
Embrace a world free of nuclear weapons

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Ending Nuclear Testing

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The history of nuclear testing began early on the morning of 16 July 1945 at a desert test site in Alamogordo, New Mexico when the United States exploded its first atomic bomb. Designated as the Trinity Site, this initial test was the culmination of years of scientific research under the banner of the so-called “Manhattan Project”.

In the five decades between that fateful day in 1945 and the opening for signature of the Comprehensive Nuclear-Test-Ban Treaty (CTBT) in 1996, over 2,000 nuclear tests were carried out all over the world.

- **The United States** conducted 1,032 tests between 1945 and 1992.
- **The Soviet Union** carried out 715 tests between 1949 and 1990.
- **The United Kingdom** carried out 45 tests between 1952 and 1991.
- **France** carried out 210 tests between 1960 and 1996.
- **China** carried out 45 tests between 1964 and 1996.

In the five decades between 1945 and 1996, over 2,000 nuclear tests were carried out all over the world.

After the CTBT was opened for signature in September 1996, about half a dozen nuclear tests have been conducted:

- **India** conducted two tests in 1998 (India had also conducted one so-called peaceful nuclear explosion in 1974.)
- **Pakistan** conducted two tests in 1998.
- **The Democratic People’s Republic of Korea** announced that it had conducted a nuclear test in 2006.

**Types of Nuclear Tests**

Nuclear explosions have been detonated in all environments: above ground, underground and underwater. Bombs have been detonated on top of towers, onboard barges, suspended from balloons, on the earth’s surface, underwater to depths of 600m, underground to depths of more than 2,400m and in horizontal tunnels. Test bombs have been dropped by aircraft and fired by rockets up to 200 miles into the atmosphere.
Atmospheric testing

Signing of the Partial Test Ban Treaty, 5 August 1963. Secretary of State Dean Rusk signing for the United States; Foreign Minister Andre Gromyko, signing for the Soviet Union; and Lord Hume signing for the United Kingdom. Photo: CTBTO.

Atmospheric testing refers to explosions which take place in or above the atmosphere. All told, of the over 2,000 nuclear explosions detonated worldwide between 16 July 1945 (United States) and 29 July 1996 (China), 25% or over 500 bombs were exploded in the atmosphere: over 200 by the United States, over 200 by the Soviet Union, about 20 by Britain, about 50 by France and over 20 by China.

International concern over radioactive fallout resulting from atmospheric tests escalated in the mid 1950s. In March 1954, the United States tested its hydrogen bomb Castle Bravo in the Pacific’s Marshall Islands. The Bravo test created the worst radiological disaster in the United States’ testing history. By accident, local civilians on the Marshall Islands, US servicemen stationed on Rongerik atoll, and the Japanese fishing trawler Lucky Dragon, were contaminated with the fallout.

Nuclear weapon tests have been carried out in all environments: above ground, underground and underwater.

Atmospheric testing was banned by the 1963 Partial Test Ban Treaty. Negotiations had largely responded to the international community’s grave concern over the radioactive fallout resulting from atmospheric tests. The United States, the Soviet Union and the United Kingdom became Parties to the Treaty; France and China did not. France conducted its last atmospheric test in 1974, China in 1980. CTBTO’s infrasound IMS stations are used to detect nuclear explosions by monitoring low-frequency sound waves in the atmosphere. CTBTO Radionuclide IMS stations are designed to detect radioactive particles emanating from an atmospheric test.

Underwater testing

Underwater testing refers to explosions which take place underwater or close to the surface of the water. Relatively few underwater tests have been conducted. The first underwater nuclear test — Operation Crossroads — was conducted by the United States in 1946 at its Pacific Proving Grounds in the Marshall Islands with the purpose of evaluating the effects of nuclear weapons used against naval vessels. Later, in 1955, the United States’ Operation Wigwam conducted a single underwater nuclear test at a depth of 600 m to determine the vulnerability of submarines to nuclear explosions.

Underwater nuclear explosions close to the surface can disperse large amounts of radioactive water and steam, contaminating nearby ships, structures and individuals.

Underwater nuclear testing was banned by the 1963 Partial Test Ban Treaty. The CTBTO’s hydroacoustic IMS stations are those best suited to detect nuclear explosions underwater.

Of the over 2,000 nuclear explosions detonated worldwide between 1945 and 1996, 25% or over 500 bombs were exploded in the atmosphere.

Underground testing
Underground testing means that nuclear explosions are detonated at varying depths under the surface of the earth. These comprised the majority (i.e. about 75%) of all nuclear explosions detonated during the Cold War (1945–1989); that is, over 800 of all tests conducted by the United States and nearly 500 of all tests conducted by the Soviet Union. When the explosion is fully contained, underground nuclear testing emits negligible fallout compared to atmospheric testing. However, if underground nuclear tests "vent" to the surface, they can produce considerable radioactive debris. Underground testing is usually evident through seismic activity related to the yield of the nuclear device. Underground nuclear testing was banned by the 1996 Comprehensive Nuclear-Test-Ban Treaty (CTBT) that bans all nuclear explosions on Earth.

75% of all nuclear test explosions during the cold war were conducted underground.

The CTBTO’s seismic IMS stations are used to detect nuclear explosions underground. The seismic data is combined with radionuclide data. Only the radionuclide technology can determine if an explosion is nuclear in origin; its stations and laboratories around the world monitor the presence of particulates and/or noble gases in the atmosphere. For more details see Nuclear Testing Tally: A numeric breakdown of the number of atmospheric and underground nuclear tests conducted by each testing country for each year from 1945–2006.

**Nuclear Testing 1945–2009**

**The beginning of the nuclear era**
The United States launched the Nuclear Age in the pre-dawn hours of 16 July 1945 when it detonated a 20-kiloton atomic bomb code-named "Trinity" at Alamogordo, New Mexico. Under the umbrella of the "Manhattan Project", the test’s original purpose had been to confirm that an implosion-type nuclear weapon design was feasible. It also gave United States’ scientists and the military an idea of what the actual size and effects of such nuclear explosions would be before using them in combat. While the Alamogordo test demonstrated many of the explosion's effects, it failed to provide a meaningful comprehension of radioactive nuclear fallout, which was not well understood by project scientists until years later. The United States dropped two atomic bombs on Japan towards the end of World War II: one an untested gun-type fission bomb called “Little Boy” on Hiroshima on 6 August 1945; another implosion-type bomb tested at Alamogordo for the first time a month earlier and called “Fat Man” on Nagasaki on 9 August. Together these two bombs killed some 220,000 Japanese citizens outright, with over 200,000 more dying subsequently from lethal radiation overdoses.

**From “hot war” to Cold War**
No sooner was World War II brought to a close in August 1945 than an all-out technical-industrial nuclear weapons race ensued between the two newly emerging superpowers, the United States and the Soviet Union. Between 1946 and 1949, the United States conducted an additional six tests. Then on 29 August 1949, the Soviet Union tested its first atomic bomb, “Joe 1”. This test marked the beginning of the “Cold War” nuclear arms race between the two superpowers.
With the Soviet Union's first atomic bomb test on 29 August 1949, the "cold war" nuclear arms race between the USSR and the United States was on.

At the outset, neither the United States nor the Soviet Union had many nuclear weapons to spare so their nuclear testing was relatively limited. However, by the 1950s the United States had established a dedicated test site (Nevada Test Site) and was also using a site in the Marshall Islands (Pacific Proving Grounds) for extensive nuclear testing. The Soviet Union also began testing on a limited scale, primarily in Semipalatinsk in the Soviet Republic of Kazakhstan. Early tests were used primarily to ascertain the military effects of nuclear weapons and to test new weapon designs.

Exacerbated tensions and an atmosphere of pervasive fear and suspicion catalyzed competition to build more powerful and sophisticated bombs. During the 1950s new hydrogen bomb designs were tested in the Pacific, as were new and improved fission weapon designs.

In 1954 India's Prime Minister Jawaharlal Nehru became the first statesmen to call for a "stand still" agreement on nuclear testing.

India’s Prime Minister Jawaharlal Nehru was the first statesman to call for a “stand still” agreement on nuclear testing on 2 April, 1954. However, this did little to stop the extensive nuclear testing that characterized the following 35 years, not subsiding until the end of the Cold War in the late 1980s.

From 1955 to 1989, the average number of nuclear tests conducted every year was 55. Nuclear testing peaked in the late 1950s and early 1960s. The year 1962 alone saw as many as 178 tests: 96 conducted by the United States and 79 by the Soviet Union. This was the year of the Cuban Missile Crisis when the Cold War threatened to become a nuclear war. The preceding year had seen the testing of the largest nuclear weapon ever exploded, the Soviet Union’s “Tsar Bomba” with an estimated yield of 50 megatons. It was tested at the Novaya Zemlya test site near the Arctic Circle.

France and China became nuclear weapon States in 1960 and 1964 respectively, with both
nuclear programmes intended to provide credible nuclear deterrents. France initially tested in Algeria, and later on in the South Pacific. China conducted all its nuclear tests at Lop Nur in Xinjiang Province.

The 1963 partial test ban treaty banned nuclear testing, including testing for peaceful purposes, in the atmosphere, underwater and in space... but not underground.

The early 1960s also saw the introduction of the only testing limitation effort that had concrete effects on how testing was conducted during the Cold War. The 1963 Partial Test Ban Treaty banned nuclear testing for military and for peaceful purposes, in the atmosphere, underwater and in space. The Treaty was important from an environmental point of view, curbing the radioactive fallout closely associated with atmospheric tests, but did little to prevent overall nuclear testing, which largely moved underground.

**Burgeoning nuclear arsenals**

The world’s nuclear arsenals ballooned throughout the Cold War, from slightly more than 3,000 weapons in 1955 to over 37,000 weapons by 1965 (United States 31,000 and the Soviet Union 6,000), to 47,000 by 1975 (United States 27,000 and Soviet Union 20,000), and over 60,000 in the late 1980s (United States 23,000 and the Soviet Union 39,000).

According to the Nuclear Threat Initiative, Israel initiated a nuclear programme in the 1950s, and had completed the R&D phase of its nuclear weapon programme in 1966, although it has not, to public knowledge, tested such a weapon. Israel has adopted a so-called “nuclear ambiguity policy”, neither confirming nor denying its nuclear status. It is not a party to the 1968 Non-Proliferation Treaty, and it has signed but not ratified the CTBT. For more information about Israel and the CTBT, click here.

Officially, India became the sixth nation to develop nuclear weapons, conducting a nuclear test, declared as a peaceful nuclear explosion, in May 1974. In 1982, one additional nation, South Africa, acquired nuclear weapons, according to the Monterey Institute’s Center on Non-Proliferation Studies. To public knowledge, South Africa did not conduct any nuclear tests. Less than ten years later, with the anticipated transition to a majority-elected government, South Africa dismantled all of its nuclear weapons, the only nation to date that voluntarily relinquished the nuclear arms under its complete control. The dismantling was completed in 1991. The same year, South Africa acceded to the 1968 Non-Proliferation Treaty as a non-nuclear weapon State. It voted overwhelmingly to end apartheid on 18 March 1992.

Underground nuclear testing was banned by the 1996 Comprehensive Nuclear-Test-Ban Treaty, which bans all nuclear explosions on Earth.

The world did not witness any significant decrease in nuclear testing activities and nuclear weapons acquisition among the nuclear weapon States until the early 1990s. The total number of nuclear tests in the second half of the 1980s amounted to as many as 174. But warmer relations between the Soviet Union and the United States from the mid-1980s prepared the way, as did the fall of the Berlin Wall in 1989 and the 1991 dissolution of the Soviet Union, which was superseded by the Russian Federation. Belarus, Kazakhstan and Ukraine who, together with Russia, had hosted the Soviet nuclear arsenal, became non-
nuclear weapon States under the Non-proliferation Treaty. The USSR's main test site, Semipalatinsk in Kazakhstan, was closed in 1991.

**Moratoria on nuclear testing**

In 1990, the Soviet Union proposed a moratorium on nuclear testing that was agreed to by the United Kingdom and the United States. This created an opportunity to move ahead for those advocates who, for decades, had promoted a comprehensive ban on all nuclear testing.

Some six nuclear tests were conducted between 1998 and 2009: two by India and two by Pakistan in 1998 and one by the Democratic People's Republic of Korea (DPRK) in 2006 and another one by the DPRK in 2009.

The Soviet Union's last nuclear test took place on 24 October 1990; the United Kingdom's on 26 November 1991 and the United States' on 23 September 1992. France and China conducted their last tests in January and July 1996 respectively, before signing the Comprehensive Nuclear-Test-Ban Treaty on the day it opened for signature, 24 September 1996, together with the other three nuclear weapon States and 66 other countries. (For the status of signature and ratification of the Treaty today, please [click here](https://www.ctbto.org/status/signatures/). France closed and dismantled all its nuclear test sites in the 1990s — the only nuclear weapon State to date that has done so.

**Breaking the de facto moratorium**

About six nuclear tests were conducted between 1998 and 2009: two by India and two by Pakistan in 1998 and one by the Democratic People's Republic of Korea (DPRK) in 2006 and another one by the DPRK in 2009, thus four times breaking the de facto moratorium that the CTBT had established.

India conducted two underground nuclear tests, code-named “Shakti (Power) ‘98”, on 11 and 13 May 1998 at its Pokhran underground testing site. In contrast to India's initial nuclear test in 1974, this time there were no claims that these were “peaceful tests”. On the contrary, government officials were quick to emphasize the military nature of the explosions. A scant two weeks later, Pakistan reacted, conducting two underground nuclear tests at its Ras Koh range.

Both India and Pakistan immediately moved to announce unilateral moratoriums on nuclear testing and have conducted no nuclear tests since 1998.

To read more about the 1998 tests conducted by India and Pakistan, see [The Treaty: History](https://www.ctbto.org/the-treaty/history/).

The announced nuclear test by the DPRK on 9 October 2006 broke the eighth-year-long de facto moratorium and was against the letter and spirit of the Comprehensive Nuclear-Test-Ban Treaty.

Again on 9 October 2006, the announced nuclear test by the DPRK broke that eight-year-long de facto moratorium. It was met with near unanimous global expressions of concern. The UN Security Council strongly condemned the act as a clear threat to international peace and security. The Chairman and the Executive Secretary of the Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO), as well as States Signatories, expressed grave concern at the declared test and characterized the event as an
action against the letter and the spirit of the CTBT. The DPRK tested a second time on 25 May 2009, an act that was once again met with worldwide condemnation.

To read more about the announced nuclear test by the DPRK and the CTBTO findings in connection with this declared test, please click here: 2006 and 2009.

See an approximate overview of all nuclear testing to date, as well as the CTBT status of the countries that have conducted nuclear tests. See also map.

Comprehensive Nuclear-Test-Ban Treaty (CTBT)

The Treaty
Central to the issue of the Day against Nuclear Tests is the Comprehensive Nuclear Test Ban Treaty which bans nuclear testing everywhere on planet — surface, atmosphere, underwater and underground. The Treaty takes on significance as it also aims to obstruct the development of nuclear weapons: both the initial development of nuclear weapons as well as their substantial improvement (H-bomb) necessitate real nuclear testing. The CTBT makes it almost impossible for countries that do not yet have nuclear weapons to develop them. And it makes it almost impossible for countries that have nuclear weapons to develop new or more advanced weapons. It also helps prevent damage caused by nuclear testing to humans and the environment.

History
Between 1945 and 1996, when the CTBT opened for signature, over 2000 nuclear tests were conducted: by the United States (1000+) Soviet Union (700+), France (200+), United Kingdom and China (45 each). Three countries have broken the de-facto moratorium and tested nuclear weapons since 1996: India and Pakistan in 1998 and the Democratic People’s Republic of Korea (DPRK) in 2006. Many attempts were made during the Cold War to negotiate a comprehensive test ban, but it was only in the 1990s that the Treaty became a reality. The CTBT was negotiated in Geneva between 1994 and 1996.

The Treaty has yet to enter into force
All 44 States specifically listed in the Treaty — those with nuclear technology capabilities at the time of the final Treaty negotiations in 1996 — must sign and ratify before the CTBT can enter into force.

Of these, nine are still missing: China, DPRK, Egypt, India, Indonesia, Iran, Israel, Pakistan and the USA. DPRK, India and Pakistan have yet to sign the CTBT. Otherwise, 182 countries have signed, of which 153 have ratified the Treaty (as of May 2010 including three of the nuclear weapon States: France, Russian Federation and the United Kingdom).

The Treaty Organization
Since the Treaty is not yet in force, the Organization is called the Preparatory Commission for the Comprehensive Nuclear-Test-Ban Organization, or CTBTO. It was founded in 1996, with approximately 260 staff from most of the CTBT’s 182 Member States. It is headed by the Executive Secretary, Tibor Tóth (Hungary). The CTBTO’s main tasks are the promotion of the Treaty and the build-up of the verification regime so that it is operational when the Treaty enters into force. The budget is around US$120,000,000 or €82,000,000.

Verification regime
It is a unique and comprehensive system. At the heart of the verification regime is the International Monitoring System (IMS), which consists of 337 facilities located all over the world that constantly monitor the planet for signs of nuclear explosions. Around 80% of these facilities are already sending data to the International Data Centre at the CTBTO headquarters in Vienna. The IMS uses the following four state-of-the-art technologies:
Seismic: Fifty primary and 120 auxiliary seismic stations monitor shockwaves in the Earth. The mandate of the CTBTO is to detect nuclear explosions such as those announced by the DPRK in 2006 and 2009. To do so, it needs to find the needle in the haystack: the vast majority of shockwaves — many thousands every year — are caused by earthquakes whereas others are man-made explosions such as mine explosions.

Hydroacoustic: Eleven hydrophone stations "listen" for sound waves in the oceans. Sound waves from explosions can travel extremely far underwater.

Infrasound: Sixty stations on the surface can detect ultra-low frequency sound waves (inaudible to the human ear) that are emitted by large explosions.

Radionuclide: Eighty stations measure the atmosphere for radioactive particles, 40 of them also pick up noble gas. Only these measurements can give a clear indication as to whether an explosion detected by the other methods was actually nuclear or not. They are supported by 16 radionuclide laboratories.

**On-site-Inspection**

If the data from the IMS stations indicate that a nuclear test has taken place, a Member State can request for an on-site-inspection to be carried out to collect evidence that will allow the final assessment to be made regarding whether a nuclear explosion — a Treaty violation — has actually taken place. This will only be possible after the CTBT has entered into force. A large on-site inspection exercise was carried out in September 2008 in Kazakhstan.

**Civil and scientific applications**

The IMS data are provided to the CTBT Member States. They are used also for applications other than test-ban verification, such as for tsunami-warning (by proving timely data), research on the Earth’s core, monitoring of earthquakes and volcanoes; research on the oceans, climate change research and many other applications.

This information and images on this page have been provided courtesy of the Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO).
**PROGRAMME**

**Informal Meeting of the General Assembly to mark the Observance of the International Day against Nuclear Tests**

The Meeting is convened by the President of the 66th session of the General Assembly, His Excellency Mr. Nassir Abdelaziz Al-Nasser and organized in cooperation with the Permanent Mission of the Republic of Kazakhstan.

**Date:** Thursday, 6 September 2012  
**Time:** 10:00 a.m. – 1:00 p.m.  
**Venue:** Conference Room 4, North Lawn Building, UN Headquarters, New York

Opening statements by:

- H.E. Nassir Abdelaziz Al-Nasser, President of the 66th session of the General Assembly  
- H.E. Ban Ki-moon, Secretary-General of the United Nations  
- Mr. Timur Zhantikin, Chairman of the Atomic Energy Agency of the Republic of Kazakhstan

**High-Level Panel on the Role of the United Nations in Nuclear Disarmament and Non-Proliferation**

The official opening ceremony will be followed by a High-Level Panel on the Role of the United Nations in Nuclear Disarmament and Non-Proliferation.

The panelists are expected to cover some key issues, including necessary steps for further progress on nuclear disarmament and non-proliferation, the establishment of further nuclear-weapon-free zones, confidence building and other relevant concerns.

**Moderator:**

- Dr. Randy Rydell, Senior Political Affairs Officer, Office of the United Nations High Representative for Disarmament Affairs

**General observations:**

- H.E. Tibor Tóth, Executive Secretary, Preparatory Commission of the Comprehensive Nuclear-Test-Ban Treaty Organization

The invited panel speakers include:

- H.E. Ambassador Susan F. Burk, Special Representative of the President of the United States for Nuclear Nonproliferation, Bureau of International Security and Nonproliferation  
- H.E. Ambassador Jim McLay, Permanent Representative of New Zealand to the United Nations  
- H.E. Ambassador Gary Quinlan, Permanent Representative of Australia to the United Nations  
- Mr. Geoffrey Shaw, Representative of the Director General of the International Atomic Energy Agency  
- Mr. John Burroughs, Executive Director, Lawyers Committee on Nuclear Policy

The panel will be followed by statements and questions and answers from Member States.

**Entry:** Delegates, NGOs and members of the media are welcome to attend. Those without a UN Grounds pass may contact: +1 (212) 230-1900, ext. 322.

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