Cold War: A Brief History

For more than forty years, the two superpowers, the United States and the Soviet Union directly threatened each other with nuclear weapons. This period of time is referred to as The Cold War. This section explores the major events of this period including; the development of the hydrogen bomb, the nuclear arms race, détente, nuclear proliferation and the nuclear world after the end of the Cold War.

The Hydrogen Bomb

After the Soviet atomic bomb success, the idea of building a hydrogen bomb received new impetus in the United States. In this type of bomb, deuterium and tritium (hydrogen isotopes) are fused into helium, thereby releasing energy. There is no limit on the yield of this weapon.

The scientific community split over the issue of building a hydrogen bomb. Edward Teller, who had explored the idea of a 'super' during the Manhattan Project, supported its development.

Edward Teller

Men like J. Robert Oppenheimer, Enrico Fermi, and I.I. Rabi opposed its development. Fermi and Rabi wrote, "Since no limit exists to the destructiveness of this weapon, its existence and knowledge of its construction is a danger to humanity as a whole."

However the Cold War was beginning to escalate. A group of scientists led by Edward Teller supported its development. They made direct approaches to the military and the Joint Committee on Atomic Energy.

In 1950, President Harry S. Truman announced work on the hydrogen bomb was to continue. Savannah River, South Carolina, became the site for the nation's hydrogen bomb production facility the following year. The facility produced tritium for the nation's nuclear arsenal until safety concerns halted production in 1990.

The MIKE Test

On November 1, 1952, the United States detonated a 10.4-megaton hydrogen device in the Pacific on the Enewetak Atoll in the Marshall Islands. The test, code-named "Mike," was the first successful implementation of Edward Teller and Stanislaw Ulam's concept for a "Super."

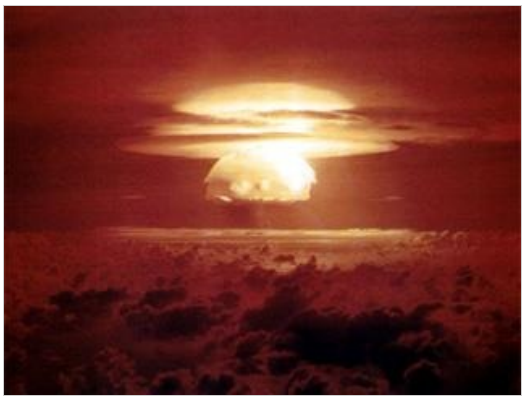
The MIKE Test

Since scientists had limited information on how well lithium deuteride would work, they chose instead to use liquid deuterium, which needed to be kept below -417° F (-250° C). A six-story cab was built to house "Mike" with its complex cooling system. Weighing 65 tons, the apparatus was an experimental device, not a weapon. A two-mile-long tunnel that extended from the device to another island was filled with helium that would provide data on the fusion reaction.

Even those who had witnessed atomic tests were stunned by the blast. The cloud, when it had reached its furthest extent, was about 100 miles wide and 25 miles high. The explosion vaporized Elugelab, leaving behind a crater more than a mile wide, and destroyed life on the surrounding islands.

The BRAVO Test

Fourteen months later, on March 1, 1954, a deliverable hydrogen bomb using solid lithium deuteride was tested by the United States on Bikini Atoll in the Marshall Islands. By missing an important fusion reaction, the scientists had grossly underestimated the size of the explosion.



The BRAVO Test

The predicted yield was 5 megatons, but, in fact, "BRAVO" yielded 14.8 megatons, making it the largest U.S. nuclear test ever exploded.

The blast gouged a crater more than 1/2 mile wide and several hundred feet deep and ejected several million tons of radioactive debris into the air. Within seconds the fireball was nearly 3 miles in diameter.

Effects on Islanders

No one was living on the Bikini atoll at the time of the BRAVO blast. However, a total of 236 people were living on the atolls of Rongelap and Utirik, 100 and 300 miles east of Bikini, respectively. The residents of Rongelap were exposed to as much as 200 rems of radiation. They were evacuated 24 hours after the detonation. The residents of Utirik, which were exposed to lower levels of radiation, were not evacuated until at least two days later. After their evacuation, many experienced typical symptoms of radiation poisoning: burning of the mouth and eyes, nausea, diarrhea, loss of hair, and skin burns.

Ten years after the blast, the first thyroid tumors began to appear. Of those under twelve on Rongelap at the time of BRAVO, 90% have developed thyroid tumors. In 1964, the U. S. Government admitted responsibility for exposing the islanders to radiation and appropriated funds to compensate them.

Effects on Fishermen

The Fukuryu Maru (Lucky Dragon) was a small Japanese tuna boat, fishing about 90 miles east of Bikini at the time of the test. About two hours after the explosion a "snow" of radioactive ash composed of coral vaporized by BRAVO began to fall on the ship. Within hours, the crewmembers began to experience burning and nausea. Within a few days, their skin began to darken and some crewmembers hair started to fall out. Upon returning to Japan, many were hospitalized and one eventually went into a coma and died. Though the U.S. denied responsibility, it sent the widow a check for 2.5 million yen "as a token of sympathy."

The Soviet Response

The Soviet Union also pursued the development of a hydrogen bomb. Initial Soviet research was guided by the information provided by Klaus Fuchs. Then Andrei Sakharov suggested a different idea. This design, known as, the "Layer Cake", consisted of alternating layers of hydrogen fuel and uranium. However, this design limited the amount of thermonuclear fuel that could be used and therefore the bomb's explosive force.

On August 12, 1953, the Soviet Union tested its first fusion-based device on a tower in central Siberia. The bomb had a yield of 400 kilotons. Though not nearly as powerful as the American bomb tested nine months earlier, it had one key advantage: It was a usable weapon, small enough to be dropped from an airplane.

The mushroom cloud from the Soviet's first hydrogen bomb

Shortly after the "BRAVO" test, Sakharov's team had the same idea of using radiation implosion. Work on the "Layer Cake" design was halted. On November 22, 1955, the Soviet Union exploded its first true hydrogen bomb at the Semipalatinsk test site. It had a yield of 1.6 megatons.

This began a series of Soviet hydrogen bomb tests culminating on October 23, 1961, with an explosion of about 58 megatons. Khrushchev boasted, "It could have been bigger, but then it might have broken all the windows in Moscow, 4,000 miles away."

Atomic Espionage

Soviet knowledge of the Manhattan Project was extensive. German-born Klaus Fuchs, a theoretical physicist, fled to England. He was a member of "the British Mission", where he made major contributions in the theory of gaseous diffusion cascades, and in implosion theory. He, along with David Greenglass, passed secrets to the Soviets through the spy Harry Gold, which helped the Soviet Union get a head start on its research and stay aware of what was going on at Los Alamos. Fuchs passed detailed designs about the implosion bomb, as well as some early information on the hydrogen bomb.

Ethel and Julius Rosenberg

Fuchs was finally arrested in England in 1950. His arrest led to the arrests of Gold, and Greenglass, his sister Ethel Rosenberg and her husband Julius. The Rosenbergs were convicted of passing atomic secrets and were sentenced to death, which drew worldwide protest. They were executed in 1953. Fuchs served nine years of a 14-year sentence. He then immigrated to East Germany, where he became deputy director of their nuclear research institute. He died on January 28, 1988.

Britain Goes Nuclear

Britain was the first country to investigate the development of nuclear weapons. Work by Otto Frisch and Rudolf Peierls in Febuary 1940, and the MAUD Committee (a code name chosen from the first name of one member's nanny) report showed the feasibility of fission weapons. British scientists, known as "the British Mission," later made major contributions to the Manhattan Project.

However, with the 1946 passing of the Atomic Energy Act, also known as "The McMahon Act," ties between U.S. and British nuclear programs were severed. As the Cold War began, Great Britain felt it should have an independent nuclear force. In January 1947, plans were formed to develop a British nuclear weapon.

Led by Sir John Crockcroft, Britain's first nuclear reactor went critical on July 3, 1948. Sites for plutonium production and highly enriched uranium were also constructed.

Due to the small size, no suitable sites for atmospheric weapons tests existed. Britain thus sought sites in other countries to test its weapons, finally settling on the Monte Bello Islands, off the west coast of Australia. On October 3, 1952, Britain detonated its first atomic device, code-named "Hurricane." It had an explosive yield of about 25 kilotons.

The British nuclear test code-named Hurricane

In 1954, Churchill decided that Britain should go ahead with hydrogen bomb development. Britain's first successful hydrogen bomb was detonated on November 8, 1957, over Christmas Island in the Pacific. The test had a yield of 1.8 megatons.

Following an amendment to the Atomic Energy Act in 1958, cooperation between U.S. and British nuclear programs resumed. After the 1957-'58 test series, the United Kingdom ceased conducting its own independent nuclear tests. Once nuclear testing resumed in 1961, the U.S. and Britain also began conducting joint tests at the Nevada Test Site. All subsequent British nuclear weapons were based on U.S. designs, which were made available to Britain.

France Joins the Club

Shortly after the end of World War II, France also embarked on a nuclear-weapons program. However, due to internal political issues, the program did not really begin until the late 1950s. Under Charles de Gaulle leadership, France's independent force de frappe (strike force) came into being

The first French nuclear test, "Gerboise Bleue," (Blue Gerbil) was detonated on February 13, 1960 at Reggane in Algeria atop a 345 foot tower. This device used plutonium and had a notably high yield of 60-70 kilotons. No other nuclear power has ever detonated such a powerful device as its first test.

Testing in Algeria at Reggane and In Ecker continued until 1966, three-and-a-half years after Algeria had gained independence. France's testing program then moved to the Mururoa and Fangataufa Atolls in the South Pacific.

Their first thermonuclear device was tested above Fangataufa Atoll in the South Pacific on August 24, 1968. It produced a yield of 2.6 megatons and heavily contaminated the atoll, leaving it off-limits to humans for six years.

French nuclear test at Mururoa Atoll

France continued atmospheric testing there until 1974. In 1995, France resumed nuclear testing under global protest. However, France has now joined the other major nuclear powers in ratifying the Comprehensive Test Ban Treaty and the Non-Proliferation Treaty.

Until recently, the French nuclear arsenal was deployed on a triad of air-, sea-, and ground-based forces. In 1996, it was announced that the ground-based component would be eliminated. Although this reduction is welcome, France is continuing to modernize its remaining nuclear forces, and they remain the world's third most-powerful nuclear nation.

Chinese Nuclear Weapons

In 1951, China signed a secret agreement with Moscow through which China provided uranium ores in exchange for Soviet assistance in nuclear technology. China began developing nuclear weapons in the late 1950s with substantial Soviet assistance.

When Sino-Soviet relations cooled in the late 1950s and early 1960s, the Soviet Union withheld plans and data for an atomic bomb, and began the withdrawal of Soviet advisers. Despite the termination of Soviet assistance, China committed itself to continue nuclear-weapons development.

China made remarkable progress in the 1960s in developing nuclear weapons. The first Chinese nuclear test was conducted at Lop Nur on October 16, 1964. It was a tower shot involving a fission device with a yield of 25 kilotons. Uranium 235 was used as the nuclear fuel. In less than 32 months, China detonated its first hydrogen bomb on June 14, 1967.

China's first hydrogen bomb test

Although the Cultural Revolution disrupted the strategic weapons program less than other scientific and educational sectors in China, there was a slowdown in succeeding years.

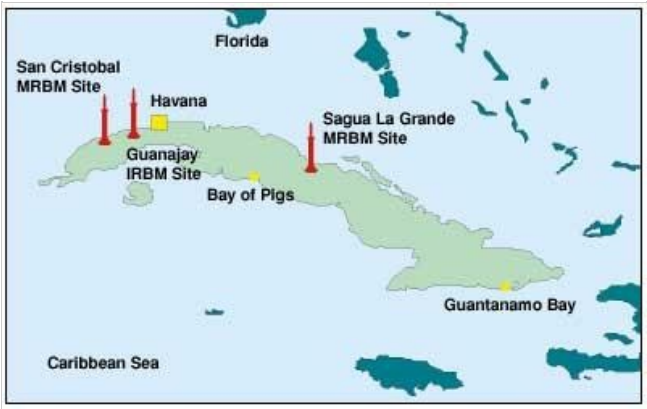
There is considerable uncertainly in published estimates of the size of the Chinese nuclear-weapons stockpile. Although these weapons are not a direct threat to the United States, they still pose a major threat to world security. China is also suspected in aiding the Pakistani nuclear program.

In 1996, China did sign the Comprehensive Test Ban Treaty.

Cuban Missile Crisis

On October 14, 1962, a U-2 spy plane flying over Cuba discovered nuclear missile sites under construction. These missiles would have been capable of quickly reaching the United States. President Kennedy convened a small group of senior officials to debate the crisis. Known as ExComm, they met almost continuously for the next two weeks. The group was split between those who wanted a military solution, such as an invasion or air strikes, and those who sought a diplomatic solution to remove the missiles.

Eight days later, Kennedy ordered a naval blockade of Cuba and all U.S. military forces to DEFCON 3. ICBMs were prepared for launch, Polaris submarines were dispatched, and B-52 bombers were placed on alert. The world watched as tensions between the U.S. and the Soviet Union increased. Khrushchev put Warsaw Pact forces on alert. Later, U.S. forces were placed on DEFCON 2.



Nuclear Missile Sites on Cuba

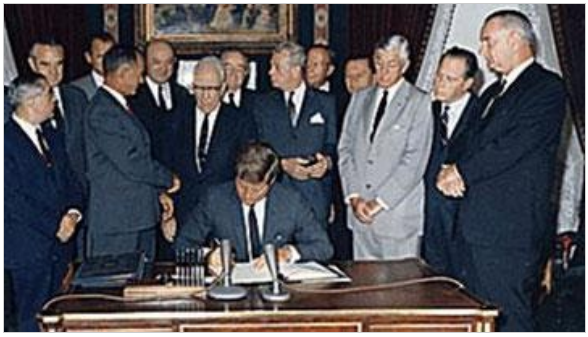
Reconnaissance flights by U-2s continued over Cuba, while U.S. and Soviet officials exchanged words of warning.

Finally on October 28, Khrushchev announced that they were withdrawing the missiles from Cuba. In the spring of 1963, the U.S. quietly removed the missiles from Turkey that equally threatened the Soviet Union. This crisis is regarded as the closest the world has come to a nuclear exchange. Soon after this incident, the famous "hotline" was installed between the U.S. and the Soviet Union to help resolve future conflicts. It was later learned that the missiles on Cuba were operational and were armed with nuclear warheads.

Soon after the Cuban Missile Crisis, negotiations were renewed regarding a Limited Test Ban Treaty (LTBT).

Limited Test Ban Treaty

In 1958, as a first step toward a test-ban treaty, both the U.S. and Soviet Union temporarily suspended nuclear testing. This informal moratorium on nuclear testing was ended in September 1961 by the Soviet Union. Two weeks later, the U.S. responded by conducting its own test series. The resumption of nuclear testing produced much radioactive and political fallout. The public concern about the fallout danger finally produced enough political pressure to force negotiations of a test-ban treaty.



President Kennedy signing the LTBT

The Limited Test Ban Treaty (LTBT) was a trilateral agreement between the U.S., U.S.S.R., and U.K., which halted atmospheric, underwater and outer space nuclear tests. Since 1963, an additional 113 countries have signed the treaty. There are two major non-signers, France and China, although they both signed the Comprehensive Test Ban Treaty in 1996.

Ironically, the LTBT indirectly contributed to the nuclear arms race because it kept the magnitude of the world's stockpiles from public awareness.

Nuclear Deterrence

For a time after World War II, America held the upper hand with regards to nuclear superiority. It used this threat of "massive retaliation" as a means to deter Soviet aggression. By the late 1950s, the Soviet Union had built up a convincing nuclear arsenal that could be delivered on the territory of the United States and Western Europe.

By the mid-1960s, unilateral deterrence gave way to "mutual deterrence," a situation of strategic stalemate. The superpowers would refrain from attacking each other because of the certainty of mutual assured destruction, better known as MAD. This theory is still a major part of the defense policies of the United States and Russia.

Both superpowers recognized that the first requirement of an effective deterrent was that it should survive or "ride out" a surprise "counterforce" targeted attack without being decimated--a task made difficult by the ever increasing numbers of accurate delivery systems, "penetration aids," and multiple warheads.

This led to the foundation of the nuclear triad, or use of three different types of delivery systems (bombers, missiles, and submarines) to assure that a second-strike capability existed able to cause massive destruction to the attacking nation.

Both the Strategic Arms Limitation Treaty (SALT) and Strategic Arms Reduction Treaty (START) treaties all reflected attempts by the superpowers to manage strategic nuclear developments in such a way as to stabilize mutual deterrence. Ballistic missile defenses were outlawed; "first strike" weapons were decommissioned; civil defense was discouraged. However, neither the U.S. nor the Soviet Union was comfortable basing their country's defense on deterrence.

The U.S. has explored various Nuclear Use Theories (NUTs) such as "counterforce", "countervailing" or "flexible response." However, the status quo of MAD remains. Current arms control efforts are aimed at finding a minimum level of mutual assured destruction.

Easing The Tensions

Both sides understood the inherited dangers of continuing to stand on the brink of nuclear holocaust. By 1969, the superpowers were, spending more than $50 million a day between them on nuclear weapons. It was a burden both sides were finding intolerable. One of the first steps back was the Strategic Arms Limitation Talks (SALT), which began in November 1969. These talks were slow and cautious in their development. An era of relaxation of strained relations or tensions, or détente, had begun.

President Nixon and Soviet Premier Brezhnev exchange the SALT I treaty

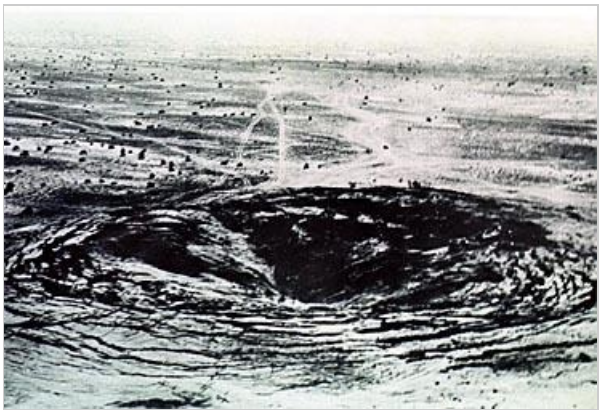
Finally in May 1972, President Nixon and Soviet Premier Brezhnev signed the SALT I treaty in Moscow. The most important parts of the agreement were the Treaty on Anti-Ballistic Missile (ABM) Systems and the Interim Agreement and Protocol on Limitation of Strategic Offensive Weapons. The Interim Agreement froze each side's number of ICBMs and submarine-launched ballistic missiles (SLBMs) at current levels for five years, pending negotiation of a more detailed SALT II. The ABM Treaty limited each side to two ABM sites, one protecting the national capital, the other a long-range missile site. After years of hostility, the Soviet Union and the United States had agreed to curb spiraling arms-race costs and reduce the risk of nuclear war.

However, this treaty did not address the recent technological advances of placing more than one warhead on a single missile. This technology, known as multiple independently targetable re-entry vehicle, or MIRV, allowed for military planners to produce greater damage for the same total yield and also reduce the effectiveness of an anti-ballistic missile system. But by not directly addressing the issue of MIRV warheads, a loophole was left for the arms race to continue. Over the next decade, Russia and America would add 12,000 nuclear warheads to their arsenals.

In an attempt to resolve the issue of MIRVed weapons, talks continued. President Ford and Premier Brezhnev signed the Vladivostok Accord in November 1974 that limited each side to 2,400 delivery vehicles, of which 1,320 could be MIRVed.

The "Peaceful" Explosion

On the morning of May 18, 1974, a nuclear device was detonated in the Rajasthan desert near Pokhran, India. This event came as a shock to the entire world. Work on a nuclear fission device had been authorized by Indian Prime Minister Indira Gandhi on September 7, 1972. A small team of about 75 scientists and engineers at the Bhabha Atomic Research Center (BARC) began the process of designing and developing an atomic bomb. The head of the development team was Raja Ramanna. The plutonium for the device was extracted from the CIRUS (Canada-India Reactor U.S.) research reactor, a 40-megawatt reactor supplied by Canada that began operating in 1960. The device's design was similar to the implosion design used on the Fat Man bomb, but the Indian design was simpler and less sophisticated than the American system.



Smiling Buddha crater

The underground test is often referred to as "Smiling Buddha" and was not a deliverable weapon. The actual yield is subject to some debate. The official yield was set at 12 kilotons, although it more likely that yield was lower, about 8 kilotons. The Indian government referred to the test as a "peaceful" nuclear explosion geared toward exploring such things as enhanced mining techniques, the "stimulation of oil reservoirs to increase both the production rate and the ultimate recovery" of oil, and to conduct other feats of large-scale underground nuclear engineering.

International reaction was negative, and Canada cut off virtually all nuclear assistance. The United States also restricted such collaborations and successfully persuaded India not to carry out further nuclear tests at that time. India continued its research and development on nuclear weapons, mostly out of sight of the public. Pakistan, India's long time rival, accelerated its nuclear program in response.

The Arms Race Resumes

In the mid-1970s, the Soviet Union achieved rough strategic parity with the United States. Shortly thereafter, the Soviet Union began replacing older intermediate-range SS-4 and SS-5 missiles with a new intermediate-range missile, the SS-20. The SS-20 was more accurate, and capable of being concealed and rapidly redeployed and carried 3 MIRV warheads. This missile was capable of hitting targets throughout Western Europe. The threat of a limited nuclear war in Europe was now a possibility.

A test launch of the Pershing II missile

The United States pressured various members of NATO to allow the installation of the Pershing II ballistic missile and ground launched cruise missiles in their countries. The proposed deployment prompted mass demonstrations across Western Europe.

Relations between the United States and the Soviet Union continued to worsen. To try to repair relations, both sides began to press for the signing of the SALT II treaty. This treaty set upper limits on their nuclear arsenals, and new weapons technology, such as MIRV warheads and cruise missiles, were counted in the number of weapons each side was allowed.

President Carter and Premier Brezhnev

The SALT II treaty was signed by President Carter and Premier Brezhnev in Vienna on June 18, 1979, and was submitted to the U.S. Senate for ratification shortly thereafter. But renewed tensions between the superpowers prompted Carter to remove the treaty from consideration in January 1980, after the Soviet Union's invasion of Afghanistan. The era of détente was over.

With the election of President Reagan in 1981, the United States began a period of increased military spending. Funding for the highly accurate MX missile and the new Poseidon nuclear submarines was approved. Reagan sought to outspend the Soviets and win the Cold War.

Although America's military build-up concerned them, the Soviets were not in a position to respond. The Soviet Union continued on a course of pursuing détente.

Reagan's Star Wars

On March 23, 1983, President Reagan proposed the creation of the Strategic Defense Initiative (SDI), an ambitious project that would construct a space-based anti-missile system. This program was immediately dubbed "Star Wars."

An artist's rendering of an X-ray laser hit an incoming missile.

The SDI was intended to defend the United States from attack from Soviet ICBMs by intercepting the missiles at various phases of their flight. For the interception, the SDI would require extremely advanced technological systems, yet to be researched and developed. Among the potential components of the defense system were both space- and earth-based laser battle stations, which, by a combination of methods, would direct their killing beams toward

moving Soviet targets. Air-based missile platforms and ground-based missiles using other non-nuclear killing mechanisms would constitute the rear echelon of defense and would be concentrated around such major targets as U.S. ICBM silos. The sensors to detect attacks would be based on the ground, in the air, and in space, and would use radar, optical, and infrared threat-detection systems.

This system would tip the nuclear balance toward the United States. The Soviets feared that SDI would enable the United States to launch a first-strike against them. Critics pointed to the vast technological uncertainties of the system, in addition to its enormous cost.

Although work was begun on the program, the technology proved to be too complex and much of the research was cancelled by later administrations. The idea of missile defense system would resurface later as the National Missile Defense.

The End of the Cold War

With the passing of several Soviet leaders, Mikhail Gorbachev assumed control of the Soviet Union. His rise to power ushered in an era of perestroika (restructuring) and of glasnost (openness).

Reagan and Gorbachev leaving the Reykjavik Summit

U.S.-Soviet relations improved considerably during the middle 1980s. At a dramatic summit meeting in Reykjavik, Iceland, in October 1986, Gorbachev proposed a 50-percent reduction in the nuclear arsenals of each side, and for a time it seemed as though a historic agreement would be reached. The summit ended in failure, owing to differences over SDI. However, on December 8, 1987, the Intermediate Nuclear Forces (INF) Treaty was signed in Washington, eliminating an entire class of nuclear weapons. The INF Treaty was the first arms-control pact to require an actual reduction in nuclear arsenals rather than merely restricting their proliferation.

As the decade came to an end, much of the Eastern Bloc began to crumble. The Hungarian government took down the barbed wire on its border with Austria and the West. The Soviet Union did nothing in response. Although travel was still not completely free, the Iron Curtain was starting to unravel. On November 10, 1989, one of the most famous symbols of the Cold War came down: the Berlin Wall. By the end of the year, leaders of every Eastern European nation except Bulgaria had been ousted by popular uprisings.

By mid-1990, many of the Soviet republics had declared their independence. Turmoil in the Soviet Union continued, as there were several attempts at overthrowing Gorbachev. On December 8, 1991, the Soviet Union ceased to exist. Boris Yeltsin, president of the Russian Republic, formed the Commonwealth of Independent States (C.I.S.). After 45 years, the Cold War was over