An Examination of Nuclear Weapons in the 20th Century

By

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Abstract

This paper examines the ways in which the 20th century was dominated by the presence of nuclear weapons, by showcasing the major focal points in a chronological sequence. The examination reveals the ways in which nuclear weapons changed the world and provides us with concrete examples of the tragedy that surrounds their use, the damaging results of experimental tests, and the ways in which it can quickly escalate into war. Recalling these concrete examples is critical when examining current international affairs.

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Contents

Introduction

The period between 1945 and 1991 is labeled the Cold War due to tensions between the two super powers — the United States of America and the Union of Soviet Socialist Republics. These two states developed and possessed nuclear weapons; a weapon so destructive it was unthinkable just a few decades prior to its invention. The time period was fraught with fears of nuclear war between the two superpowers; nuclear fall-out shelters were built, bomb drills were often present in schools, and numerous contingency plans were put in place for this specific scenario.

The two super powers, and their allies, built up nuclear arsenals large enough to destroy the planet. However, when the USSR fell in 1991, the fear of nuclear war began to dissipate. The world attention turned towards the democratization of the former USSR states, the violent disintegration of Yugoslavia, turmoil in the Middle East, and stabilizing the economy after such a dramatic shift. As the world moved into the 21st century the United States was attacked by a radical Islamic terrorist organization in the deadliest attack on US soil in history. Since then terrorism has been the main focal point of concern and unease. The world, at large, turned away from nuclear weapons and towards these new threats.

But despite this shift from Cold War tensions to the upsurge of terrorism, nuclear weapons are still present and their threat is just as real. While only five states possessed nuclear weapons during the Cold War there are now nine states with nuclear weapons — USA, Russia, United Kingdom, France, China, Israel, Pakistan, India, and North Korea. For this reason it is imperative that we look back on the Cold War to show us what did happen and what could have happened. This paper aims to showcase this past so that we can avoid a future nuclear catastrophe.

Chapter 1: Nuclear Weapons and their Origins

Mechanical Basis of Nuclear Weapons

An atom is the basic structure of any element; it is the combination of a central nucleus and orbiting positive-charged particles, called protons, and neutrally charged particles, called neutrons. Negatively charged particles, called electrons, orbit the nucleus. The movement of electrons within an atom are the cause of atoms emitting energy – the electromagnetic spectrum.[1]

The power of a nuclear weapon derives from artificially changing the structure of an atoms nucleus. Nuclear power either splits an atom's nucleus to create two new lighter atoms or it combines two atom's nuclei to form a new heavier atom. The splitting of an atom is called fission; it is rare in nature, however once the mechanism is discovered it takes relatively little energy to induce the process.[2] Fission can cause an atom's neutrons to fly outwards, when this happens a nuclear chain reaction can be achieved, this is necessary for a fission weapon to work.[3] To create the chain reaction a heavy element is required to fling out more neutrons that will continue to split other nuclei; for this reason Uranium, the heaviest natural element, is used as the mechanism for any nuclear chain reactions. The combining of atoms is called fusion; it is abundant in nature, it is mechanism that fuels stars. To reproduce this mechanisms artificially, an incredible amount of energy and heat is required to overcome atoms natural repulsion of each other.[4] The power of a fusion weapon is derived by causing one fusion reaction that will then set off a second fusion reaction.[5]

Foundations for a Weapon

The concept of nuclear fission as a feasible energy source was first proposed by physicist Leo Szilard in 1933.[6] He believed that the energy process being researched could produce an atomic energy chain reaction[7] the atomic energy created would be able to fuel the world's

systems and end the need for coal and oil;[8] the first ideas of nuclear power had a peaceful mindset. In that same year another scientist, Ernest Rutherford, working in the field of nuclear physics declared that in the present moment, they did not have enough knowledge on the subject nor the technology at the time, to use atomic energy. Rutherford was correct; at the time he expressed this sentiment the scientific community did not have the necessary knowledge to use atomic energy.[9]

That knowledge and technology would quickly develop in only 6 years time. Scientists Otto Hahn and Fritz Strassman successfully split the nucleus of the Radium atom, producing a Barium atom in 1938.[10] This discovery lead to rapid research in the field and ultimately resulted in the race to discover the process to divide heavier atoms and create the nuclear chain reaction.

Scientists quickly realized that energy like this could be used for more than just peaceful means. Leo Szilard, a proponent of atomic energy for a power source, proposed scientists' self censorship for fear of giving away information that could result in weapons controlled by Nazi Germany,[11] his proposal was mostly successful within the scientific community. Despite early thoughts of peaceful use it became apparent to scientists that during war time this energy could be developed into a weapon. The research on fission had already be successful now it was a matter of weaponizing it before the enemy did. This starts the story of a weapon that would come to dominate the rest of the 20th Century's world relations.

End Notes Chapter 1

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Chapter 2: World War II

The Race to Make a Nuclear Bomb

In 1939, one year after the first successful split of an atom, Albert Einstein, at the behest of Leo Szilard,[1] wrote a letter to President Franklin D. Roosevelt explaining the concept of a nuclear fission bomb.[2] He urged the President to being work on such a project due to his belief that the Germans were beginning their own research on the matter.[3] After all, the first successful experiment of fission had taken place in Germany. In the same year, Werner Heisenberg had come to the same conclusion about a weapon and offered the idea to a German audience in Berlin. In January of 1940, the United Kingdom became the first country to start research on an actual weapon,[4] not simply fission and nuclear physics alone. Otto Frisch and Rudolph Peierls, now refuges from Germany, became research for this idea under the United Kingdom's (UK) MAUD Committee.[5]

In the United States of America (US), President Roosevelt received the letter from Einstein but was cautious with his response to such an idea,[6] but in October of 1939 he gave his approval to begin Uranium research[7] under the oversight of the Committee on Uranium. Due to this hesitancy, by early 1940 only 6,000 dollars in funds had been approved for the research.[8] The research was underway at the University of Columbia in New York City[9] by Leo Szilard and Enrico Fermi.[10] They worked for the "Metallurgical Laboratory", a fake name to avoid spies.[11] In 1941 in a briefing, Frisch and Peierls described in detail the power that a nuclear bomb could explode. This prompted Winston Churchill and others to speed up the research.[12] To further research the potentiality of a bomb, the scientists first needed to build a nuclear reactor which needed a much larger space that New Your City. The Project was moved to the University of Chicago[13] under a new name, "The Manhattan Project".

The Manhattan Project

The Manhattan Project began when J. Robert Oppenheimer, a professor from University of California, Berkley was designated head of the project's operation. The project was located in three areas: Oak Ridge, Tennessee; Los Almos, New Mexico; and Hanford, Washington.[14] The construction of its research, tests sites, living facilities, and the roads to these locations came under the directive of the US Army Corps of Engineers; the Army was not interested in the idea and kept putting off getting the sites, such as Oak Ridge Tennessee.[15] The project came in full force when Army General Leslie Groves took charge; scientists resisted him as well as the Army as they did not want to be 'put into uniform' as scientists during World War I were forced to do. However, Groves took quick control with the right to order materials and the purchase of the Tennessee property[16] the project became well equip to fully being its research. The Manhattan Project would cost over 2 billion 1943 dollars[17] and attracted large numbers of American and European scientists including Enrico Fermi, Leo Szilard, Otto Frisch, and Rudolph Peierls.[18]

The US first successful nuclear tests happened on July 16, 1945, in the New Mexico Desert near Alamogordo. The bomb named Trinity was dropped from a steel tower and yielded a power equivalent of 21 kilotons of TNT.[19] The scientists stood at a distance of 20 miles to view the test, which professors Paul P. Craig and John A. Jungermant call "lucky," due to it being just outside the range of burns and permanent eye damage; they also explain that once the mushroom cloud formed, the scientists, knowing the effects of the bomb, quickly left to avoid health effects.[20]

The Potsdam Conference

At the end of World War II in the European Theater the so-called "Big Three," leaders of the United States, the United Kingdom, and the Union of Soviet Socialist Republics (USSR), met

at Potsdam, Germany from July 17th, one day after the successful test, to August 2; this became known as the Potsdam Conference. The Allies – by winning the war, had the ability to re-shape Europe's borders. Questions for the conference included: how to handle Germany, German-Soviet-Polish lands and borders, and the deportation of Germans from various areas of Europe. The leaders agree that Germany would be fully de-militarized and cut into four zones of occupation, each controlled by one of the big three present at the conference and the addition of France.[21] Other things were agreed upon such as treaties and setting up councils, this was all done out in the open, diplomatically, with translators. However, the most impactful thing came offhandedly, away from any recorders and without Truman's translator; a private discussion between Truman and Stalin about the nuclear bomb. While the whole conversation can never be known it was overheard in some aspects, Secretary of State James F. Byrnes in his memoirs claims that Truman never used the term "atomic bomb," only that they had a new bomb more destructive than any before.[22]

The only bomb to have been exploded at this point was the Trinity test, so it was understandable for Truman to assume that the Soviets did not know the US had obtained a working bomb. It was naïve to assume that the Soviets new nothing about uranium and plutonium research being undertaken. Stalin had long known about the Manhattan Project, indeed there we multiple spies within the Manhattan project that would give information to the Soviet Union to help build their own bomb later.[23] Stalin simply told Truman that he hoped they would use it and it would be successful, according to recounts. The day following Stalin and Truman's discussion, the US and the UK declared the 'Potsdam Proclamation' against Japan promising utter destruction if they did not surrender. Again, the words 'atomic bomb' were not said.

Professor Michael D. Gordin from Princeton University, in his book "Red Cloud at Dawn," proposes that the beating-around-the-bush style that Truman took, soured the relationship between the US and the USSR giving up the chance for any cooperation between East and West.[24] Cemented by this is the fact that Stalin and Truman never met in person again.[25] Whether or not this is true cannot be proven, but it begs the question as to why Truman withheld information about the bomb so cryptically: to say that it was 'destructive' and there would be 'utter destruction' seems odd if you consider the fact that in only 13 days the entire world would know about the atomic bomb; not in it's entirety due to withholding facts about the bombings, but that it existed and its power was enormous. Perhaps, the information needed to be kept secret so that if the first bomb did not work they could release a second one, as they did with Nagasaki. No great power of World War II was unfamiliar with the concept of nuclear fission, they had all researched it to some extent,[26] so if Truman had announced that the "destruction" would be coming from a nuclear weapon, Japan may have taken it more seriously and possibly avoided the two horrors that would take place.

The Only Time

The bombings of Hiroshima and Nagasaki have been the only two instances in history where nuclear weapons were used in warfare. Hiroshima was bombed on August 6th, 1945 by a bomb named "Little Boy," that produced a yield of 13 kilotons[27] killing 80,000 according to most sources[28] but upwards to 140,000 in other sources, the level destruction is too extensive to ever have a clear picture.[29] Truman broke the news to the world after the successful mission and warned the Japanese that if they did not surrender they would detonate a second bomb.[30] According to Stalin's daughter, he went silent hearing the news, quietly withdrew to his, "champers, at which point he became ill."[31] On August 9, 1945, the Soviet Union told Japan that

their nations would be at war. Some have criticized this move as a chance to gain a seat at the table for when the war in the Pacific theater was over; the Soviet Union claimed it was following through on their promise to enter the Pacific theater 3 months after Germany's surrender.[32] After the bombing Japan's cabinet was split 3-3 on surrender[33] and did not. After 3 days of waiting, on August 9, 1945, the US dropped the bomb "Fat Man" on the Nagasaki, it yielded 22 kilotons and killed between 40,000 and 70,000.[34] On August 14, 1945, Japan had accepted all terms of the surrender.

The Reality of the Bomb

The question then posited is: was dropping the bomb just? The traditional argument is that a land invasion would have killed more Japanese and Americans and only prolonged the war; the idea was firmly planted in the evidence of the loss of life seen at the invasion of Okinawa. Still, directly following the bombs and the revelations of its horror the United States press slammed the US for the use of such a horrifying weapon and decried the fate of humanity due to its existence.[35] Here is a portion of chart taken from "Scientists and the Development of Nuclear Weapons," by Lawrence Badash, to show the destruction of nuclear weapons. As mentioned before all estimates for death vary.

	Hiroshima Nuclear Bomb	Nagasaki Nuclear Bomb	Tokyo- 1,667 tons of incendiary bombs dropped between May 9-10 , 1945
Population at the time	250,000	195,000	?
Dead	70-80,000	35-40,000	<100,000
Wounded	70-80,000	35-40,000	<80,000
Area Destroyed in Square Miles	4.4	1.8	15.8

The death toll for Tokyo took two days, the death tolls for Hiroshima and Nagasaki took only a few minutes. The damage of Tokyo was ruins, the damage of Hiroshima and Nagasaki

was near flattening of all existing infrastructure and landscape in minutes. The injuries at Hiroshima and Nagasaki were novel and there was little information on how to treat them.

Other cities were bombed in similar fashion to Tokyo but Hiroshima had not been. Yuki Takaka, a historian Hiroshima Peace Institute is recorded in the documentary, "Rouen to Hiroshima: The Battle of the Skies," explaining this peculiarity:[36]

> It's estimated that 80,000 people perished in a single instant and at the end of 1945 the number of victims rose to over 140,000. While a 100 or so Japanese cities had suffered bombardments since the month of January 1945, Hiroshima had been completely left out, ignored. So there had been a will to experiment. They'd been careful to reserve the city so as to be able to measure as precisely as possible the destructive power of the atomic bomb.

Scientists had indeed chosen Hiroshima, as well as Niigata, and Kyoto as prime targets due to their industrial centers and the lack of previous US bombing.[37] The bomb, according to US secret deliberations, was meant to be a psychological weapon, not just a physical one.[38] Looking at the three locations proposed by the military and scientists, Kyoto stands out as the most devastating target of all in terms of psychology. Kyoto was Japans capital for over 1000 years, with much of its historical buildings and sites left unchanged, and contained innumerable cultural artifacts.[39] Secretary of War Henry L. Stimson took this into consideration and crossed it off the list. Thus, this action can be viewed as an understanding of the bombs destructive power, and the need to use it carefully. It shows that the United States understood what this bomb was going to do. The questions then remains: if they knew its power should they have stilled used it at all?

Aria Shunichiro is a Hiroshima atomic bomb survivor, explains what he saw, at the age of 12, when he walked closer to the city center after the bomb had dropped:[40]

> Their skin was bright red because they had all been burnt. They had their hands stretched out in front of them. […] thousands of them fleeing the city center and we, young school boys, found ourselves in the middle of these hoards of people […] I was confused

> shocked terrified, it was their own skin that was pealing off and hanging down to the ground, they were holding it delicately in their hands because it must have been extremely painful […] they were coming from all sides and we were surrounded they advanced very slowly then dropped down to the ground, dead. One after the other. […] it was covered in crowds of [dead] bodies

On the other side, Paul Warfield Tibbets IV, grandson of Paul Warfield Tibbets Jr. the pilot who dropped Little Boy on Hiroshima, recalls the words of his grandfather:[41]

> As my grandfather started to get older and we started to talk about his career he said Paul don't miss this: 'I never lost a night of sleep after that mission. We did the best job we could, to carry out the orders that the president of the United States gave us. Which we were convinced would lead to brining the war to an end as quickly as possible

Thousands of Americans had died during the war and the President, Commander and Chief, had the means to end it. By doing so, he was saving many American lives; that was the US goal in World War II, to the end the war to protect their own. What Paul Tibbets Jr. believed was his reason to faithfully follow through with his orders, and it worked.

If it worked, than to many that is enough justification for a first time use. However, Yuki Takaka makes the argument that Truman's claim that the bombed saved millions of lives by ending the war quicker was a myth. It was a myth said over and over until it was believed; the US needed this myth because they developed the bomb as a deterrent weapon and strategic tool. They needed to justify its use, if the US recognized its use was a war crime they would not be able to keep it. They would not risk losing a weapon that deterred active aggression by the Soviet Union.[42]

We can never know which idea was true, was Hiroshima a test, was a way to end the war quicker, or was the justification created after the war. However, the US did do one more action that can be seen as a crime against the Japanese people. The US occupied Japan from 1945-1952. During that time the US army heavily censored the Japanese media, if did not allow any information regarding the atomic bombings to be published and those who did speak out were

jailed. Due to the censorship of information, the people had no understanding of the effects of radiation. As symptoms developed, people believed survivors were contagious and so separated themselves.[43] For this reason, the survivors were called "Hibakusha," literally bomb-effected people; they were discriminated against and forgotten. It was not until after the occupation of Japan ended that any medical funding was approved and even to this day they still face discrimination and misunderstanding.[44]

The American Monopoly

After the end of the war, it was apparent to everyone that the US had achieved a weapon of unprecedented destruction. What was more important was the revelation that the US was willing to use it, on any target. Whether or not the nuclear program was meant to create a deterrent weapon or not, it did. It created one of the greatest deterrent weapons in history.[45]

While the Soviet Union was increasing money spent on their military, while the US was diminishing the number of its military personnel. The atomic bomb was expensive: the Manhattan Project had already taken 2 billion dollars, but trying to match the Soviet Union's standing conventional army would have been more expensive.[46] After World War II the US had the following advantages: 2/3rds of the worlds gold reserves, 3/4ths of all invested capital, ½ the worlds manufacturing ability, produced 1/3 of the worlds goods, and the gross national product was three times larger than the Soviet Union.[47] Despite downsizing the military, the US was the world's economic power and had the means to create more weapons. The US considered communism a continually threat but having a nuclear weapons "monopoly" gave the United States not only security but seeming control over world happenings. This security dis just 4 years later, when the Soviet Union attained its own nuclear bomb.

End Notes Chapter 2

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Chapter 3: The Arms Race

Overview

The Arms Race is a period during the Cold War in which the United States of America (US), the United Soviet Socialist Republic (USSR), and their respective allies rapidly produced nuclear weapons and nuclear technology in an effort to remain superior to the other powers. The Arms Race period starts in 1945, the year the United States dropped two nuclear bombs on Japan. The race slowed down in 1963 when the "Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space, and Underwater" (abbreviated as 'Partial Test Ban Treaty' or PTBT) was signed by the United Kingdom (UK), the US, and the USSR[1]. It did not end testing of nuclear weapons underground. However, it was the first treaty written with the intent to purposefully end the arms race; as stated in the treaty: "Proclaiming as their principle aim […] put an end to the armaments race and eliminate the incentive to production and testing of all kinds of weapons, including nuclear weapons."[2] A more impactful end comes in 1970 when the "Treaty on the Non-Proliferation of Nuclear Weapons," (NPT) comes into effect.[3]

Going Nuclear

Key developments of the arms race include when each nuclear power had their first successful bomb test, also know as "going nuclear." The nations that were nuclear powers at the end of the Arms Race were: The US, the USSR, the UK, France, and China.[4]

The American monopoly over nuclear weapons was broken when the USSR went nuclear with its first successful bomb test on August 29, 1949. Named RDS-1, codenamed Joe 1 by the US, it was dropped on Semipalatinsk Test Site (Semipalatinsk-1) in modern day Kazakhstan, with a yield of 20 kilotons.[5] The US had created a department named Office of Atomic Energy-1 (AFOAT-1) within the Air Force. The department was charged with running the US' Atomic Energy Detection System, a system designed to maintain surveillance of any

nuclear weapon related activity.[6] This system detected the USSR's first atomic bomb,[7] a US specially equipped air craft picked up radioactive particles that, after analysis, proved to be fission fragments.[8]

The results went to the National Security Council (NSC) and where given to the President Truman and the director of the Central Intelligence Agency (CIA) on September 9th.[9] However, AFOAT-1 was kept on an extreme need-to-know basis[10] this caused miscommunications within different levels of bureaucracy; the rest of the CIA did not hear of the discovery and sent a message to Truman on September 20th, declaring that the USSR would not be able to go nuclear until the mid 1950s.[11] During this stretch of time Truman and other high level officials who knew about AFOAT-1's discovery where questioning whether or not to go public with the information.[12] The CIA report proved the varying levels of secrecy surrounding the discussion of nuclear weapons and had to be weighed into the decision of releasing the information or not. On September 23rd Truman shared the information with his cabinet and took a poll on whether to announce the findings; all but two cabinet members were in favor of release.[13] Directly following the cabinet meeting the news was delivered via a written memo to White House press correspondents; the same day the UK also announced the USSR's successful test of a nuclear weapon. The USSR did not conduct another nuclear test until September 24, 1951 in the same location with a yield of 30 kilotons.[14]

The UK went nuclear with its successful detonation of an atomic device, codenamed Operation Hurricane, in Monte Bellow Islands in Oceania, on October 3, 1952,[15] with a yield of 25 kilotons.[16] However, the UK did not develop its first fully usable nuclear weapon until November 1953, labeled Blue Danube, and did not have a fully operational deliver squadron until 1956.[17] France joined the nuclear powers on February 13, 1960 with a successful test of a

nuclear aerial bomb, named Gerboise Bleue at Reggane, Algeria.[18] The bomb yielded 70 kilotons,[19] the largest yield of a first atomic test, surpassing US's first atomic bomb Trinity's 20 kilotons yield.

China's nuclear testing had a large entanglement with its foreign relations with the USSR. In 1961, the US Department of the Air Force forecast that China would become a nuclear power within 10 years; however, without USSR support, China would be unable to reach nuclear capability within that time frame. It also warned that in the meantime the USSR would supply China with nuclear weapons, those weapons would remain under the control of the USSR but the US would still have to face a monolith of "Sino-Soviet bloc" nuclear weapons.[20] In 1960 the USSR's support of China's nuclear development program abruptly broke off. However, contrary to the US Air Force's initial assessment China was still able to successfully go nuclear with its first successful test, named 596, on October 16, 1964 at Lop Nur, Xinjian.[21] After the successful test Chinese officials recognize that the program would not have been successful without prior USSR help, despite the cutting of ties, in 1960.[22]

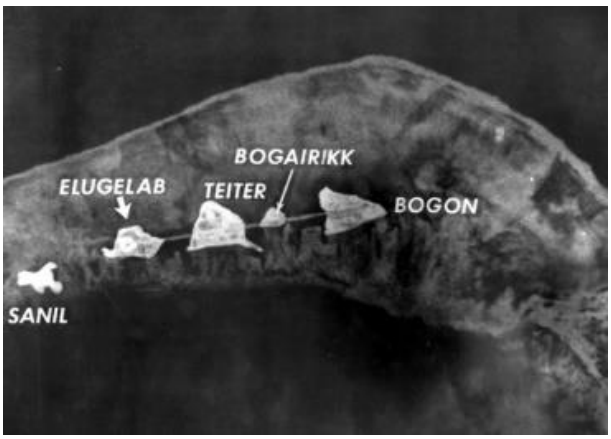
The Hydrogen Bomb

The bombs used on Hiroshima and Nagasaki, as well as all the initial tests conducted by the nuclear states were all atomic bombs (A-bombs) the mechanism that used fission energy and a chain reaction. Atomic bombs generally yield between than 100 kilotons, with the exception of the US' Ivy King, the largest fission type bomb every exploded with a yield of 500 kilotons.[23]

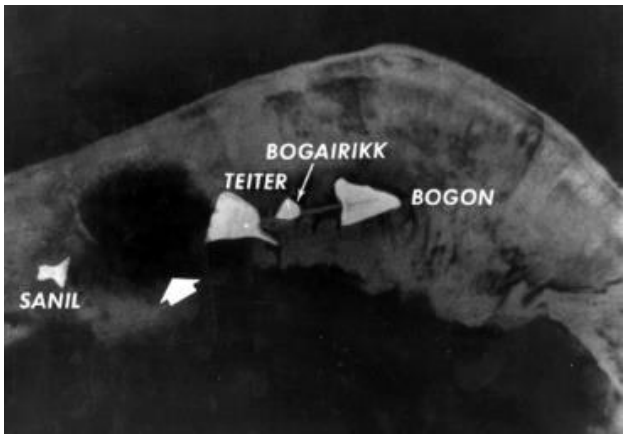
The next wave of testing weapons was the introduction of the hydrogen bomb (H-bombs) its mechanism of action is a fusion reaction which had the capability to produce significantly higher yields once the mechanism was discovered.[24] Thus, testing and producing the H-bomb was the next frontier of the arms race. The US and USSR far outpaced other nuclear states in the

Arms Race when in comes to the H-bomb. The British tested their first atomic device in October of 1952 while in November of 1952 the US detonated its first H-bomb.[25]

Ivy Mike was the first successful test of any hydrogen based bomb, denoted on November 1, 1952.[26] Scientists feared that the bomb could cause a submarine landslide and tsunami; thus, the test was conducted by remote control. Ivy Mike was detonated on surface level at Elugelab Island located in the Pacific Ocean's Enewetak Atoll. The first true H-bomb yielded 10.4 megatons, produced a mushroom cloud up 100,000 feet high, and left a crater 1 mile in diameter and 200 feet in depth.[27] The island of Elugelab no longer existed after the explosion, showing the immense destruction that new H-bombs had the potential to cause.



Before test of H-bomb Ivy Mike at Elugelab Island *Source: Brookings Institution*



After the test with Eluglab destroyed *Source: Brookings Institution*

The largest detonation of an A-bomb yielded 500 kilotons, in comparison to the first H-bomb's 10.4 megaton yield, it was clear that to keep up in the arms race the nuclear powers would need to quickly build up H-bomb stockpiles rather than the earlier A-bombs.

The USSR's first test of the H-bomb was labeled RDS-6, their fourth nuclear weapon tested[28], codenamed Joe 4 by the US. It was tested on August 12, 1953 at Semipalatinsky-1; it

was the first successful test of an H-bomb detonated in the air [29] and yielded 400 kilotons.[30] The first "true" H- bomb test, the same mechanism of action employed by the US', a 2-stage fusion, exploded by the USSR was on November 22nd, 1955 and yielded 1.5 megatons.[31] All 5 nuclear powers held an H-bomb weapon by the end of the 1960s.

Country	First Atomic Test [32]	First Hydrogen Bomb Test [33]
United States	1945	1952
Russia	1949	1953
United Kingdom	1952	1957
France	1960	1968
China	1964	1967

Magnitude of the Race

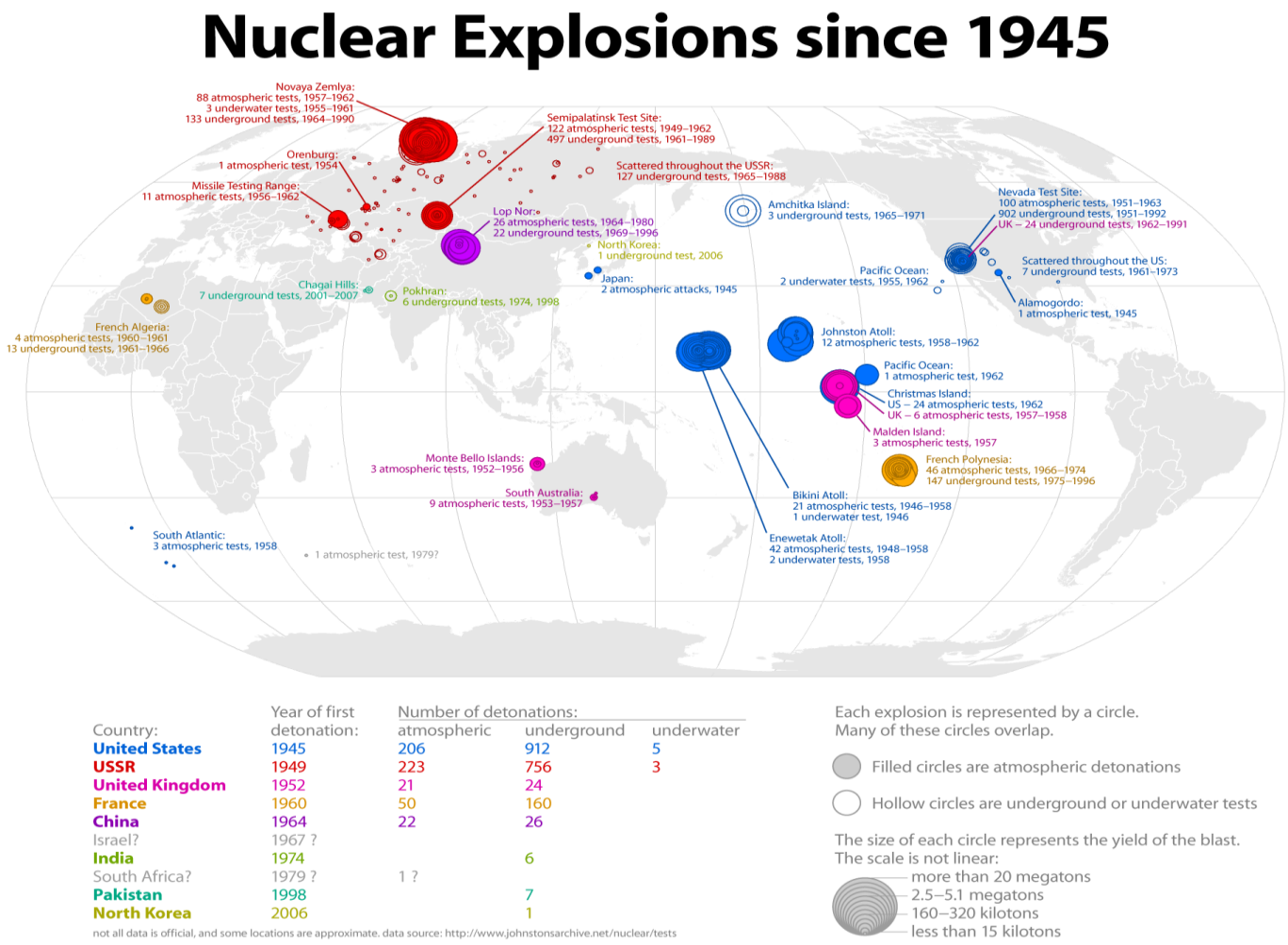
By 1953 the United States had 832 nuclear weapons; by 1955 the US had 2,280 weapons, yet only air bombers to deliver them;[34] the same method used to bomb Hiroshima, the flight had taken 6 hours and 30 minutes to make it from the Marianna Islands to the Japanese mainland.[35] During the time the USSR was conducting Intercontinental Ballistic Missile (ICBM) Tests, the missiles would have the capability to deliver a nuclear weapon onto the US mainland within 30 minutes.[36] In 1957 they successfully tested a small ICBM, then only 2 months later launched their first space satellite, giving the US a reason to fear their IBCM program as more advanced than it actually was, later called the "missile gap." The IBCMs being tested by the USSR did not fully have the capability to deliver the bombs at that time.[37]

The USSR tested the limits of nuclear weapons by attempting to make a 100 megaton weapon; a 50/50 combo of fission and fusion technology with 3 stages.[38] The bomb was labeled RDS-220, known as the "Tsar Bomba" and various other names. The production of the bomb was hasty and it weighed 27 tons and was 2 meters wide and 8 meters long; the plane designed to carry it, TU-16 badger, had to be outfitted.[39] The bomb was carried and released via parachute, to

give the piolet time to escape the main blast zone.[40] It had a yield of 50 megatons,[41] the cloud reached up 45 miles high reaching earth's mesosphere[42] despite being detonated in the air it set off earthquake seismic detectors across the entire world.[43] If such a bomb were detonated, it would have up to a 15 mile radius of complete devastation with another 10 miles of severe damage.[44] At the test site, window panes were partially broken 550 miles out. In comparison, the blast zone of Hiroshima's bomb was 1.4 mile radius of total devastation, three miles of severe damage, and windows broken out to 12 miles.[45] With the weight of the bomb, its size, the need to outfit the plane itself, it was unlikely to be an effective weapon, only one such bomb was ever made and ever exploded.

Despite that possibly comforting fact, the USSR proved that with technology a blast of 50 megatons was possible. The PTBT treaty to stop all atmospheric, oceanic, and spaces tests when into effect in 1963, despite an effort to end the testing of nuclear weapons it simply lead to 700 underground tests by the US and 500 underground tests from the USSR to happen out of the public eye for 20 years.[46]

By the end of the Cold War the USSR had tested 715 bombs with a combined yield of 452 megatons; the US had detonated 1,089 nuclear bombs with a combined yield of 141 megatons. The other 3 nuclear states paled in comparison the UK exploded 42, France 182, and China 35.[47] Below is a map of all the nuclear detonations from 1945-2007.[48]



The Human Effects

All of the events shown on the map above did not happen in a vacuum: the nuclear tests affected out environment, ecosystem, and tragically many lives. Illustrated prior, was the island of Elugelab being wiped off the map. Eluglab was part of the Marshall Islands, the US used these islands for 67 nuclear tests.[49] The Marshall Islands were not uninhabited places the US chose to use, they were home to the Marshallese people. This group of people came from Southeast Asia around 2000 years ago, they believe their land belongs to everyone via their clan, called *bwj*.[50]

Yet, the US simply moved them out of the way; one example is the expulsion of the Marshallese people from Bikini Atoll to Rongerik Atoll.[51] The US did so without much thought, as Tomaki Juda, a child at the time, explains in an interview:[52]

> We spent two years there.
> Rongerik was like a desert: there were no coconut drinks; the fish around its waters were contaminated; etc…And the people on Rongerik were starving to death. One time, one of our grandmothers died of hunger. Sometime later, however, a man [a researcher] came from the University of Hawaii. He [and his team] came and ran some experiments and tests, then called Kwajalein defense authorities to send medications and food as soon as possible to Rongerik Atoll. After some time, another group decision was reached to move us from Rongerik Atoll to Kwajalein

The people were then moved to Kwajalein to Kili Island, another poor decision, he continues to tell his story:[53]

> So Kili is a place where it is quite difficult to…[live]. The residents suffered hunger again. I was the mayor during the famine. I […] decided later to run for the mayoral seat to see if I could do something to ease the hunger—I started with the High Commissioner for the US Territory through the United Nations-Justice of Council and asked for provisionary help […] So they responded and brought C-rations […]The C-rations helped ease the hunger at that time of famine. However, there wasn't enough financial assistance […] The Americans did not give money to the people of Bikini, [not even] pocket money that could enable them to buy them food from the stores. They had to live only on C-rations.

Still more injustice came when the US detonated a 15 megaton bomb on Bikini and unpredicted winds sent lethal doses of radioactive fall out to Rongelap Atoll, inducing an emergency evacuation of the natives. During the same incident, a Japanese fishing boat was near the waters and crew members later became sick, one died, and the fish caught were all contaminated.[54]

The Soviet Union also conducted tests with only bare minimum consideration of people's livelihoods. In fact, the USSR's disregard was worse in some cases, as the USSR often disregarded health concerns within its industries, but the accelerated need during the Arms Race

made it worse for those in the nuclear industry.[55] The main testing site for USSR nuclear tests was Semipalainski-1, named for the town that laid 100 miles from the testing site, and is apart of modern day Kazakhstan; it was where Joe-1 was detonated.[56] In total, 456 tests were detonated at this site. During this time around 500,000 people were exposed to radiation, and around 10,000 of them experienced symptoms such as: hair loss, miscarriage, cancer, infant mortality, cancer, skin disorders, depressions, and suicide.[57] Information about health effects was no distributed, the cause of the heath issues being related to radiation was denied, and there were no serious investigations until 1989.[58]

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Chapter 4: The Cuban Missile Crisis

Background and the USSR's Decision

John F. Kennedy in his presidential race stressed the "missile gap," The idea that the USSR was advancing far more capable missiles than the US; this turned out to be false. Nikita Khrushchev, leader of the USSR between 1953-1964, knew that this missile gap idea was exactly the opposite: the USSR lagged far behind in creating ICBMs.[1] The US had missiles located throughout NATO nations[2] and Khrushchev questioned, in private, why should the US be allowed to put weapons in locations that could reach USSR homeland, but not the other way around.[3] This idea set an ideological foundation for the beginnings of the Cuban Missile Crisis

The ties between the USSR and Cuba, led by Fidel Castro, were tightknit, while the tensions between the US and Cuba where immense. During the early 1960s the US was running a full scale campaign against Cuba: in 1961 the US had been defeated at the Bay of Pigs, an invasion planed by the US, using US-trained, Cuban anti-revolutionaries in an attempt to overtake the country;[4] later that year Operation Mongoose was designed to undermine the Castro regime; USSR and Cuban officials discovered that the US sent Miami-based deployments of reconnaissance and sabotage teams into Cuba; the US placed sanctions on Cuba's economy and a full embargo on trade with Cuba; the US managed to convince 15 other Latin American nations to break diplomatic relations with Cuba.[5] Understandably the USSR and Cuba feared an eventual, full-scale invasion by the US.

The concept of placing weapons in reach of the US to break the double-standard and the fear of tensions between the US and Cuban escalating, in junction lead to the USSR's decision to deploy forces to Cuban soil.[6] In secrecy, the USSR sent IRBMs, MRBMS, tactical nuclear weapons, fighter air craft, navy ships, light bombers, cruise missiles, and Soviet military troops.[7] The sheer size of the force being sent to Cuban shows that it was most likely a set up of a lasting

strategic point against the US, with the US hostility towards Cuba making it the perfect location. The USSR's Ministry of Defense approved formal orders to deploy its forces to Cuba on June 10, 1962.[8]

The 13 Day Crisis

On October 14 a US Aircraft flying over Cuba identified the missile sites.[9] This news was relayed to President Kennedy on October 16, the start of the so called "13 Days;" an ad-hoc group formed quickly to discuss the unfolding events. The group would later come to be known as the Executive Committee of the National Security Council (Excomm). All members agreed that the US could not remain idle in this situation, but they disagreed on which route the US should take in its response — a military response or a diplomatic response.[10] On October 17,after two Excomm meetings, a draft was written that presented the conclusions of the meetings and included the possible courses of action:[11]

> Track A– Political Action, pressure and warning, followed by a military strike if satisfaction is no received
> Track B– A military strike without prior warning pressure or action, accompanied by messages making clear the limited nature of this action
> Track C– Political Action, pressure and warning, followed by a total naval blockade, under the authority of the Rio Pact and either Congressional Declaration of War on Cuba or the Cuban Resolution of the 87th Congress
> Track D– Full-scale invasion, to "take Cuba away from Castro".

On October 18 Kennedy and Andrei Gromyko, the USSR's Foreign Affairs Minister met; he assured Kennedy that the forces in Cuba were meant solely for Cuba's defense. He also mentioned that this defense is necessary due to the US "pestering" a small country. Kennedy does not disclose that the US knows about the missiles themselves and instead reads part of an earlier statement, made on September 4, waring the USSR against sending any offensive weapons to Cuba, and the discussion on the situation ends there. During that day the Excomm

deliberations continue and the course of action agreed upon is a blockade of Cuba; multiple small governmental groups are established to work on multiple facets the blockade would entail.[12]

A blockade is considered an act of war by multiple treaties and court cases. A blockade therefore is subject to the laws of warfare; an unannounced blockade is unlawful. With the serious implications of war a decision was reached on October 20 to go through with the plan[13] for a "quarantine" of Cuba, allowing the US to avoid an act of war and also to receive support from International Organizations.[14] The secrecy surrounding the situation was slipping and the media caught the story. On October 21 the President made personal phone calls to journalists at the *New York Times*, *Washington Post*, and, via a 3rd party, the *New York Herald Tribune.* All three media outlets agreed to hold the story.[15]

The following day, October 22, President Kennedy addressed the Nation and American diplomats serving abroad alerted foreign ministers and heads of states about of the situation.[16] The speech used strong accusations against the USSR, to show to the world that the US would not back down:[17]

> By the presence of these, large, and long range, and clearly offensive weapons of sudden mass destruction constitutes an explicit threat to the peace and security of all the Americas in flagrant and deliberate defiance of the Rio Pact of 1947, the traditions of this nation and hemisphere, the joint resolution of the 87th congress, the charter of the United Nations, and my own public warnings to the Soviets on September 4th and 13th , this action also contradicts the repeated reassurances of Soviet spokesmen both publicly and privately delivered, that the arms build up in Cuba would retain its original defense character.

During the period of the quarantine one Soviet ship did not divert its path and continued on to Cuba, directly defying the US quarantine. The US military rapidly increased its readiness level for war (see DEFCON below). The resolution to the crisis involved a series of private letters back and forth between Kennedy and Khrushchev. Khrushchev knew the situation was

rapidly deteriorating, and it was not in his favor; through secret negotiations Khrushchev agreed to remove all forces from Cuba if the US removed any and all US missiles located in Turkey.[18] On October 28 Khrushchev publically announced, on Radio Moscow, that he was removing all missiles from Cuba, ending the 13 day crisis.[19]

The Brink of War (DEFCON)

The US military is always under one of five Defense Readiness Condition States (DEFCON), a system that states the level of alertness that the military must be set at in relation to current and unfolding events.[20] DEFCON 5 is the readiness of the military at all times, essential "normal". DEFCON 1 is maximum readiness and would be declared when a nuclear war is considered imminent. During the Cold War different parts of the military were set at different levels, the Strategic Air Command (SAC) was usually set at DEFCON 4.[21]

However, DEFCON becomes alarming when the change is sudden, involves large sections of the military, and is world wide. Worldwide changes in US military DEFCON have happened at only 4 times.[22] The first event being more of an 'accident' in which Secretary of Defense Thomas Gates wanted to low-key test the new system in response to a minor intelligence report. The order went to DEFCON 3 and was instituted worldwide within a day catching the attention of the media, it was quickly reverted back to DEFCON 5.

The first true and meaningful instance of using the DEFCON system was during the Cuban Missile Crisis, on October 24, two days after Kennedy addresses the nation the Strategic Air Command was placed on DEFCON 2, one step below imminent nuclear warfare and all other forces were ordered to DEFCON 3.[23] While the name wasn't known the preparation of military action was clear, Soviet Intelligence alerted Khrushchev on October 26 that a US Air Strike on Cuba could be imminent. On October 27 Fidel Castro sent a personal message to Khrushchev

stating he believed a US invasion of Cuba could happen within 24-72 hours.[24] The sheer military confrontation was immense, and the US did not act light handedly. The severity of the other three world wide DEFCONs increases prove this point: the Gulf War, the Yom Kippur War, and the September 11, 2001 attacks.[25] Knowing this, in combination with proposed Tracks C and D of the Excomm course of actions, proves how closely the Cold War super powers came to full nuclear war.

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Chapter 5: Arms Limitations

The Necessity

The goal of restricting nuclear weapons had arose in 1946 with the "Baruch Plan" proposed at the United Nation (UN), it was not amicable to either super power and failed to be implemented. The failure left the idea of full-scale successful arms control out of view for nearly a decade.[1] However, non-official discussions between the US, UK, and USSR, to specifically ban the testing of nuclear weapons began in the early 1950s. Despite this, the issue was not addressed in any formal agreement until 1963 and a full-scale ban was not reached until 1996.[2]

Nuclear weapons are a deterrent weapon, they are not meant for battles, but instead to end wars in their entirety. No state would be willing to give up such powerful weapons; nor would any state want to waiver in their conviction to use them, if necessary.[3]

As shown in Chapter 2, the Arms Race had produced more weapons than could ever be needed, while in the process devastating entire ecosystems, damaging the environment, destroying peoples livelihoods, and causing serious illnesses to those living near testing sites, and not admitting that the testing had caused the illnesses.

It became increasingly clear that unlimited testing would become harmful; negotiations had to be agreed upon by the nuclear powers. No state would act alone during the stalemate of the Cold War as it would mean wavering in strategic defenses; no agreement, meant no change, at least between the US and USSR.

Aside from nuclear weapons testing, by the 1960s nuclear delivery system technology was advancing rapidly. Both the US and USSR were testing Intercontinental Ballistic Missiles (ICBMs) , with the US having the 10 "Atlas missiles" and the USSR having around half that,[4] of particular concern for the USSR, the US had intermediate range missiles (IRBMs) located in Norther Atlantic Treaty Organization (NATO) countries throughout Europe that could

effectively reach the USSR's territory at any time. The development of operational Submarine Launched Ballistic Missiles (SLBM) was also in full swing.[5] Testing bans would not be enough, restrictions on non-peaceful nuclear technology developments, the end to the proliferation of nuclear weapons, a structured framework, and official oversight of nuclear arms control were all necessary to prevent the possible disaster of a nuclear war.

Limiting and Banning Testing

The beginning of nuclear testing bans began with the USSR's 1958 decision to halt nuclear testing, so long as the other nuclear powers did as well; the moratorium was met with great hesitancy from both the US and UK.[6] Due to public outcry over pollution a convention of scientific experts from eight nations gathered at Geneva to discuss on-site testing. With the idea of inspection looming over their heads and the disagreements over what type of testing to stop, the USSR and US both rapidly conducted large scale nuclear tests and then agreed to halt further testing for an indefinite time,[7] thus also halting the threats of inspection. At this time, during the President Eisenhower administration, the fear of a so called "missile gap" emerged. It was thought that the USSR's missiles were much more advanced and much more numerous than those of the US. John F Kennedy used this idea on his campaign trail, blaming President Eisenhower for creating the missile gap due to the 1958 moratorium.[8] The missile gap idea was factually wrong,[9] the USSR was focused on IRBMs and middle-range ballistic missiles (MRBMs),[10] rather than ICBMs. However, despite the fact that the ICBM missile gap idea was false, the IRBMs and MRBMs could reach the US State of Alaska via the eastern most part of the USSR's territory, and the contiguous 48 states via Cuba, giving rise to the 1962 Cuban Missile Crisis discussed in the previous chapter.

Described in Chapter 2, the Partial Test Ban Treaty (PTBT) of 1963 was the first international negotiation with the aim to "put an end to the armaments race."[11] It banned all testing in the ocean, in the air, and in space.[12] Its origin lay in the Cuban Missile Crisis, the shock factor of the situation made the two sides quickly turn back to diplomatic avenues. With the help of the UK, the US and USSR agreed to the PTBT;[13] however, the other two nuclear powers of the time, France and China, did not sign onto the treaty.[14]

The next attempt to further restrict the testing of nuclear weapons came with the "Treaty on the Limitation of Underground Nuclear Weapon Tests," (also known as Threshold Test Ban Treaty and TTBT) in 1974 between the US and the USSR. The treaty directly refers back to the PTBT in its opening, it states that the previous treaty was an attempt "to achieve the discontinuance of all test explosions of nuclear weapons of all time, and to continue negotiations…" it further claims that signing the TTBT, "would contribute to the achievements of these objectives.[15] Its main point was to limit the size of underground test explosions to 150 kilotons. Within Article 1, it also states that the two powers will continue negotiations on underground testing.

Despite these early efforts, a comprehensive ban on all nuclear weapons testing would not be signed until 1996, after the Cold War had ended.

Non-proliferation of Nuclear Weapons and Technology

Attempts to ban the proliferation of new nuclear weapons also appeared very early on. Talks of limiting nuclear technology to solely peaceful use began in 1946, 3 years before the USSR had successfully detonated its first bomb. The negotiations hoped to create a system in which nuclear technology could be used by all states for peaceful means, with safeguards to protect against weaponry; the program failed and disbanded in 1949.[16]

The next push to end the proliferation came in November 1953 when the United Nations General Assembly proposed that the Disarmament Commission establish a sub-commission for which the nuclear powers could meet to discuss the goal of non-proliferation.[17] Following this proposal President Eisenhower gave a speech before United Nations in December of 1953, now famously called the "Atoms for Peace" speech. In his speech, he begins by stressing the disasters of a nuclear war. He explains that the technology to develop nuclear weapons is no longer truly a secret to the powerful nations of the world, which could lead to dangerous consequences. He also claims the US will never demand that the USSR give up what is rightfully theirs; rather, he stated the US' aim in the discussion over non-proliferation was to building bridges between the two states, not further the divide.

Eisenhower's desire for the end of nuclear weapons is shown emphatically in his final words to the UN:[18]

> To the making of these fateful decisions, the United States pledges before you, and therefore before the world, its determination to help solve the fearful atomic dilemma--to devote its entire heart and mind to finding the way by which the miraculous inventiveness of man shall not be dedicated to his death, but consecrated to his life.

His proposal led to the creation of the International Atomic Energy Agency (IAEA) to both promote and control nuclear technology.[19] Though this and the frame work of the UN non-proliferation was negotiated starting in 1957 and went through the 1960s, culminating in the Nuclear Non-Proliferation Treaty (NPT).

The NPT opened in 1968 for signatures and went into effect in 1970. A totally of 93 states signed the NPT between 1968-1970; all states wishing to join after signatures closed could accede to the treaty; 98 States have done so, including the contested state of Palestine.[20] In 2003 the Peoples Republic of Korean (North Korea) withdrew from the treaty, the only state to have done so.[21] The treaty contains 11 articles. A summary of the treaty is as follows: no nuclear state

will help, in any way, any non-nuclear state obtain nuclear weapons; no non-nuclear state will make an effort to obtain nuclear weapons; all non-nuclear states accept the safe-guards set forth by the IAEA when conducting nuclear power for peaceful purposes; no part of the treaty will prohibit the research of nuclear power for peaceful purposes; each nuclear state may assist all other states with the exchange of materials and technology for peaceful means under international oversight and guidelines; the treaty will undergo review every five years; after 25 years the treaty will be reviewed to see if it should continue to be enforced.[22]

Strategic Arms Limitations Talks

The Strategic Arms Limitations Talks were two formal discussions between the US and USSR; SALT I took place from 1969-1972, while SALT II took place from 1972-1979.

SALT I took place with the backdrop of the Vietnam War, the remaining tension over the Sino-Soviet split, the cooling of tensions between East Germany and West Germany, known as the Ostpolitik, and the Arab-Israeli conflict. The talks of SALT I focused on defining under what parameters agreements could be made in, discarding non-essential details and finally compromising to some degree to obtain successful results.[23]

The US and USSR's greatest disagreements concerned delivery systems and missiles; this discussion was crucial following the uncertainty of the Cuban Missile Crisis. The USSR wanted to include all US weapon delivery systems including: long-range bombers, tactical bombers, any nuclear-armed aircraft located in Europe, and nuclear-armed ships in all waters adjacent to Soviet soil. These latter provisions were unacceptable to the US and had to be dropped if any formal agreement wanted to be achieved. The largest issue were ballistic missiles (see chart), the differing types of missile capabilities, and their locations. As the talks reached their last session the US and USSR agreed on the "Limitation on Anti-Ballistic Missile systems,"

or the AMB Treaty. The treaty allows for a certain number of missiles, in only certain areas, with specific ranges;[24] in effect, it was a preventive measure to prevent a full-scale missile arms race. The treaty only mentions ICBMs by name but includes what it calls "strategic missiles."[25] Due to possible confusion two further measures were put into place the "Interim Agreement between the [US] and the [USSR] on certain Measures with Respect to the Limitation of Strategic Defensive Arms," this added SLBMs to the treaties "strategic missiles" definition.[26] A second document was then signed called the, "Protocol to the Interim Agreement Between the [US] and [USSR] on Certain Measure with respect to the Limitation of Strategic Offensive Arms." This second document was essentially a revision to the first, it specifically limited the number of SLBMs for each state and that new developments can only be to replace older systems.[27]

SALT II took place one month after the interim agreement. SALT II took on more restraints than SALT I did, it addressed the numbers of ICBM, SLBMs, heavy bombers, and ASBM. It required a dismantling of systems if they exceeded the proscribed limits. Bans on testing and development of new ICBMs (except for *one* on each side), building new fixed launchers for ICBMS, converting light ICBM launchers to heavy launchers, heavy mobile ICBMs, heavy SLBMs, heavy ASBMs, surface ship missile launchers, launching from the sea bed, and delivery systems in earth's orbit. The treaty was to remain in effect until 1985.[28] President Reagan's Administration did not ratify the treaty; however, it did follow through with the terms of the Treaty.[29]

Main Missiles Under Question during the 1960s and 70s. Sources: [30] [31] [32]		
Acronym	**Type**	**Notes**
ICBM	Intercontinental Ballistic missile	Part of the so false "missile gap" Considered Strategic
MRBM	Medium Range Ballistic Missile	1 of 2 USSRs main focus on ballistic missile development

IRBM	Intermediate Range Ballistic Missile	Involved in the Cuban Missile Crisis of 2 USSRs main focus on ballistic missile development
SLBM	Submarine Launched Ballistic Missile	Considered Strategic
ASBM	Air to Surface Ballistic Missile	

The Unenforceable Comprehensive Test Ban Treaty

A ban on all testing was proposed and adopted by the United Nations General Assembly in 1996, called the Comprehensive Test Ban Treaty (CTBT), it has been signed by 183 states and ratified by 166. However, to fully go into force 44 designated "nuclear capable" states must sign and ratify the treaty. Of those 44, India, Pakistan, and North Korea have not signed the treaty and eight states have not ratified it.[33] The United States signed the treaty under President George H. W. Bush but the US Senate refused to advice and consent to the treaty in 1999. President Barak Obama in 2009 stated he would call for the advice and consent of the Senate to ratify the treaty but ultimately failed; as of 2017 the US has still not ratified the CTBT.[34] Currently, nuclear weapons are still overseen by the IAEA and also the United Nations Office for Disarmament Affairs (UNODA). However, without the full cooperation of all nuclear states, no world wide enforceable treaty can be reached, as shown in the case of the CTBT.

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Chapter 6: Dissolution of the Soviet Union

The Soviet Union's fall from power was almost entirely political rather than revolutionary. Mikhail Gorbachev became General Secretary of the Central Committee of the Communist party, the de facto head of state for the USSR, as leader of the Soviet Union he introduced many reforms. One of these reforms would lead to the USSR's demise — the introduction of Presidency and multiple political parties in the USSR inevitably leading to full democratization.[2] A coup of political hardliners, the Soviet Military, and the KGB attempted a coup de ta on Gorbachev's government to reverse the liberalization;[3] the coup failed but ultimately took substantial power away from Gorbachev.

Republic	Type	Date
Azerbaijan	sovereignty	Sep 23 (1989)
Georgia	sovereignty	March 9
Lithuania	independence	March 11
Estonia	independence	March 30
Latvia	independence	May 4
Russia	sovereignty	June 11
Uzbekistan	sovereignty	June 20
Moldova	sovereignty	June 23
Ukraine	sovereignty	July 16
Belorussia (Belarus)	sovereignty	July 27
Turkmenistan	sovereignty	August 22
Tajikistan	sovereignty	August 25
Armenia	independence	August 23
Kazakhstan	sovereignty	October 25
Kirgizia (Kyrgyzstan)	sovereignty	December 12

[1]

The republics of the USSR in 1989 and 1990 started to declare sovereignty, self-governance within the USSR, or independence from the USSR as a whole. The table shows dates, all republics decaled in 1990 except for Azerbaijan which declared in 1989.[4]

In December of 1991 the larger sovereign republics of Russia, led by Yelstin, Ukraine, Belarus, and Kazakhstan created the Commonwealth of Independent States;[5] this creation ended the government of the Soviet Union. On December 25th 1991 Gorbachev stepped down from his position as leader of the USSR and Yelstin stepped up as President of the new state, Russia.[6]

The USSR's nuclear arsenal was located mainly in Russia, Belarus, Kazakhstan, and Ukraine. The US wanted only one state to remain a nuclear power and the best course of action, in their view, was to return all nuclear weapons to Russia, the most stable of the new founded governments. Belarus obliged, Kazakhstan took a stance on being nuclear free, but Ukraine wanted to retain its weapons.[7] Ukraine wanted to insure that it would remain independent from Russia. The US feared that if the nuclear weapons were not returned to Russia they would be in the hands of the new unstable Ukrainian government.

Through trilateral discussions between the US, Russia, and Ukraine, in 1993-1994 Ukraine agreed to transfer all nuclear weapons to Russia in exchange for material to create nuclear energy reactors.[8] The dissolution of the USSR and the peaceful transfer of nuclear weapons to Russia mark the end of the Cold War.

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Conclusion

The horrors that nuclear war can cause to human lives were shown in the devastated cities of Hiroshima and Nagasaki and the story of the Hibakusha; the destruction of the environment is shown in the contamination of the Marshall Islands; the speed at which a situation can devolve into nuclear war was seen in the 13 days of the Cuban Missile Crisis. These events may be in the past, but the reality of nuclear weapons is ever present.

Today nine states currently possess nuclear weapons. The United States, Russia, United Kingdom, France, China, India, Pakistan, Israel, and North Korea. Another twenty three states are in nuclear alliances with those powers: Albania, Australia, Bulgaria, Canada, Croatia, Czech, Denmark, Estonia, Greece, Hungary, Iceland, Japan, Latvia, Lithuania, Luxembourg, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, South Korea, and Spain.[1] As of 2016 the current nuclear stockpile is about 15,350 warheads; the number of nuclear warheads peaked in 1986 at around 70,300 (2).[2]

Country	Year of First Test[3]	First H Bomb[4]	Number of Warheads 2016[5]
United States	1945	1952	7,000
Russia	1949	1953	7,300
United Kingdom	1952	1957	215
France	1960	1968	330
China	1964	1967	260
India	1974	1998 possible	100-120
Pakistan	1998		110-130
Israel	?		80
North Korea	2006 (4)		Less than 10
Total			~ 15,350

These states are fraught with turmoil. In 2017, the main issue in focus is North Korea (DPRK) they have continued to conduct nuclear weapon and missile tests despite condemnations

and sanctions of the international community. All of the DPRK's nuclear missile tests have failed[6] to some this comes as a relief; however, we have seen that the USSR and China both went nuclear far sooner than any intelligence agencies had predicted. Today our ability to track and observe the DPRK's nuclear program is much more sophisticated, but if we want to be proactive, we cannot count on predictions as to when the DPRK will or will not obtain working ballistic missiles

If the DPRK puts working nuclear missiles at the heavily guarded 49th parallel, the agreed split between North and South Korea at the end of the Korean War, will another situation like the Cuban Missile Crisis emerge? The boarder is staffed with US Military personal and missiles in such a location would threaten our close allies, South Korea and Japan. If such a situation does develop it is important to recall the past, the Cuban Missile Crisis was everted due to two level headed Heads of State, Nikita Khrushchev and John F Kennedy. Kennedy did not directly head to war first, he tried to specifically avoid war by "quarantining" Cuba instead of "blockading" it. He used a show of force and personal secret negotiations between the two of them, to end the crisis. It is important for the world to ask, if this same situation happened between Kim Jog-un and Donald Trump, would we still be able to avoid nuclear war?

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