically.
- **Article V:** To consult bilaterally and multilaterally to solve any problems with the implementation of the BWC.
- **Article VI:** To request the UN Security Council to investigate alleged breaches of the BWC and to comply with its subsequent decisions.
- **Article VII:** To assist States which have been exposed to a danger as a result of a violation of the BWC.

- **Article X:** To do all of the above in a way that encourages the peaceful uses of biological science and technology.

Export control treaties are also very important in order to stop the illegal proliferation of WMD's to terrorist groups or to other dangerous elements. Several Control treaties have been set up to keep this from happening:

The **Proliferation Security Initiative (PSI)** is an international effort led by the United States to interdict transfer of banned weapons and weapons technology. The PSI is primarily focused on combating proliferation of nuclear, chemical, and biological weapons and materials. The initiative is designed to work within the framework of other international agreements and the role of participating countries varies. The PSI consists of 15 core countries, which alongside the US include Russia, Japan, France, Germany and the United Kingdom. A further 60 countries have agreed to cooperate on an ad hoc basis. In September 2005, the People's Republic of China announced that it would not be participating in PSI due to concerns over its legality. India has so far resisted signing on to PSI. However, India, US, Japan, Australia & Singapore are conducting PSI exercises in the Bay of Bengal (Malabar Exercises - September 2007). In August 2005, a multi-national maritime interdiction exercise, codenamed Exercise Deep Sabre, was conducted in Singapore as part of the Proliferation Security Initiative. The exercise, launched at the Changi Naval Base and conducted in the South China Sea, involved some 2,000 personnel from the military, coast guard, customs and other agencies of 13 countries, including Singapore, Australia, Canada, France, Germany, Italy, Japan, Russia, the United Kingdom and the US. Ten ships and six maritime patrol aircraft were involved in the exercise that aimed to develop and practice effective procedures to prevent the proliferation of weapons of mass destruction.

International assistance for vital part of establishing a safe environment for carrying out the goal of non-proliferation and disarmament. So several groups have been established to help countries in need to properly dispose of potentially dangerous materials.

Elimination of Weapons Grade Plutonium Production (EWGPP)

The purpose of the EWGPP program is the permanent shutdown of the last three operating Russian nuclear reactors that produce weapons-grade plutonium. Plutonium production is a nonproliferation risk, as plutonium can be used in a nuclear weapon. The United States and the Russian Federation have agreed to halt their production of plutonium, and have been cooperating for the past decade to close their plutonium production facilities. In Russia, ten of these plutonium reactors have been shut down, while three remain in operation. These three reactors are not only a nonproliferation threat, but they pose a significant nuclear safety risk. The design of the reactors predates that of the Chernobyl plant, and is one of the least safe designs in operation today. These three reactors, however, provide necessary heat and electricity to two Siberian cities that are part of the Russian nuclear weapons complex: Seversk and Zheleznogorsk. The plutonium production facilities also provide employment for Russians living in these cities. Under the EWGPP program, the United States is providing support to the Russian Federation for the construction of replacement fossil fuel energy plants in exchange for the permanent shutdown of the plutonium reactors. The Russian Federation has agreed to permanently shut down the reactors once the replacement facilities are operating. Thus, the civilian energy requirements of the surrounding region will be met as the existing plutonium production reactors are replaced with a safe source of heat and electricity. Former U.S. Secretary of Energy Spencer Abraham and Russian Minister of Atomic Energy Alexander Rumyantsev signed the Implementing Agreement for the project in March 2003. DOE contracted with U.S.

firms to oversee the work, all of which will be carried out by Russian contractors and subcontractors. A schedule and project milestones ensure that reactor shutdown is proceeding concurrently with the construction and refurbishment of the fossil fuel plants. The reactors at Seversk (designated ADE-4, 5), the Russian term for plutonium production reactor will be shut down by 2008, while the reactor at Zheleznogorsk (ADE-2) will be shut down by 2011.

The projected cost of the EWGPP projects at Seversk and Zheleznogorsk is approximately \$1 billion (U.S.\$). Shutting down these reactors represents a significant nonproliferation and nuclear safety achievement to which international funding is critical.

There are two means of international participation in the EWGPP program: Contributions for the construction of the Zheleznogorsk fossil fuel plant. Contributions to projects that fall outside the scope of the U.S.-Russian agreement. In 2005, Congress provided DOE with the authority to receive international funds to apply to the Zheleznogorsk project. Several countries have made vital contributions to the construction at Zheleznogorsk thus far, including the United Kingdom, Canada and the Netherlands. This funding is key to the timely shutdown of the reactor and maintaining the construction schedule and total project cost. Funding will be sought from other countries as part of their G-8 Global Partnership commitments. Countries wishing to contribute will sign a Memorandum of Agreement with DOE/NNSA.

Funding for projects that address issues outside the scope of the Implementing Agreement but related to the shutdown of the reactors, in particular worker retraining, economic diversification and environmental remediation from reactor operation, is essential to reducing the negative impacts of the reactor shutdown. Measures are being taken to ensure that the challenges raised by the shutdown of the reactors be met. For instance, in partnership with EWGPP and Rosatom, Switzerland facilitated an international conference in February 2005 to highlight projects that complement the reactor shutdown process, help protect and remediate the surrounding environment and reduce the impact on the local economies through the creation of new business enterprises and jobs. Eleven countries and two international organizations attended this event. Countries wishing to participate in these activities will need separate bi-lateral agreements with Rosatom.

One of the most important global actors in non-proliferation and disarmament is also the U.N. and its International Atomic Energy Agency (IAEA) and The U.N. Security Council:

The **International Atomic Energy Agency (IAEA)** seeks to promote the peaceful use of nuclear energy and to inhibit its use for military purposes. The media often refer to the IAEA as "the UN's Nuclear Watchdog". While this describes one of the Agency's roles, it is by no means the only one. The IAEA has its headquarters in Vienna, Austria. Two "Regional Safeguards Offices" are located in Toronto, Canada; and Tokyo, Japan. The IAEA has two liaison offices, located in New York, USA; and Geneva, Switzerland. In addition, it has laboratories in Seibersdorf and Vienna, Austria; Monaco; and Trieste, Italy. It was established as an autonomous organization on July 29, 1957. In 1953, U.S. President Dwight D. Eisenhower envisioned the creation of this international body to control and develop the use of atomic energy, in his "*Atoms for Peace*" speech before the UN General Assembly. The organization and its Director General, Mohamed ElBaradei, were jointly awarded the Nobel Peace Prize announced on 7 October 2005. The IAEA is a specialized agency of the United Nations (UN). The IAEA is not under direct control of any UN body, but reports to both the General Assembly and the Security Council; unlike most other specialized agencies, it does not do most of its work with ECOSOC. The IAEA's structure and function is defined by its founding document: the IAEA's Statute (see below). The IAEA has three main bodies: the Board of Governors, the General Conference, and the Secretariat.

The Board of Governors is one of two policy making bodies of the IAEA. The Board consists of 13 members designated by the outgoing Board and 22 members elected by the General Conference. The outgoing Board designates the ten members who are the most advanced in atomic energy technology and the remaining three most advanced members from any of the following areas that are not represented by the first ten: North America, Latin America, Western Europe, Eastern Europe, Africa, Middle East and South Asia, South East Asia, the Pacific, and the Far East. These members are designated for one year terms. The General Conference elects 22 members from the remaining nations to two year terms. Eleven are elected each year. The 22 elected members must also represent a stipulated geographic diversity (Statute). The current Board members are: Albania, Algeria, Argentina, Australia, Austria, Bolivia, Brazil, Canada, Chile, the People's Republic of China, Croatia, Ecuador, Ethiopia, Finland, France, Germany, Ghana, India, Iraq, Ireland, Italy, Japan, Lithuania, Mexico, Morocco, Nigeria, Pakistan, Philippines, Russian Federation, Saudi Arabia, South Africa, Switzerland, Thailand, United Kingdom, United States of America, (IAEA Board of Governors 2007–2008).

The Board, in its five yearly meetings, is responsible for making most of the policy of the IAEA. The Board makes recommendations to the General Conference on IAEA activities and budget, is responsible for publishing IAEA standards and appoints the Director General subject to General Conference approval (IAEA Fundamentals 2005). Board members each receive one vote. Budget matters require a two-thirds majority. All other matters require only a simple majority. The simple majority also has the power to stipulate issues that will thereafter require a two-thirds majority. Two-thirds of all Board members must be present to call a vote (IAEA Board of Governors 1989). The General Conference (GC) is the IAEA's lesser policy making body. The GC is made up of all 144 member states. The GC meets once a year, in September, to approve the actions and budgets passed on from the Board of Governors. The GC also approves the nominee for Director General and requests reports from the Board on issues in question (Statute). Each member receives one vote. Issues of budget, Statute amendment and suspension of a member's privileges require a two-thirds majority and all other issues require a simple majority. Similar to the Board, the GC can, by simple majority, designate issues to require a two-thirds majority. The GC elects a President at each annual in order to facilitate an effective meeting. The President only serves for the duration of the session (Statute). The main function of the GC is to serve as a forum for debate on current issues and policies. Any of the other IAEA organs, the Director General, the Board and member states can table issues to be discussed by the GC (IAEA Fundamentals 2005). This function of the GC is almost identical to the General Assembly of the United Nations. The IAEA budget is two-part. The regular budget funds most activities of the IAEA and is assessed to each member nation (€280 million in 2007). The Technical Cooperation Fund is funded by voluntary contributions with a general target in the \$70 million range. The process of joining the IAEA is fairly simple. A State must notify the Director General of its desire to join. The Director then submits the request to the Board for consideration. If the State is approved by the Board, the GC must then consider the State. When the State receives final approval for membership, it must then submit its signed acceptance of the IAEA's Statute. The State is considered a member when its acceptance letter is deposited; the IAEA's other members are subsequently notified of the new member. The IAEA exists to pursue "safe, secure and peaceful uses of nuclear sciences and technology" (Pillars 2005). The IAEA pursues this mission with three main functions: inspections of existing nuclear facilities to ensure peaceful use, information and standards to ensure the stability of nuclear facilities, and as a hub for the sciences seeking peaceful applications of nuclear technology.

These forces are trying their best to keep terrorists and other countries from acquiring WMD's and judging by the fact that there had not yet been a nuclear holocaust they are doing pretty well. Frankly speaking I think that if terrorist really wanted to use WMD's, they most likely would have already done so. I as a person wouldn't lose sleep over it, and in my philosophical opinion-

even though none of these treaties grant the World 100% safety from Nuclear Devastation, if it is meant to be- it is meant to be. These are very important issues of World Politics, but as time passes and I examine myself and the World I live in I understand that politics creates these problems only to try and solve them. Politics is useless, because at the end of the day it does not grant you peace of mind, a higher moral standpoint or a reason to wake up the next morning. Politics is a machine that grants people jobs, opinions, sides to choose from and reasons to be afraid. I don't consider these things to be priorities in my existence. I don't want to be a politician; I have come to understand that I really want to be a writer. I find the history of this subject boundlessly interesting because of how these weapons affected society and peoples view on life and themselves. I found it extremely interesting learning about the plague and the first nuclear weapons, World War I and the gasses used during it. But when it comes down to determining whether world peace is possible- I say nay, for a very simple reason- Chekhov once said :

“If there is a gun hanging on the wall in the beginning of the play, it will surely fire at its end.”