

# BEGINNING AND END OF THE BOMB



**We must be curious to learn how such a set of objects—hundreds of power plants, thousands of bombs, tens of thousands of people massed in national establishments—can be traced back to a few people sitting at laboratory benches discussing the peculiar behavior of one type of atom.**

*Spencer R. Weart, as quoted in The Making of the Atomic Bomb by Richard Rhodes*

# Beginning and End of the Bomb

This exhibit highlights important aspects of the development of nuclear weapons and their use on Hiroshima and Nagasaki seventy-five years ago. It originated in 1995 as Fifty Years with the bomb. The exhibit gives different perspectives on these events—as represented by the selected quotations and visual materials. These perspectives represent different views of the use of atomic bombs on Hiroshima and Nagasaki and contrast the sublime beauty of the colors seen after the first explosion with the horror the devastation and suffering inflicted upon Hiroshima and Nagasaki. The exhibit also makes connections between these events and subsequent nuclear weapons tests to life in Hawai‘i. Finally, the exhibit looks forward and asks viewers to think about the future.

In addition to informing viewers about the development of nuclear weapons over the past seventy-five years, the goal of this exhibit is to stimulate critical thinking about the role of nuclear weapons in World War II and about the prospects for reducing the threat from these weapons now that the Cold War is over. We hope that this exhibit will be the catalyst for informed dialogue on these issues and welcome your comments on it.



Front cover: Hiroshima dome,  
G.K. Hunter,  
Author and Photographer

Trinity July 1945. (C761, Los Alamos National  
Laboratory, Jack Aeby)

# SECTION A

## First Nuclear Explosion at Alamogordo, New Mexico

War ended in Europe in May of 1945 but continued to rage in the Pacific. Of the 60,000 U.S. Marines in the battle of Iwo Jima, 6,800 were killed and 22,000 were wounded—the largest fraction of casualties in Marine Corps history; about 19,000 of the 20,000 Japanese soldiers on Iwo Jima were killed. The firebombing of Tokyo on 9-10 March by 334 B-29's started a fire that burned about 16 square miles and resulted in 100,000 dead, 1 million injured and 1 million people made homeless. Work continued in the United States on the secret Manhattan Project to make the first atomic bombs. The original motivation for this project was to make A-bombs before Germany did, but work continued after the German surrender in part because of the scientific and technical challenge and to demonstrate that the enormous resources devoted to the Manhattan Project had not been wasted. Some scientists and military leaders also hoped that producing an A-bomb would end a war that had caused, and was continuing to cause, unprecedented devastation and suffering.

Some scientists were also beginning to examine the implications of the use of the A-bomb by the United States, not only in the context of World War II but also in the post-war era. Niels Bohr had met with both Winston Churchill and Franklin Roosevelt

in 1944 trying to convince them to inform the Soviet allies about the Manhattan Project in the hope that this would avoid a nuclear arms race after World War II ended. In June of 1945, seven Manhattan Project scientists, including James Franck and Leo Szilard, wrote a report addressing these issues and arguing for a demonstration of the A-bomb before it was used in warfare.

**Scientists have often before been accused of providing new weapons for the mutual destruction of nations, instead of improving their well-being. It is undoubtedly true that the discovery of flying, for example, has so far brought much more misery than enjoyment and profit to humanity. However, in the past, scientists could disclaim direct responsibility for the use to which mankind had put their discoveries. We feel compelled to take a more active stand now because the success which we have achieved in the development of nuclear power is fraught with infinitely greater dangers than were all the inventions of the past. All of us, familiar with the present state of nucleonics, live with the vision before our eyes of sudden destruction visited on our own country, of a Pearl Harbor disaster repeated in thousand-fold magnification in every one of our major cities.**

*The Franck Report, June, 1945*



J. Robert Oppenheimer, Director of the Los Alamos Atomic Bomb Project with Major General Leslie R. Groves, Chief of the Manhattan Project. War and Peace in the Nuclear Age (PBS documentary).

The first test of the plutonium A-bomb took place while Truman, Churchill, and Stalin were meeting at Potsdam. The site was an area on the Alamogordo Bombing Range in southern New Mexico known as the Jornada del Muerto—Journey of Death. This name had been given to this region by the conquistadores. J. Robert Oppenheimer, the physicist leading the Manhattan Project, was inspired by a John Donne sonnet he had recently read to name the site and the test Trinity. The desert sand fused by the heat of the explosion became known as “trinitite.”

**The effects could well be called unprecedented, magnificent, beautiful, stupendous and terrifying. No man-made phenomenon of such tremendous power had ever occurred before. The lighting effects beggared description. The whole country was lighted by a searing light with the intensity many times that of the midday sun. It was golden, purple, violet, gray and blue. It lighted every peak, crevasse and ridge of the nearby mountain range with a clarity and beauty that cannot be described but must be seen to be imagined. It was that beauty the great poets dream about but describe most poorly and inadequately. Thirty seconds after the explosion came first, the air blast pressing hard against the people and things, to be followed almost immediately by the strong sustained, awesome roar which warned of doomsday and made us feel that we puny things were blasphemous to dare tamper with the forces heretofore reserved for the Almighty. Words are inadequate tools for the job of acquainting those not present with the physical, mental and psychological effects. It had to be witnessed to be realized.**

*Description of the Trinity test by Brigadier General Thomas F. Farrell, who was in a shelter 10,000 yards from the explosion on 16 July 1945*

# SECTION B

## Aftermath of Hiroshima and Nagasaki Atomic Bombings

The “Little Boy” bomb dropped by the Enola Gay on Hiroshima used uranium-235 for the nuclear chain reaction. This uranium isotope was separated from the uranium-238 which comprises most natural uranium at Oak Ridge in Tennessee. The components for “Little Boy” were transported on the Navy cruiser Indianapolis, which stopped in Honolulu on the way to Tinian. The bomb exploded at a height of 1900 feet and had an explosive yield equivalent to 15 kilotons of TNT. Scientists were sufficiently confident that this bomb design would work that it was not tested before its use on Hiroshima. The explosion and subsequent fires caused 70,000 deaths by the end of August and a total of 140,000 by the end of 1945. As large as these numbers are, they did not seem so shocking after the firebombings of Dresden and Tokyo. However, the Tokyo bombing on 9-10 March that killed 100,000 people required 334 B-29’s dropping 2000 tons of incendiary explosives.

The “Fat Man” bomb dropped on Nagasaki by the B-29 named “Bock’s Car” was a plutonium bomb similar to that in the Trinity test. The plutonium for these bombs was produced at the Hanford facility in eastern Washington state. The bomb exploded at a height of 1650 feet and had an explosive yield of 21 kilotons. The blast and fires from this explosion caused the deaths of 70,000 people by the end of 1945.

Many people in the U.S. felt that these bombings were justified as a means to end the war and also as punishment for the Japanese attack on Pearl Harbor and for the atrocities committed by the Japanese Army. These views are contained in the excerpts from President Truman’s speech of 9 August 1945.

**The world will note that the first atomic bomb was dropped on Hiroshima, a military base. That was because we wished in the first attack to avoid, in so far as possible, the killing of civilians. But that attack is only a warning of things to come. If Japan does not surrender, bombs will have to be dropped on her war industries and, unfortunately, thousands of civilian lives will be lost. I urge Japanese civilians to leave industrial cities immediately and save themselves from destruction....**

**I realize the tragic significance of the atomic bomb....**

**Having found the bomb we have used it. We have used it against those who attacked us without warning at Pearl Harbor, against those who have starved and beaten and executed American prisoners of war, against those who have abandoned all pretense of obeying international laws of warfare. We have used it in order to shorten the agony of thousands and thousands of young Americans....**

**We shall continue to use it until we completely destroy Japan's power to make war.  
Only a Japanese surrender will stop us....**

**We must constitute ourselves trustees of this new force—to prevent its misuse, and to turn it into the channels of service to mankind...**

**It is an awful responsibility which has come to us....**

**We thank God that it has come to us, instead of to our enemies; and we pray that He may guide us to use it in His ways and for His purposes.**

*Excerpts from President Truman's speech on 9 August 1945, as reported in the 10 August 1945 N.Y. Times*

However, most of the victims of the Hiroshima and Nagasaki bombings were civilians; President Truman seems to have acknowledged this in private meetings with his cabinet on 10 August.

**Stimson, still trying to bring his Air Force under control, had argued at the Friday morning meeting that the United States should suspend bombing, including atomic bombing. Truman thought otherwise, but when he met with the cabinet that afternoon he had partly reconsidered. "We would keep up the war at its present intensity," Forrestal paraphrases the President, "until the Japanese agreed to these terms, with the limitation however that there will be no further dropping of the atomic bomb." Henry Wallace, the former Vice-President who was now Secretary of Commerce, recorded in his diary the reason for the President's change of mind: "Truman said he had given orders to stop the atomic bombing. He said the thought of wiping out another 100,000 people was too horrible. He didn't like the idea of killing, as he said, 'all those kids.'"**

*Report of meetings on 10 August 1945 involving President Truman, Secretary of War Stimson, and Secretary of the Navy Forrestal from The Making of the Atomic Bomb by Richard Rhodes.*

Ironically, some of the victims of the Hiroshima and Nagasaki bombings were U.S. citizens born in Hawaii. The quotes below are taken from interviews with hibakusha that are part of an oral history project done in 1984.

**I don't think on the government or legal level, they don't have responsibility. However, from the humanity standpoint, definitely, not only the U.S. government, but I think, all the Allied forces have some kind of responsibility.**

*H.K., US citizen, Honolulu resident*

**I got married to an American and came to the country that won the war. However, that doesn't take away any of my scars. Whether it's a country which lost or won, the scars will remain for many generations to come.**

*K.C., Kailua resident*

**You think you forgave, you think you forgot about those things about the past, but some of the things that you experience is just embedded in you and the fear is so bad, that even though you're so far away – it still comes back.**

*D.M., US citizen, Honolulu resident*

**You try not to think about it too much, but yet a lot of time you think, "Oh, if I – if that didn't happen, my girlfriends all would be living and we would have been..."**

*J.S. US citizen, Honolulu resident*

*Quotes from four Hiroshima hibakusha from Nuclear Survivors in Hawaii, A Collection of Oral Histories, Friends of Hibakusha, Hawai'i, 1984*



The atomic bomb (Fat Man) fell on Nagasaki on 9 August 1945 and completely destroyed Urakami Cathedral. 7 January 1946.

# SECTION C

## End of World War II

The image shows the front page of The New York Times from Wednesday, August 15, 1945. The masthead reads "The New York Times" in a large, bold, serif font. Below it, the date "NEW YORK, WEDNESDAY, AUGUST 15, 1945" is printed. The main headline is in large, bold, black letters: "JAPAN SURRENDERS, END OF WAR! EMPEROR ACCEPTS ALLIED RULE; MARSHAL ARTHUR SUPREME COMMANDER; OUR MANPOWER CURBS VOIDED". To the right of the masthead, there is a box for "LATE CITY EDITION" with weather and temperature information. Below the main headline, there are several smaller headlines and a photograph. The photograph shows a group of men in military uniforms, likely the Emperor of Japan and Allied leaders, standing together. The caption below the photo reads "PRESIDENT ANNOUNCING SURRENDER OF JAPAN". Other headlines include "HIRING MADE LOCAL", "Third Fleet Fells 5 Planes Since End", "ALL CITY LETS GO", "Hundreds of Thousands Roar Joy After Victory Flash Is Received", and "YIELDING UNQUALIFIED, TRUMAN SAYS Japan Is Told to Order End of Hostilities, Notify Allied Supreme Commander and Send Envoys to Him".

The use of the atomic bombs and the reasons for the Japanese surrender continue to cause controversy. Historians continue to debate these issues as well as estimates of the number of casualties that would have resulted if the U.S. had invaded the Japanese home islands in the Fall of 1945. The Smithsonian Museum in Washington, D.C. had planned a major exhibit on the atomic bombings but objections by veterans groups and members of Congress that the proposed exhibit was biased eventually led to the decision to display only the fuselage of the Enola Gay, the B-29 bomber that dropped the bomb on Hiroshima. The quotes below give a flavor of the controversy. The first two represent the views of many U.S. veterans and others, including some Japanese survivors, who remember the carnage in the Pacific. The third is the conclusion of the U.S. Strategic Bombing Survey about the reasons for the Japanese surrender. The final quote is from President Truman's speech proclaiming V-J day.

I was a 21-year-old second lieutenant leading a rifle platoon. Although still officially in one piece, in the German war I had already been wounded in the leg and back severely enough to be adjudged, after the war, 40 percent disabled. But even if my legs buckled whenever I jumped out of the back of the truck, my condition was held to be satisfactory for whatever lay ahead. When the bombs dropped and news began to circulate that "Operation Olympic" would not, after all, take place, that we would not be obliged to run up the beaches near Tokyo assault-firing while being mortared and shelled, for all the fake manliness of our facades we cried with relief and joy. We were going to live. We were going to grow up to adulthood after all.

From *Hiroshima: A Soldier's View* by Paul Fussell in the August 1981 issue of *The New Republic*





Douglas MacArthur watches as Japanese Foreign Minister Mamoru Shigemitsu signs the surrender document ending World War II on the deck of the USS Missouri, 2 September 1945.

**After Biak the enemy withdrew to deep caverns. Rooting them out became a bloody business which reached its ultimate horrors in the last months of the war. You think of the lives which would have been lost in an invasion of Japan's home islands—a staggering number of Americans but millions more of Japanese—and you thank God for the atomic bomb.**

*Goodbye Darkness: A Memoir of the Pacific War* by William Manchester as quoted by Paul Fussell in *Hiroshima: A Soldier's View*

**Based on a detailed investigation of all the facts and supported by the testimony of the surviving Japanese leaders involved, it is the Survey's opinion that certainly prior to 31 December 1945, and in all probability prior to 1 November 1945, Japan would have surrendered even if the atomic bombs had not been dropped, even if Russia had not entered the war, and even if no invasion had been planned or contemplated.**

*U. S. Strategic Bombing Survey, Japan's Struggle to End the War, 1946*

**As President of the United States I proclaim Sunday Sept. 2, 1945 to be V-J Day—the day of the formal surrender of Japan. It is not yet the day for the formal proclamation of the end of the war nor of the cessation of hostilities. But it is a day which we Americans shall always remember as a day of retribution—as we remember that other day, the day of infamy.**

*From President Truman's 1 September 1945 speech, as quoted in the 2 September. N.Y. Times*

# SECTION D

## Nuclear Tests on the U.S. Mainland

In the 1950's, nuclear weapons were developed for use on the battlefield. These weapons were tested at the Nevada Test Site, about 100 miles from Las Vegas. Some of these tests also involved troops to prepare them for the nuclear battlefield. Many of these "atomic vets" were thus exposed to radiation levels that were not monitored well and may have been high enough to have caused health problems. Some of the surviving "atomic vets" are still trying to get compensation from the U.S. government for radiation-related illnesses.

Some scientists who had been involved in the Manhattan project continued to try to influence policy on control of nuclear weapons. J. Robert Oppenheimer helped formulate a plan for international control which was introduced in the United Nations by Bernard Baruch in June of 1946. Mistrust and animosity between the United States and Soviet Union doomed this effort. In December of 1945, Hyman Goldsmith and Eugene Rabinowitch, who had been one of the authors of the Franck report, founded the Bulletin of the Atomic Scientists to provide a forum for open discussion of nuclear weapons issues. After

the Soviet Union exploded its first atomic bomb in August of 1949, the General Advisory Committee of the Atomic Energy Commission was asked for advice about proceeding to develop more powerful nuclear weapons (H-bombs).

The General Advisory Committee, headed by J. Robert Oppenheimer, recommended against an "all-out" effort. Other scientists, notably Edward Teller, and Atomic Energy Commission member Lewis Strauss argued for the H-bomb, which the Air Force wanted for the Strategic Air Command. President Truman's decision to approve the H-bomb effort came just four days after the arrest of Klaus Fuchs, who had passed bomb secrets to the Soviet Union.



Baneberry test on 18 December 1950 that was not contained as intended.

**We have been asked by the Commission whether or not they should immediately initiate an “all-out” effort to develop a weapon whose energy release is 100 to 1000 times greater and whose destructive power in terms of area of damage is 20 to 100 times greater than those of the present atomic bomb. We recommend strongly against such action....We base our recommendation on our belief that the extreme dangers to mankind inherent in the proposal wholly outweigh any military advantage that could come from this development. Let it be clearly realized that this is a super weapon; it is in a totally different category from an atomic bomb. The reason for developing such super bombs would be to have the capacity to devastate a vast area with a single bomb. Its use would involve a decision to slaughter a vast number of civilians. We are alarmed as to the possible global effects of the radioactivity generated by the explosion of a few super bombs of conceivable magnitude. If super bombs will work at all, there is no inherent limit in the destructive power that may be attained with them. Therefore, a super bomb might become a weapon of genocide.**

*From the top secret report of the General Advisory Committee of the Atomic Energy Commission, headed by J. Robert Oppenheimer, 30 October 1949*

**It is part of my responsibility as Commander in Chief of the Armed Forces to see to it that our country is able to defend itself against any possible aggressor. Accordingly, I have directed the Atomic Energy Commission to continue its work on all forms of atomic weapons, including the so-called hydrogen or superbomb. Like all other work in the field of atomic weapons, it is being and will be carried forward on a basis consistent with the overall objectives of our program for peace and security.**

*President Truman authorizing work on H-bombs, 31 January 1950*

# SECTION E

## Nuclear Tests in the Pacific

The first nuclear tests after World War II were the “Able” and “Baker” tests that were part of Operation Crossroads at Bikini. The Bikinians had been persuaded by the U.S. to evacuate their atoll for these tests. The levels of radioactivity from these and subsequent tests are still sufficiently high that the Bikinians cannot return to live at Bikini Atoll. U.S. military personnel involved in Operation Crossroads also received radiation exposure that was not monitored well. Later tests of more powerful fusion weapons

(H-bombs) produced fallout that affected indigenous people and U.S. personnel on nearby islands. The fallout from the “Bravo” test on 1 March 1954 caused health problems for people on Rongelap Atoll 125 miles from Bikini and produced radiation sickness, including one fatality, in the crew of a Japanese fishing boat, which had been 100 miles from the explosion. The following quotes contrast what was reported about the Bravo test by the U.S. Atomic Energy Commission and by the mayor of Rongelap Atoll.

**During the course of a routine atomic test in the Marshall Islands, 28 United States personnel and 236 residents were transported from neighboring atolls to Kwajalein Island according to a plan as a precautionary measure. These individuals were unexpectedly exposed to some radioactivity. There were no burns. All were reported well. After the completion of the atomic tests, the natives will be returned to their homes.**

*U.S. Atomic Energy Commission press release, as quoted in Putting the Earth First by Ronni Alexander, 1994*



Baker underwater nuclear weapon test by the United States military at Bikini Atoll, Micronesia, on 25 July 1946.

**In the afternoon something began falling from the sky upon our island. It looked like ash from a fire. It fell on me, it fell on my wife, it fell on our infant son. It fell on the trees, and on the roofs of our houses. It fell on the reef, and into the lagoon.... We were very curious about this ash falling from the sky. Some people put it in their mouths and tasted it. One man rubbed it into his eye to see if it would cure an old ailment. People walked in it, and children played with it. Later on, in the early evening it rained. The rain fell on the roofs of our houses. It washed away the ash. The water mixed with the ash which fell into our water catchments. Men, women and children drank that water. It didn't taste like rainwater and it was dark yellow, sometimes black. But people drank it anyway. Then, the next day, some Americans came to our island. They had a machine (Geiger counter) with them. They went around the island. They looked very worried and talked rapidly to each other. They told us we must not drink the water in our catchment tanks. They left—without explaining anything. By now most of the people were sick. Many vomited and felt weak. Later, the hair of men, women and children began to fall out. A lot of people had burns on their skin. On the third day some ships came to our island. They explained that we were in great danger because of the ash. They said, "If you don't leave, you will die."**

*John Anjain, mayor of Rongelap Atoll, as quoted in Putting the Earth First*

The United Kingdom tested nuclear weapons first in the Monte Bello Islands west of Australia in 1952 and later in South Australia and near Christmas (Kirimati) Island. The United States and the United Kingdom conducted atmospheric nuclear tests in the Pacific until 1962. France's first nuclear tests were in Algeria in 1960. France conducted atmospheric nuclear tests at Moruroa and Fangataufa Atolls near Tahiti from 1966 through 1974. From 1975 through 1991, France conducted underground nuclear tests at Moruroa. Construction and other activities related to the French testing program have provided jobs for many Tahitians. Some, like retired construction worker Uraroa Tetuanui, support the testing and are proud of their role in it. Others highlight the negative aspects; the following quotes represent the views of these Pacific islanders about nuclear testing.

**No government has ever been honest enough nor had the cynical frankness to admit that its nuclear testing entails health hazards. No government has ever hesitated to expose other people—particularly if they are small and defenceless—to these dangers. The Americans exploded their most powerful bombs among the inhabitants of the Marshall Islands. The English used Christmas Island, surrounded by atolls peopled by Polynesians. The Russians preferred to make their tests among the peoples of Siberia. The Chinese government chose a region inhabited by Tibetans and Mongols. The French first exploded their bombs in Africa and are now ready to do so in our islands.**

*John Teariki, Tahitian political leader, in a speech on 7 September 1966 during a visit to Tahiti by French President Charles de Gaulle, as quoted in Putting the Earth First*

**We thought that the Centre d'Experimentation du Pacifique was going to lead to enormous wealth. It was an illusion. It brought money but destroyed our lifestyle. We have the politics and attitudes of the Arab states, but we have absolutely no resources. One day everything is going to disintegrate.**

*Francis Sanford, Tahitian politician supporting autonomy, as quoted in Alain Rollat's article "Problems Come to Paradise" in the October 1987 Pacific Islands Monthly*

# SECTION F

## High-Altitude Nuclear Tests Launched from Johnston Atoll

In the late 1950's and early 1960's, the United States conducted twelve high-altitude nuclear tests launched near Johnston (Kalama) Island, about 800 miles southwest of Honolulu. These tests were announced and people in Hawaii observed them from Honolulu and from Haleakala on Maui. About two weeks after the "Starfish Prime" test, a Thor missile blew up on the launch pad at Johnston contaminating the area with plutonium from the warhead. The 27 April 1995 *Honolulu Advertiser* reported that three nuclear cleanup workers at Johnston had tested positive for exposure to plutonium. The "Kingfish" test on 1 November 1962 was apparently delayed for a few days to avoid any disturbance of radio signals during the Cuban missile crisis (16-28 October). The last U.S. atmospheric nuclear test was launched from Johnston on 4 November 1962. The JACADS facility to incinerate chemical weapons completed its mission in 2000.

The Limited Test Ban Treaty, which banned atmospheric and underwater nuclear tests, was signed in August of 1963. The lofty goals expressed in the Limited Test Ban Treaty preamble have still not been realized. (A brief summary of the status in 1995 follows. Updates are in section H). Since 1993 only China has continued nuclear testing. A Comprehensive Test Ban Treaty which would prohibit all nuclear weapons testing is being negotiated; it is hoped that this treaty will be finished in 1996. China has stated that it will stop testing when the Comprehensive Test Ban Treaty enters into force; it conducted an underground test on 15 May, just three days after the end of the nuclear Non-Proliferation Treaty Review and Extension Conference. On 13 June French President Jacques Chirac announced that France would resume underground nuclear testing at Moruroa Atoll in September. French plans call for a series of eight tests ending in May of 1996 after which France would end testing permanently and would sign the Comprehensive Test Ban Treaty. Subsequent newspaper reports indicated that the United States was also considering resuming low-yield nuclear tests.

**Proclaiming as their principal aim the speediest possible achievement of an agreement on general and complete disarmament under strict international control in accordance with the objectives of the United Nations which would put an end to the armaments race and eliminate the incentive to the production and testing of all kinds of weapons, including nuclear weapons,... Seeking to achieve the discontinuance of all test explosions of nuclear weapons for all time, determined to continue negotiations to this end, and desiring to put an end to the contamination of man's environment by radioactive substances,...**

*From the preamble of  
the 1963 Limited Test Ban Treaty*

One of the consequences of the Limited Test Ban Treaty affecting Hawai'i is an obscure U.S. program known as Safeguard C. This program was mandated by Congress to maintain support facilities in the Pacific so that atmospheric nuclear testing could quickly resume if necessary. The Kaua'i Test Facility at the Pacific Missile Range Facility on Kaua'i was set up under Safeguard C to provide capability to launch sensors to monitor atmospheric nuclear tests. The Kaua'i Test Facility is now used to launch "Star Wars" experiments.



Eight hundred miles away high above Johnston Island, the nuclear explosion lights the sky near the Hawaiian Islands as spectators in Waikiki watch. Life Magazine, 20 July 1962 issue.



# SECTION G

## The Future

Over 127,000 nuclear weapons have been produced in the past seventy-five years, but none have been used in warfare since Nagasaki. Production of such unprecedented destructive potential was justified in the U.S. as necessary to prevent nuclear attack on the U.S. and its allies. The hope was that a potential attacker would be deterred by the prospect of nuclear destruction in retaliation. There have been no large-scale wars in which the U.S. and Soviet Union confronted each other, but there were some close calls (e.g. the Cuban missile crisis) and numerous smaller-scale wars.

Nuclear deterrence and the existence of large nuclear arsenals raise difficult ethical dilemmas. In the mid-1980's, the U.S. Catholic Bishops' analysis found nuclear deterrence conditionally acceptable only if there were no better alternatives to prevent nuclear war. The U.S. Methodist Bishops found nuclear deterrence unacceptable. The end of the Cold War offers the opportunity to reconsider these ethical issues and perhaps the possibility of a treaty abolishing nuclear weapons, similar to the treaties banning chemical and biological weapons.

The nuclear Non-Proliferation Treaty has been partially successful stopping the spread of nuclear weapons to countries that did not have them in 1970. However, some nuclear-capable nations (e.g. Israel, India, Pakistan) have not signed the Non-Proliferation Treaty, other nations which have signed may be trying to acquire nuclear weapons in secret, and the nuclear-weapons

nations (U.S., Russia, United Kingdom, France, and China) have not fulfilled their Non-Proliferation Treaty commitments to ban nuclear testing and to pursue negotiations on nuclear disarmament. The Non-Proliferation Treaty Review and Extension Conference in April-May 1995 reached a consensus to extend the Non-Proliferation Treaty indefinitely. The nations at the conference also adopted a statement of Principles and Objectives for Nuclear Non-Proliferation and Disarmament, which calls for "completion by the Conference on Disarmament of the negotiations on a universal and internationally and effectively verifiable Comprehensive Nuclear-Test-Ban Treaty no later than 1996" and for "determined pursuit by the nuclear-weapon states of systematic and progressive efforts to reduce nuclear weapons globally, with the ultimate goal of eliminating those weapons."



Hiroshima Peace Bell, Honolulu, Hawai'i. Michael Jones.

Production of nuclear weapons over the past 75 years has left a legacy of radioactive contamination throughout the nuclear weapons production complex. The U.S. Dept. of Energy report "Closing the Circle on the Splitting of the Atom" documents the environmental, safety, and health problems. The Dept. of Energy study "Estimating the Cold War Mortgage" estimates

that the remediation of 115 contaminated sites in 30 states would cost \$200-350 billion. About 80% of the work would be done over the next 40 years, but the work would not be complete until the year 2070. The contamination is much worse in the former Soviet Union. In addition, disposing of the plutonium in dismantled warheads is a serious and urgent problem.

**Even with the Cold War over, our nation must maintain military forces that are sufficient to deter diverse threats.... We will retain strategic nuclear forces sufficient to deter any future hostile foreign leadership with access to strategic nuclear forces from acting against our vital interests and to convince it that seeking a nuclear advantage would be futile. Therefore, we will continue to maintain nuclear forces of sufficient size and capability to hold at risk a broad range of assets valued by such political and military leaders.... A critical priority for the United States is to stem the proliferation of nuclear weapons and other weapons of mass destruction and their missile delivery systems.**

*President William J. Clinton, NSS July 1994, as quoted in the 22 September 1994 presentation of the Dept. of Defense's Nuclear Posture Review*

**As we make adjustments in our future plans for the U.S. nuclear posture, uppermost in our minds is the fact that the states of the former Soviet Union are yet in the early stages of implementing the agreed reductions called for by the START I and START II agreements. We are trying to hasten that process through, among other things, our Cooperative Threat Reduction programs with Russia, Ukraine, Kazakhstan; and Belarus. But we kept in mind as we conducted the Nuclear Posture Review that START I has not yet entered into force, nor has START II be (sic) ratified. For this reason, and because of the uncertain future of the rapid political and economic change still underway in the former Soviet Union, we made two judgments in the NPR. First, we concluded that deeper reductions beyond those we made in the NPR would be imprudent at this time; and second, we took several actions to ensure that we could reconstitute our forces as the decade went along, if we needed to. The results of the NPR strike an appropriate balance between showing U.S. leadership in responding to the changed international environment and hedging against an uncertain future.**

*From the 22 September, 1994 press release announcing the results of the U.S. Dept. of Defense's Nuclear Posture Review (quoting Secretary of Defense William J. Perry)*

**There are no compelling technical or political reasons why we and the Russians, and even the French and the Chinese too, should not in time succeed in negotiating our nuclear weapons all the way down to zero. The obstacles are primarily institutional and psychological. Too few of us believe that negotiating down to zero is possible. To achieve this goal, we shall need a worldwide awakening of moral indignation pushing the governments and their military establishments to get rid of these weapons which in the long run endanger everybody and protect nobody. We shall not be finished with nuclear weapons in a year or in a decade. But we might, if we are lucky, be finished with them in a half century, in about the same length of time that it took the abolitionists to rid the world of slavery.**

*Weapons and Hope by Freeman Dyson, 1984*

**The most safe, sure and swift way to deal with the threat of nuclear arms is to do away with them in every regard. This should be our vision of the future. No more testing. No more production. No more sales or transfers. Reduction and destruction of all nuclear weapons and the means to make them should be humanity's great common cause.**

*UN Secretary-General Boutros Boutros-Ghali at the opening of the Nuclear Non-Proliferation Treaty Review and Extension Conference at the UN in New York, 17 April 1995*



Hiroshima Cenotaph Public Domain.  
Michael Oswald 5 April 2006.

**Memorial Cenotaph at Hiroshima, Japan. Dedicated to the memory of those who perished in the atomic bombing. The inscription on the monument reads: "Let all the souls here rest in peace, for we shall not repeat this evil."**

# SECTION H

## Updates

There have been a number of significant developments – some hopeful and some ominous – since 1995. This update focuses on nuclear testing, reductions in U.S. and Russian nuclear forces, on international efforts to achieve the abolition of nuclear weapons, and on provocative actions by Iran and North Korea.

China and France conducted nuclear tests while the Comprehensive Test Ban Treaty (CTBT) was being negotiated in Geneva. China did four tests in 1995-1996. The six French tests near Tahiti during that period sparked protests in Tahiti, Hawai'i, and worldwide. India blocked approval of the treaty by the United Nations Conference on Disarmament but Australia submitted it as a U.N. resolution in September 1996. This resolution passed by a vote of 158 to 3. The CTBT has been signed by 184 nations and ratified by 168. Of the 44 nations that must ratify before it enters into force, all but three (India, Pakistan, and N. Korea) have signed and five (China, Egypt, Iran, Israel, and the U.S.) have not yet ratified.

Perhaps the most ominous developments since 1995 are the nuclear tests by India, Pakistan, and North Korea. India did five tests in mid-May 1998 and Pakistan followed with six tests at the end of May. Both countries are also developing and testing missiles which could carry nuclear warheads. North Korea withdrew from the Non-Proliferation Treaty in 2003 and did 6 nuclear tests

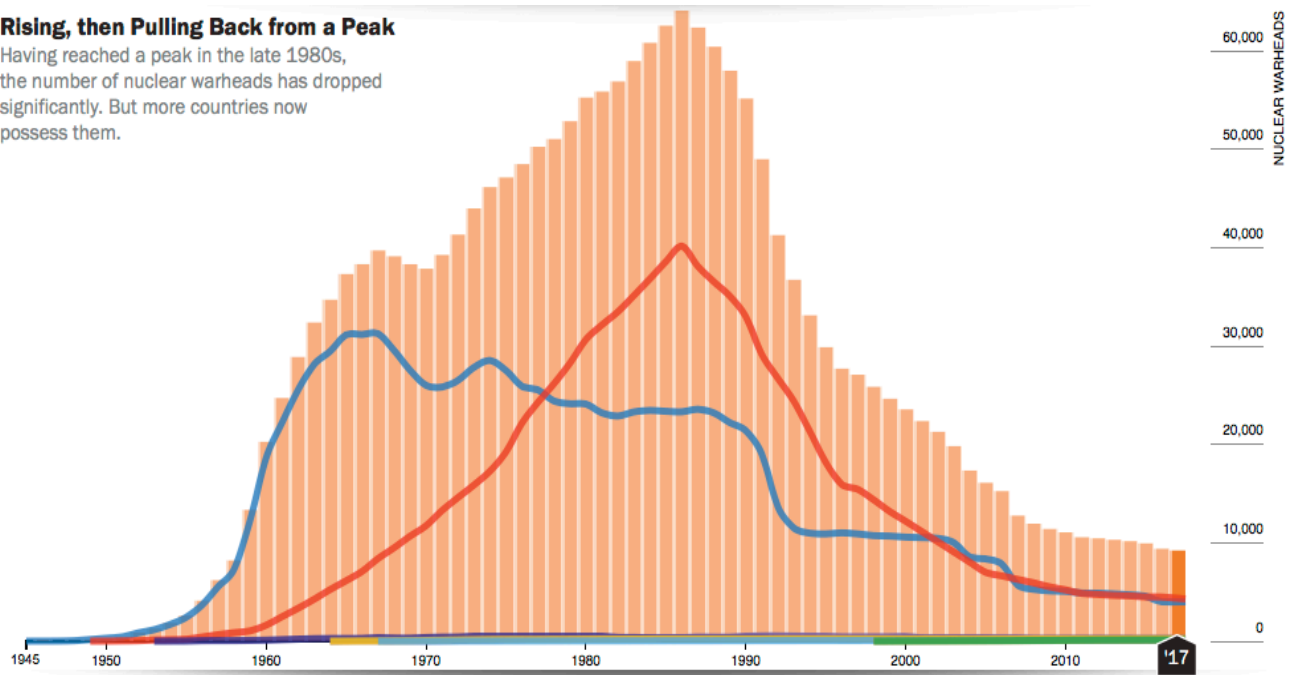
from 2006 to 2017. These and tests of long-range missiles were condemned by the UN Security Council, which also imposed sanctions. Iran's nuclear program was also subject of UN sanctions several times from 2006 until 2015 when an agreement was reached limiting the amount of enriched uranium and enrichment level. This agreement is under stress after the U.S. withdrew in May 2018 and Iran exceeded the limits in July 2019. Allegations that Iraq had weapons of mass destruction (WMDs) in 2003 were used by the U.S. and U.K. to justify invasion. No WMDs were found.

The U.S. and Russia have reduced their nuclear forces significantly since the end of the Cold War but the reductions have stalled. The SORT (Moscow) Treaty reducing arsenals was signed in 2002 and expired in 2012. The New START Treaty signed in 2010 imposed further reductions but expires in 2021. The U.S. withdrew from the ABM Treaty in 2002 and from the INF Treaty in 2019. Prospects for further reductions are not promising. Russia is developing new weapons to counter U.S. missile defenses. The 2018 U.S. Nuclear Posture Review envisions updating all three legs of the nuclear triad.

Perhaps the most hopeful developments since 1995 are efforts on abolition of nuclear weapons at the grassroots, national, and international levels. An encouraging precedent is the entry into force of the Chemical Weapons Convention in April 1997. This treaty bans chemical

### Rising, then Pulling Back from a Peak

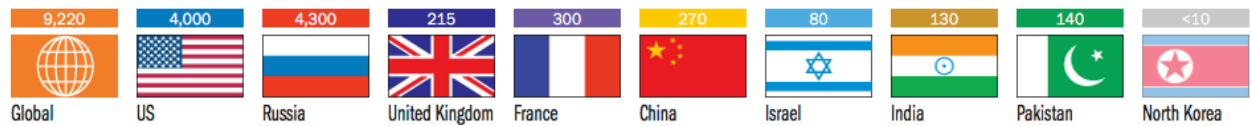
Having reached a peak in the late 1980s, the number of nuclear warheads has dropped significantly. But more countries now possess them.



#### STOCKPILED WARHEAD COUNT BY YEAR

CLICK A FLAG TO HIDE OR REVEAL

COMPARATIVE CUMULATIVE



Source: *The Bulletin of the Atomic Scientists' Nuclear Notebook*, written by Hans M. Kristensen and Robert S. Norris, Federation of American Scientists



Paper lanterns to commemorate the victims of the bombing of Hiroshima float in the Motoyasu River in front of the Atomic Bomb Dome, in Hiroshima, Japan. TORU YAMANAKA / AFP/GETTY IMAGES.

weapons and includes intrusive inspection and monitoring procedures that would be necessary for a treaty banning nuclear weapons. One approach to abolition is the establishment of nuclear-free zones. In March 1996, the U.S., U.K., and France finally signed the protocols of the 1985 South Pacific Nuclear Free Zone Treaty. The Treaty of Pelindaba, which makes Africa a nuclear-weapon-free zone, was signed the next month.

A major impetus for renewed international action was the ruling in July 1996 by the World Court that “threat or use of nuclear weapons would generally be contrary to the rules of international law applicable in armed conflict” and that nations are obligated to “bring to a conclusion negotiations leading to nuclear disarmament.” Negotiations on a treaty prohibiting nuclear weapons were stalled for many years but a treaty was submitted to the U.N. General Assembly in July 2017 and opened for signature in September 2017. Seventy nations have signed but none of those with nuclear weapons are included.

How does this affect Hawai‘i? According to a report in the November and December 1995 Bulletin of the Atomic Scientists, nuclear weapons that had been stored in Hawai‘i were removed in 1995. (There had been 345 in Hawai‘i according to the 1985 book Nuclear Battlefields.) It is generally acknowledged that the threat of nuclear attack by Russia is much less since the end of the Cold War. However, proliferation of weapons of mass destruction and ballistic missiles are increasing threats. The unexpected launch of a three-stage missile by N. Korea on 31 August 1998 raised fears that such a missile might be able to strike Alaska or Hawai‘i.

The false missile alert on 13 January, 2018 was even more alarming. These incidents and the July 1998 report of the Commission to Assess the Ballistic Missile Threat to the United States are often cited as reasons to deploy a national missile defense and theater missile defenses against shorter-range missiles. Missile interceptors have been deployed in Alaska and California. The Pacific Missile Range Facility on Kaua‘i has been involved in tests of missile interceptors on Navy ships and from land. A sea-based X-band radar used for missile tracking and which resembles a giant golf ball can often be seen in Pearl Harbor. Environmental studies began in 2018 for a missile tracking radar on Oahu and interceptors have been proposed for Kaua‘i.

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*Radio Bikini* (1988 documentary about nuclear tests at Bikini in 1946) 56 min. DVD 1856.

*Half-Life: A Parable for the Nuclear Age* (1986 documentary focussing on the 1954 Bravo test at Bikini) 86 mins. DVD 11088.

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Nagasaki and Hiroshima Peace Bells in Honolulu, Hawai'i, Michael Jones.



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