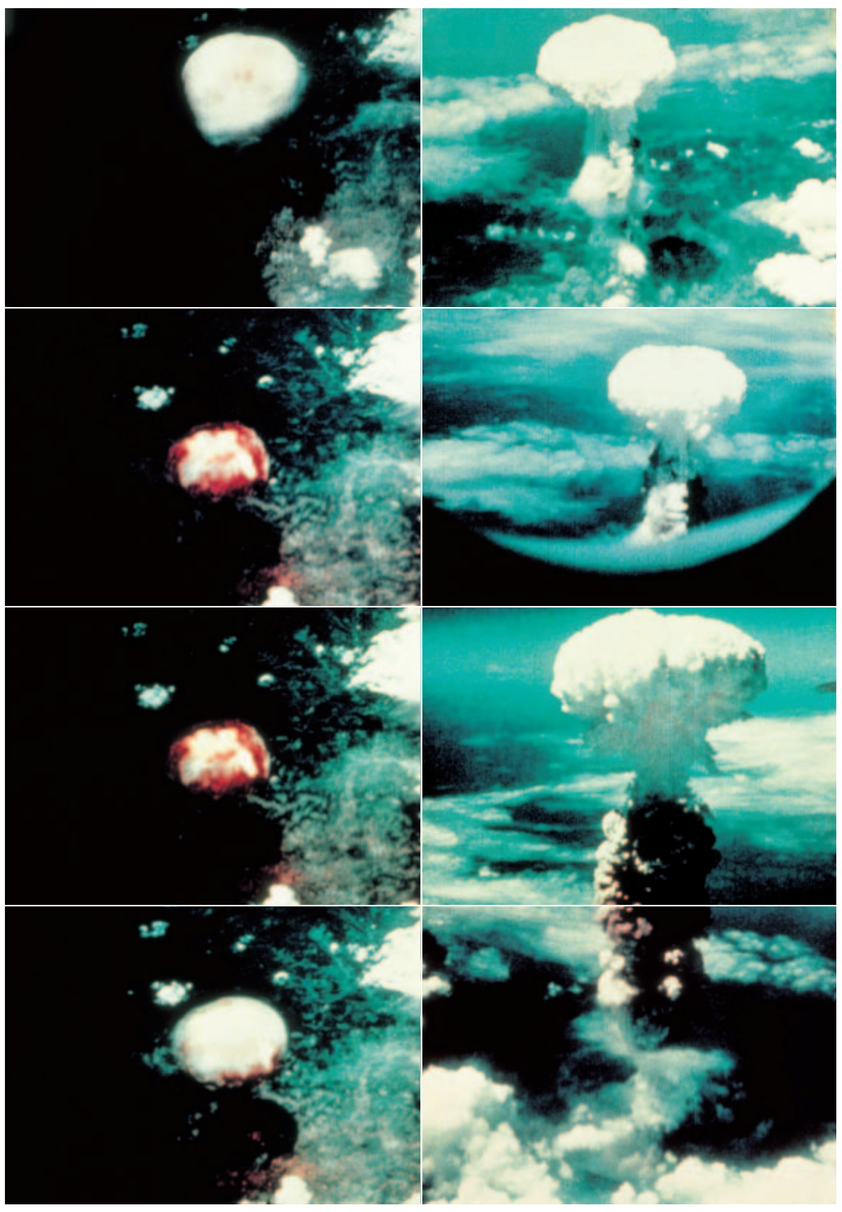
Billowing Mushroom Cloud

Hiroshima: 8:15 a.m., August 6, 1945
Nagasaki: 11:02 a.m., August 9, 1945

▲ **The Mushroom Cloud about 1 Hour after Detonation** (Hiroshima)
Taken from an altitude of about 9,000 m (29,520 feet) and a distance of about 80 km (50 miles) from the hypocenter from one of the three US bombers that took part in the A-bomb mission. (August 6, 1945-Photo: US Army)



▲ **The Billowing Mushroom Cloud** (Nagasaki)
A round white puff of smoke, then instantly a crimson fireball began to swell. (August 9, 1945-Photo: US Army) Courtesy: The Japan Peace Museum

The Vanished Cities

▲(Hiroshima) **Taken from the roof of the Hiroshima Chamber of Commerce and Industry building 260 m (286 yards) north of the hypocenter.**
(October 5, 1945-Photo: Shigeo Hayashi)

▲(Nagasaki) **Taken 120 m (132 yards) east of the hypocenter near what is now the Nagasaki Atomic Bomb Museum.**
(Mid-October 1945-Photo: Shigeo Hayashi)

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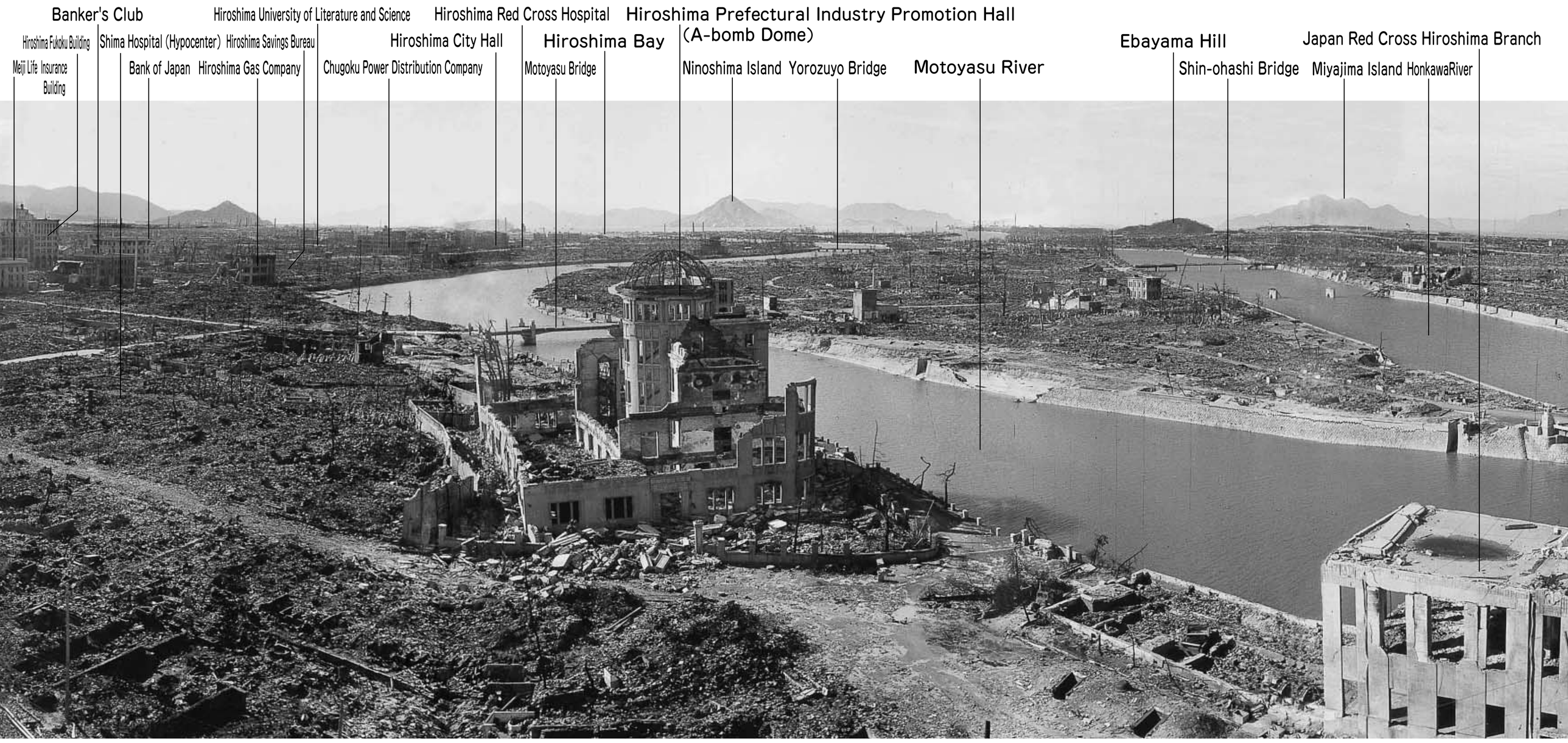

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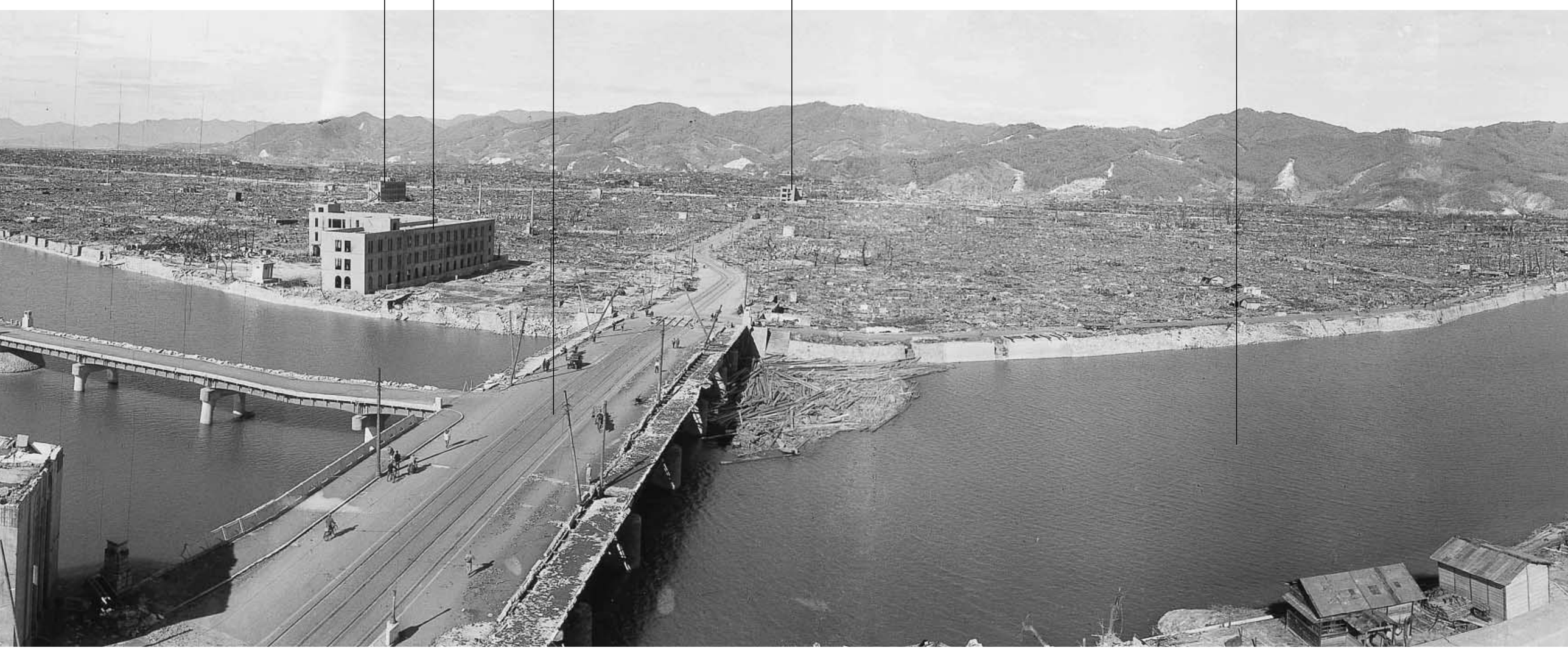
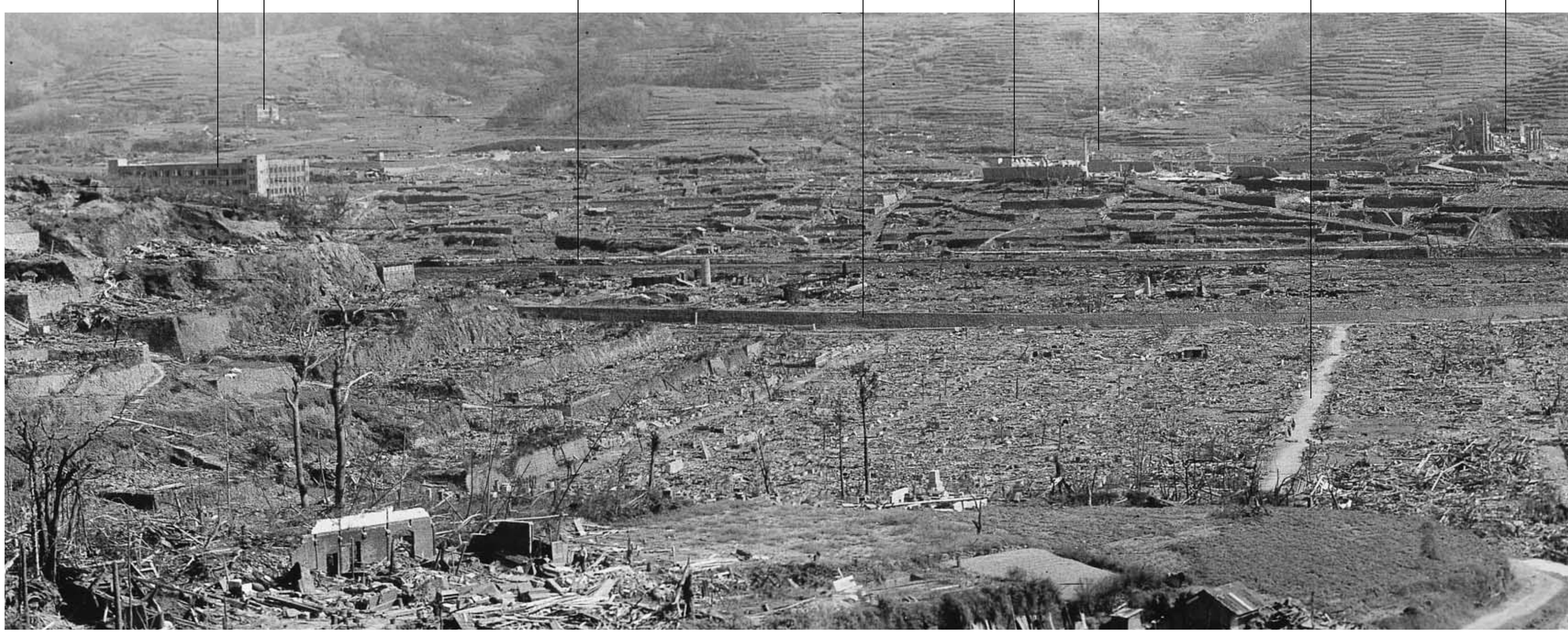
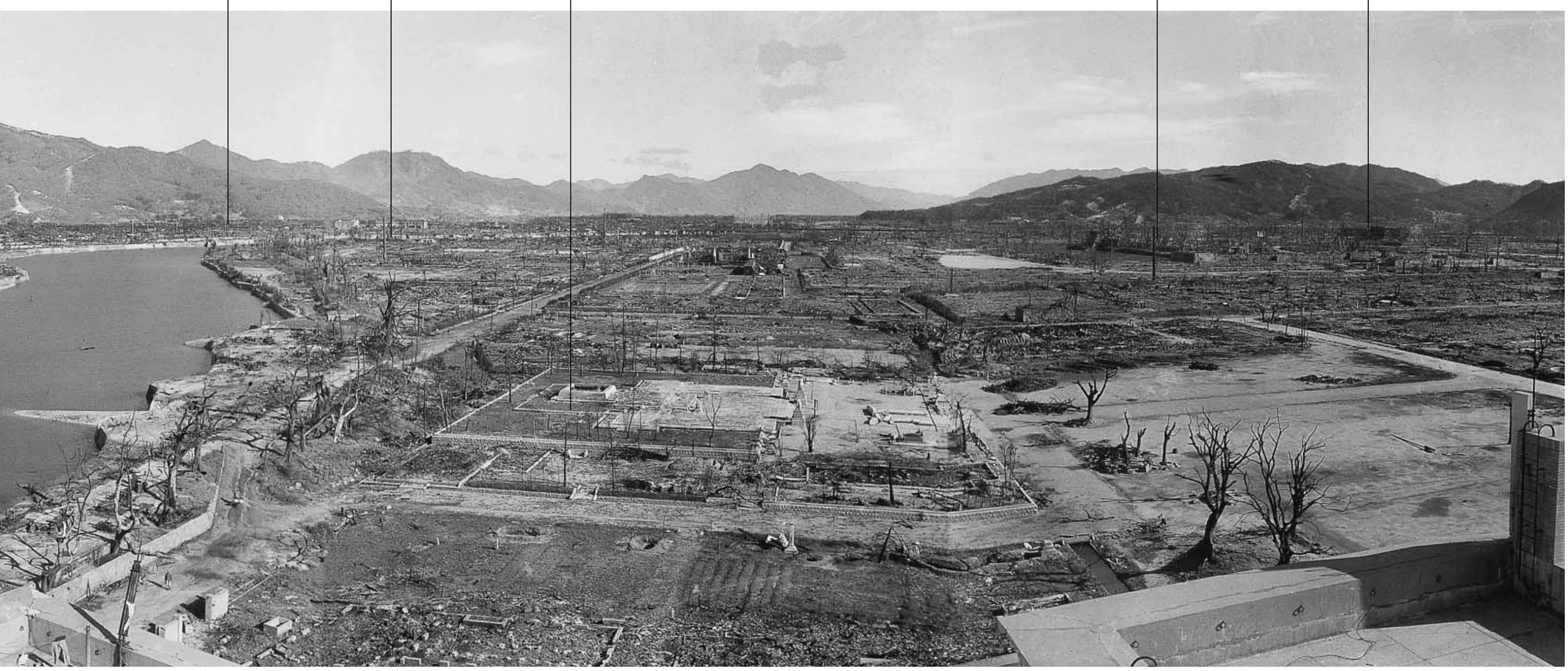




▲(Nagasaki) **Taken 900 m (990 yards) west of the hypocenter. The photo on the left is the view across the Urakami River in the opposite direction.**
(Mid-October 1945-Photo: Shigeo Hayashi)

HIROSHIMA & NAGASAKI



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A-bomb Damage

Atomic bombs utilize the enormous energy released by nuclear fission to inflict massive and instantaneous destruction and slaughter. The energy is released in three forms: heat, blast, and radiation. The synergistic effects of these three produce unimaginable destructive power. Two such bombs utterly obliterated the cities of Hiroshima and Nagasaki.

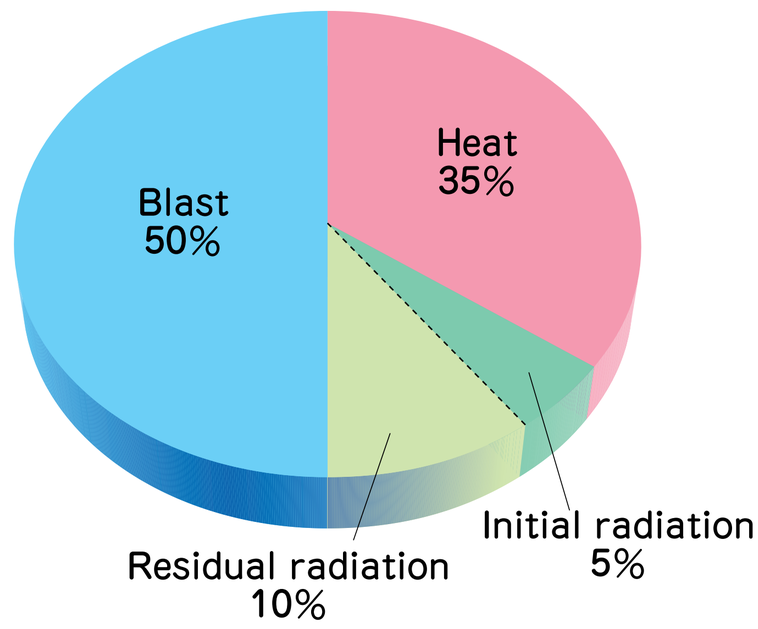
Long after the bombings, survivors continue to suffer from the physical damage caused by radiation. They have been forced to carry the terrible burden of never knowing when the aftereffects might manifest as a life-threatening disorder.

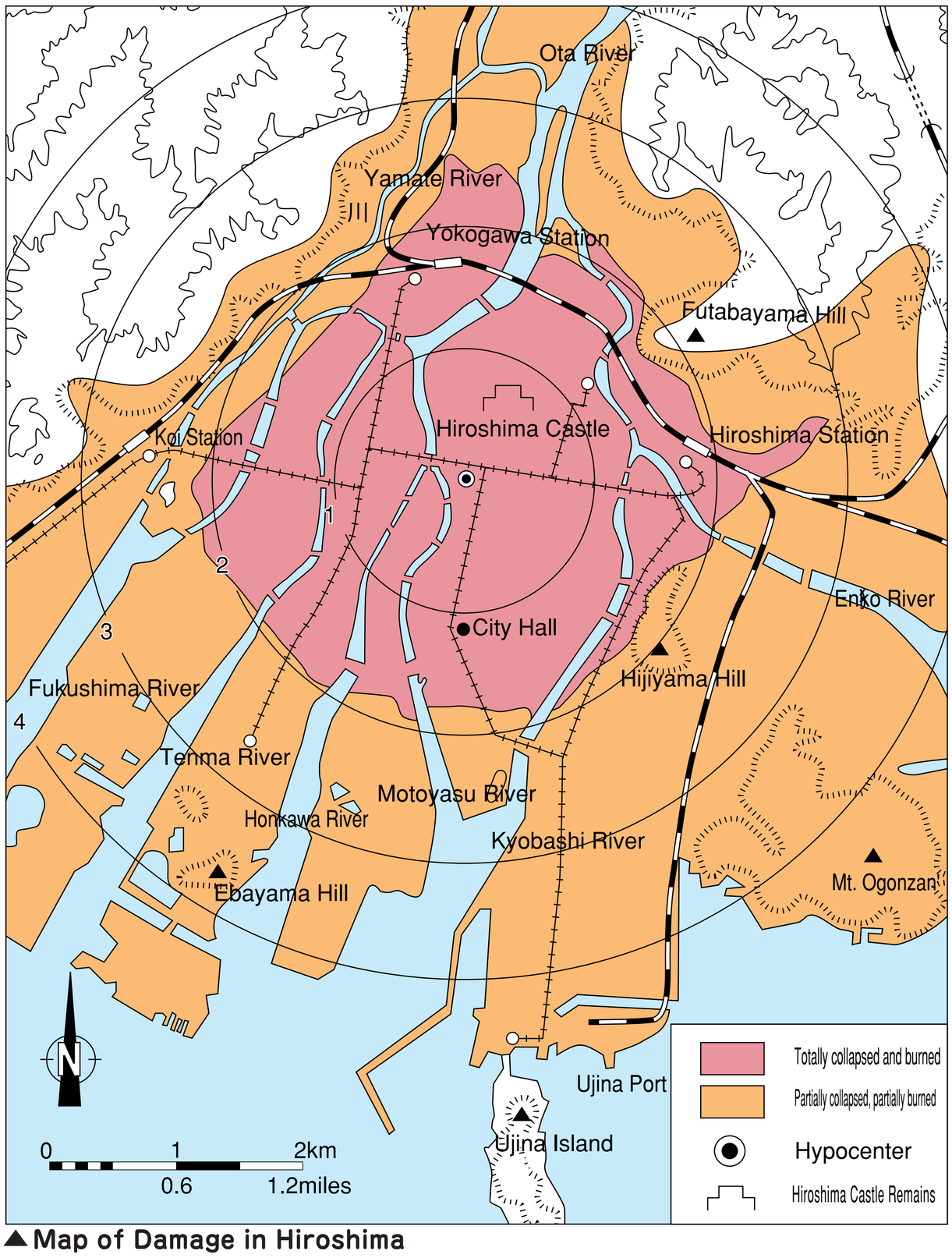
The atomic bombs inflicted massive human and property damage, resulting in intense psychological and emotional trauma, which was compounded by destruction of the entire fabric of those urban societies. The most distinctive characteristic of A-bomb damage is the complex interaction of destructive effects wrought by this broad spectrum of personal and social loss.

Profile of A-bomb Damage

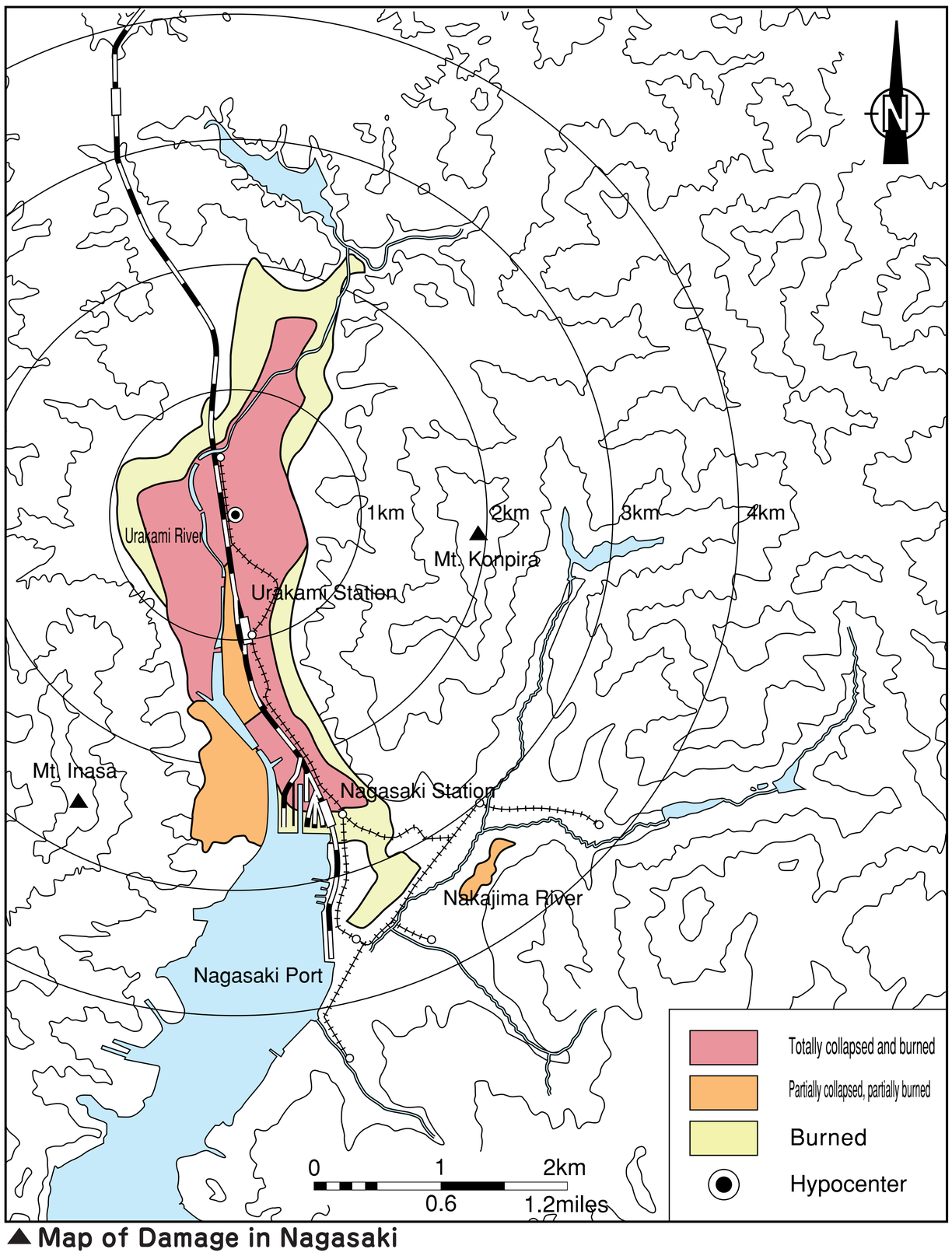
Category	Hiroshima	Nagasaki
Time of explosion	8:15 a.m., August 6, 1945	11:02 a.m., August 9, 1945
Number of dead	About 140,000 (± 10,000) [350,000 people estimated to have been in Hiroshima at the time]	About 74,000 (± 10,000) [Total pop. 240,000]
Damage to buildings	No. of buildings at the time: about 76,000	No. of buildings at the time: about 51,000
% damaged	92 %	36%
Totally collapsed and burned	63%	23%
Totally collapsed	5%	2%
Partially collapsed, partially burned, seriously damaged	24%	11%

Energy Released





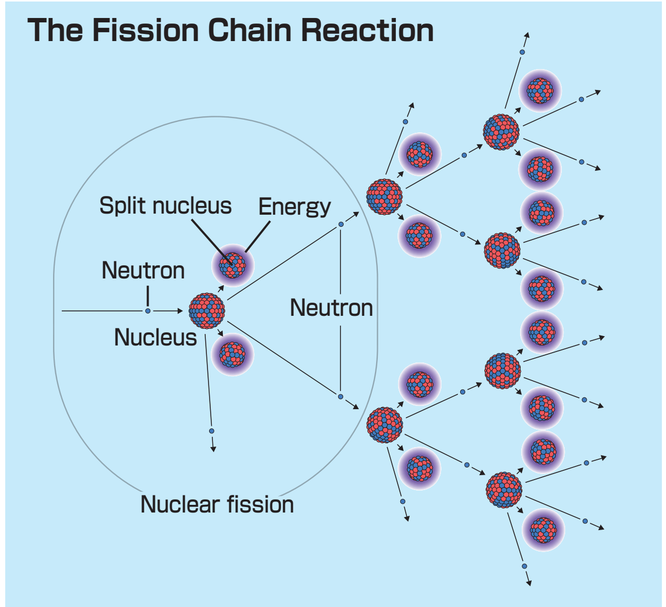
▲ Map of Damage in Hiroshima



▲ Map of Damage in Nagasaki

The Atomic Bomb

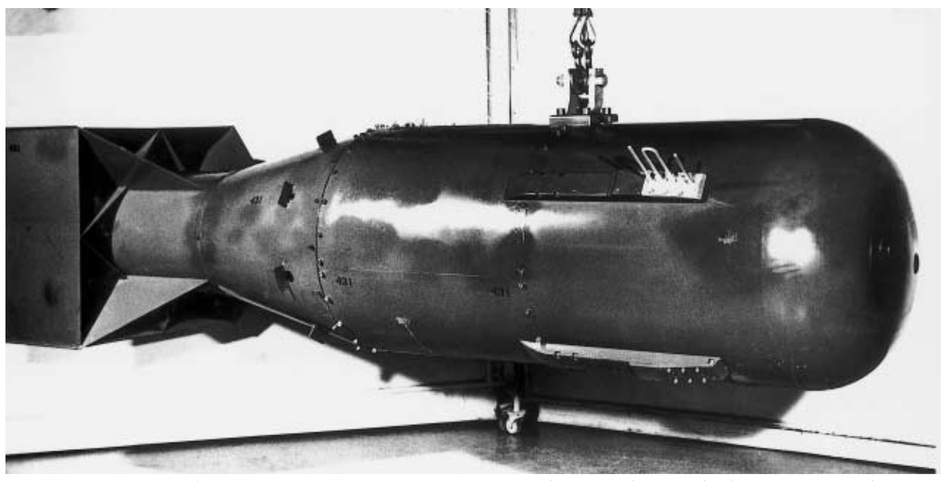
A single neutron colliding with the atomic nucleus of a fissionable substance like uranium 235 (or plutonium 239) can cause the nucleus to split, releasing 2 or 3 more neutrons and a large amount of energy in the forms of extreme heat and lethal radiation. These newly released neutrons collide with other nuclei, releasing more neutrons and more energy. Under proper conditions, this chain reaction spreads through the substance, releasing enormous energy instantaneously. The atomic bomb is a weapon designed to inflict massive destruction with the vast energy thus released.



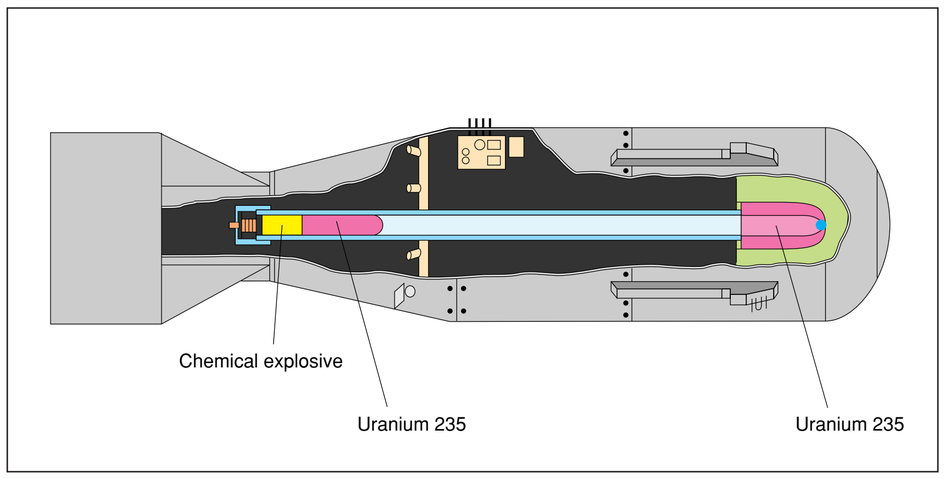
▲ The First Atomic Test at Alamagordo
(July 16, 1945-Photo: US Army)

The Manhattan Project

During the Second World War, which began in 1939, US President Franklin Roosevelt ordered the development of the atomic bomb. This development effort, called the "Manhattan Project," began in August 1942. It was carried out in top secrecy and absorbed vast financial and human resources.

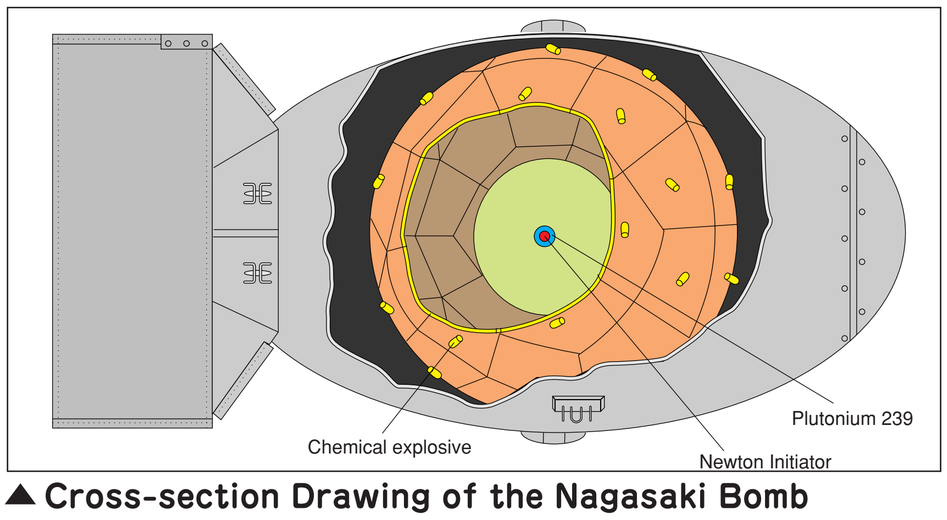


▲ The Atomic Bomb Dropped on Hiroshima (Little Boy)



▲ Cross-section Drawing of the Hiroshima Bomb

▲ The Atomic Bomb Dropped on Nagasaki (Fat Man)



▲ Cross-section Drawing of the Nagasaki Bomb

Profiles of Atomic Bombs

Category	Hiroshima	Nagasaki
Type	Gun-barrel uranium bomb (Nickname Little Boy)	Implosion plutonium bomb (Nickname Fat Man)
Weight	approx. 4 tons	approx. 4.5 tons
Explosive power (TNT equivalent)	approx. 16,000 tons	approx. 21,000 tons
Detonation altitude	approx. 600m (1,969 feet)	approx. 500m (1,640 feet)
Structure	Quantities of uranium 235, each less than a critical mass, were placed at two ends of a long, thin cylinder. A chemical explosion propelled the U-235 at one end forcefully into the piece at the other end, instantly creating a critical mass and starting a fission chain reaction. U-235 is present in natural uranium, but only in tiny amounts. This bomb thus required technology to increase that percentage.	Quantities of plutonium 239, each less than a critical mass, were placed around the inside of a sphere. A chemical explosion drove the pieces forcefully toward the center, compressing them instantly into a critical mass and starting the nuclear fission. P-239 does not exist naturally. This bomb thus required a reactor capable of creating this element.

Critical mass: The minimum amount of fissionable material required to sustain a nuclear chain reaction.

Before the A-bomb

▲**Before the Bombing** (Hiroshima) This photo shows, just left of center, the Hiroshima Prefectural Industry Promotion Hall (now, the A-bomb Dome). (June 13, 1936-Photo: Noboru Watanabe)

Hiroshima

The city of Hiroshima boasted two primary aspects. Its high concentration of army installations made it a "military city," while the Hiroshima Higher School of Education supported its reputation as an "education city."

▲**Hondori** (Main Street) before the War (Hiroshima) (Around 1935) Courtesy: Hiroshima Municipal Archives

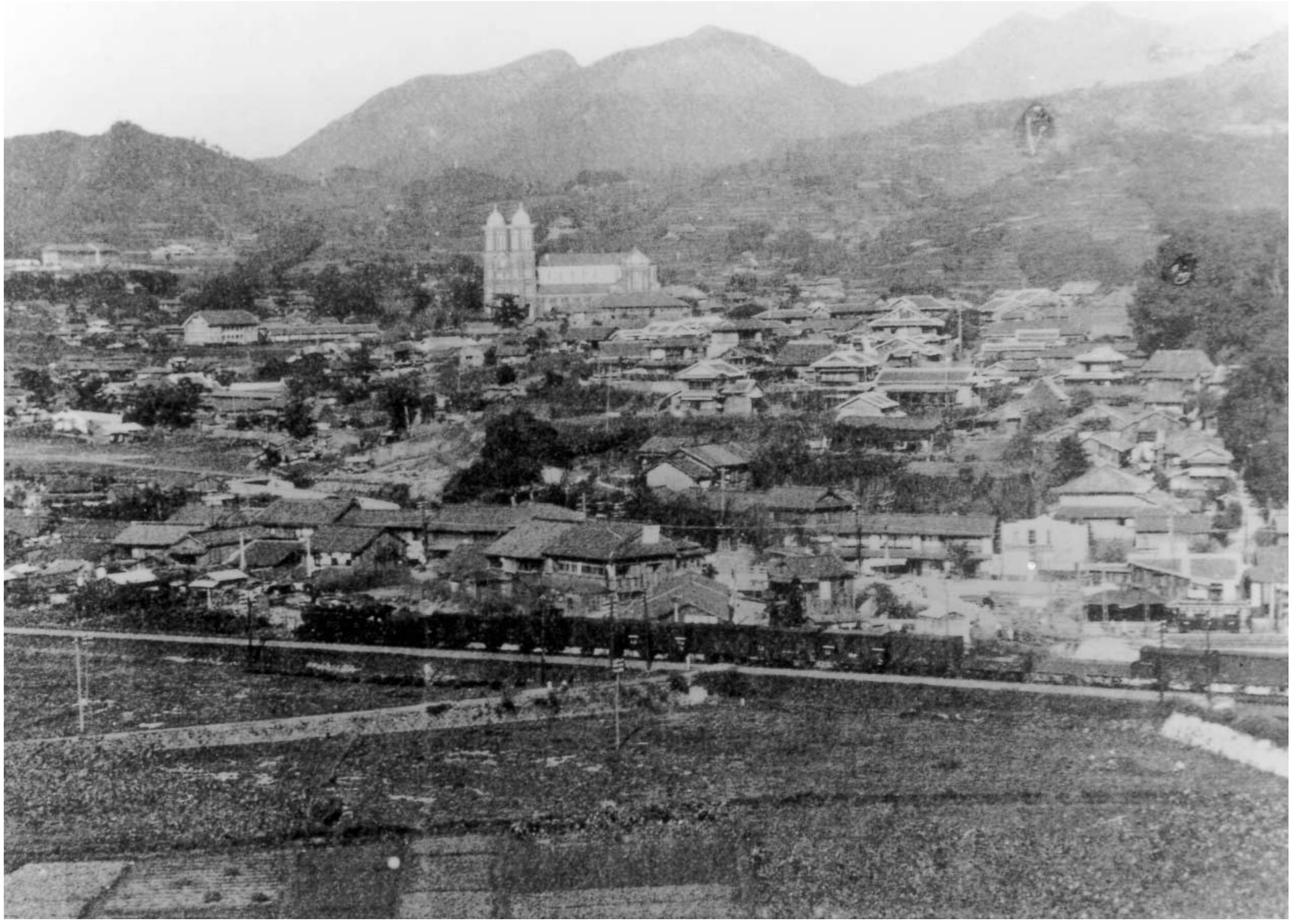
▲**After the Bombing** (Hiroshima) This photo was taken after the bombing from the same location as the photo on the left. The A-bomb Dome can be seen in the center. (Autumn 1945-Photo: Yoshita Kishimoto)

Nagasaki

As Nagasaki modernized, its main industry shifted from trade to shipbuilding.

▲**The Hamano-machi Streetcar Corner Before the War** (Nagasaki) Courtesy: Nagasaki Foundation for the Promotion of Peace

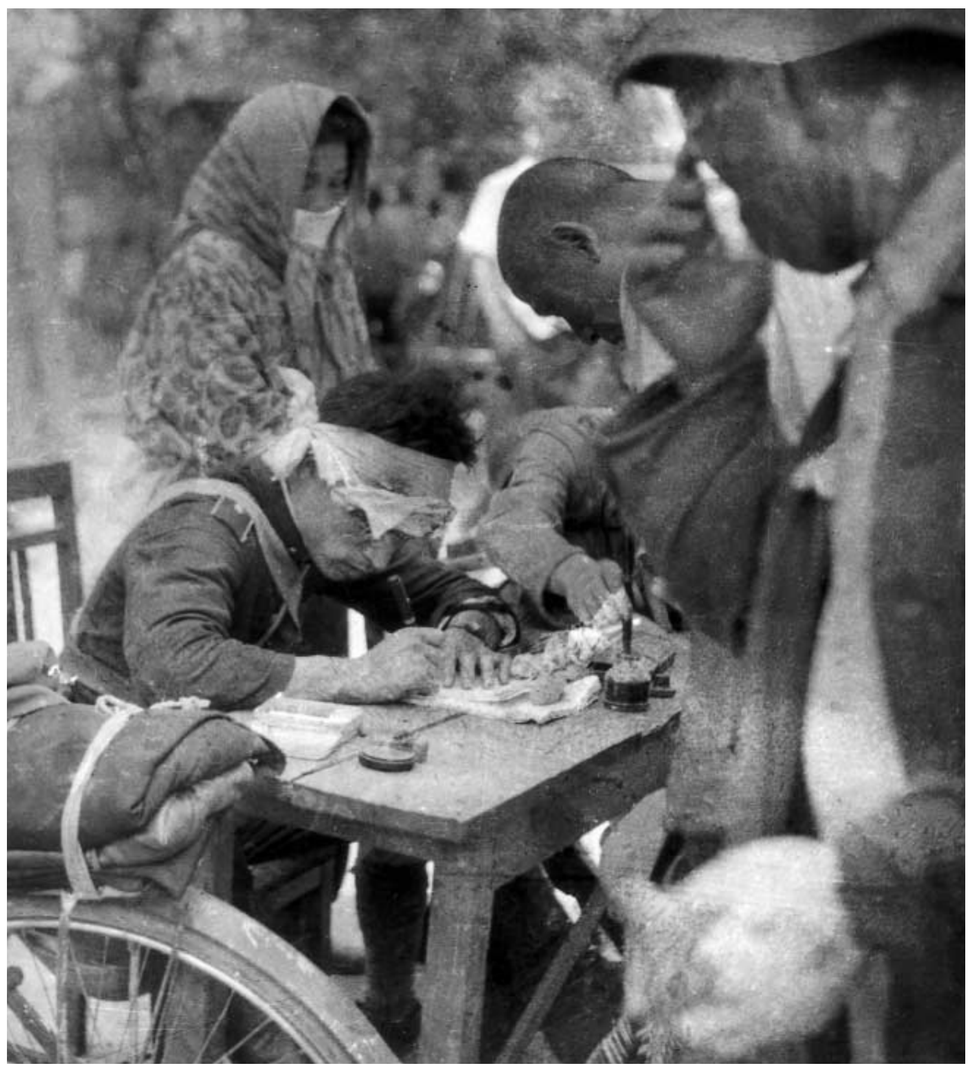
▲**Urakami Cathedral after the Bombing** (Nagasaki) (Mid-October 1945-Photo: Shigeo Hayashi)



▲**Before the Bombing** (Nagasaki) The large building in the center is Urakami Cathedral. Courtesy: Nagasaki Foundation for the Promotion of Peace

Immediately After the Bombings

▲ **A-bomb Survivors Suffering from Burns and Other Injuries** (Hiroshima, about 2.3 km (1.4 miles) from the hypocenter)
Approximately 3 hours after the bombing (Around 11 a.m., August 6, 1945-Photo: Yoshito Matsushige)



◀ **Policeman Writing Disaster Certificates**
(Hiroshima, about 2.5 km (1.6 miles) from the hypocenter)
(Around 5 p.m., August 6, 1945-Photo: Yoshito Matsushige)

A Young Girl on a Relief Truck ▶
(Hiroshima, about 920 m (0.5 miles) from the hypocenter)
With red and oozing burns, this girl lacked even the strength to drink water.
(August 9-12, 1945) Courtesy: Asahi Shimbun Company

▲ **Stunned Survivors Watching Vacantly over the Injured** (Nagasaki, about 1.1 km (0.7 miles) from the hypocenter) (August 10, 1945-Photo: Yosuke Yamahata)

▲ **A Dead Horse and Wagon near the Hypocenter** (Nagasaki)
(August 10, 1945-Photo: Yosuke Yamahata)

▲ **Corpses of a Mother and Baby on the Platform at Urakami Station**
(Nagasaki, about 1 km (0.6 miles) from the hypocenter) (August 10, 1945-Photo: Yosuke Yamahata)

▲ **The Charred Corpse of Boy**
(Nagasaki, about 700m (0.4 miles) from the hypocenter) (August 10, 1945-Photo: Yosuke Yamahata)

HIROSHIMA & NAGASAKI

▲ **Gathering Bodies** (Hiroshima) Bodies being gathered for cremation was a common sight throughout the city. (August 9-12, 1945) Courtesy: Asahi Shimbun Company

◀ **Relief Teams Carry the Severely Injured on Stretchers**
(Nagasaki, about 1.1 km (0.7 miles) from the hypocenter)
Taken the day after the bombing near Urakami Station.
The people carrying stretchers are probably rescue team members from the factory.
(August 10, 1945-Photo: Yosuke Yamahata)

▼ **Crowded, Chaotic Relief Station**
(Hiroshima, about 1.2 km (0.7 miles) from the hypocenter)
Lacking medical supplies, applying zinc oxide and a layer of gauze to burned faces was the best they could do.
(August 7, 1945-Photo: Yotsugi Kawahara)

HIROSHIMA & NAGASAKI

Conditions Immediately after the Bombing as Drawn by Survivors

▲ **August 6** (Hiroshima) (Picture: Kanemitsu and Chieko Ikeda)

▲ **Destroyed Steel Mill** (Nagasaki) (Picture: Hiroshi Matsuzoe)

▲ **Dead Victims Clustered around a Fire Cistern** (Hiroshima) (Picture: Akira Onoki)

▲ **Children Crying as their Mother is Taken Away on a Stretcher** (Nagasaki) (Picture: Sakae Ikeda)

▲ **A Woman Trapped under a Collapsed House and Calling for Help** (Hiroshima) (Picture: Shoichi Furukawa)

▲ **The Urakami District after the Bombing** (Nagasaki) (Picture: Mura Ashizuka)

Heat Rays

When the A-bomb exploded, the temperature at the epicenter soared to over one million degrees centigrade. The fireball expanded to 280 m (308 yards) in diameter. The heat rays generated by the fireball brought temperatures on the ground near the hypocenter to 3,000 to 4,000 ℃ (5,432 to 7,232 ℉).

▲ **Shadows of Railings Cast by the Heat Rays** (Hiroshima, 890 m (979 yards) from the hypocenter) (November 1945-Photo: US Army)

▲ **Human Shadow Etched in Stone**
(Hiroshima, 260 m (286 yards) from the hypocenter)
The heat rays burned the stone steps white. Only the place where a person was sitting remained dark.
(End of 1946-Photo: Yoshito Matsushige)

▲ **Shadow of a Man and Ladder Remain on a Wooden Wall**
(Nagasaki, about 4.4 km (2.6 miles) from the hypocenter) Courtesy: Asahi Shimbun Company

▲ **Charred Remains of a Fence Ignited by the Heat Rays**
(Hiroshima, 2.1 km (1.1 miles) from the hypocenter)
The heat rays caused this crosstie fence along the Sanyo Main Line to burst into flame.
(End of August 1945-Photo: Isao Kita)

Blast

The explosion generated super-high air pressure, reaching hundreds of thousands of atmospheres. The surrounding air expanded enormously creating an extremely powerful blast. The leading edge of the blast was a shock wave traveling faster than sound, followed by a powerful wind.

At the hypocenter, the maximum blast pressure was 35 tons per m^2. The maximum wind velocity was 440 m/sec (about 1,000 mph).

The shock wave and blast crushed all wooden buildings within 2 km (1.2 miles) of the hypocenter. Close to the hypocenter it crushed even ferro-concrete buildings.

▲**Looking North from the Hypocenter** (Hiroshima)
In the foreground is Shima Hospital, at the hypocenter. To the right is the gate to Gokoku Shrine. (November 1945-Photo: US Army)

▲**The Aioi Bridge Buckled by the Blast** (Hiroshima, 300 m (328 yards) from the hypocenter)
The Aioi Bridge, located in downtown Hiroshima, is said to have been the target of the bombing. This 30-cm (12-inch) thick concrete sidewalk was blown upward by the intense blast reflecting off the river.
(October 1945-Photo: Toshio Kawamoto)

▲**Building Directly beneath the Epicenter** (Hiroshima, 210 m (231 yards) from the hypocenter)
This roof, punched in by the blast from directly above, is collecting rainwater.
(1945-Photo: US Army)

▲**Statues of St. Maria and St. John in the Ruins of Urakami Cathedral** (Nagasaki, 500 m (550 yards) from the hypocenter)
The cathedral was totally destroyed. All parishioners there at the time died.
(1945-Photo: US Army)

▲**Shiroyama National Elementary School in Ruins** (Nagasaki, 500 m (550 yards) from the hypocenter)
Because of an air-raid alert, the building was occupied by faculty, pupils, and a number of Mitsubishi Nagasaki Ordnance Factory employees, who were using the school. Nearly all died.
(1945-Photo: US Army)

Super-High-Temperature Fire

▲ **Burned Corpses Scattered near the Hypocenter** (Nagasaki, 110 m (121 yards) from the hypocenter) The buildings in this area were burned completely to ashes. (August 10, 1945-Photo: Yosuke Yamahata)

The heat rays emitted by the fireball ignited houses and anything combustible near the hypocenter. Kitchen fires in collapsed houses around the city also spread out of control. Throughout the day, the entire city was engulfed in a sea of flame. The total area reduced to ashes was about 13 km² (8 mi²) in Hiroshima and 6.7 km² (4.2 mi²) in Nagasaki.

Though the total energy of the Nagasaki bomb was greater than that of Hiroshima, more of Hiroshima burned due to topography and the distribution of buildings.

▲ **Ruins of the Nagasaki Medical College Hospital** (Nagasaki, 700 m (770 yards) from the hypocenter) More than 1,000 staff, nursing students, patients, and visitors were in this hospital. (1945-Photo: US Army)

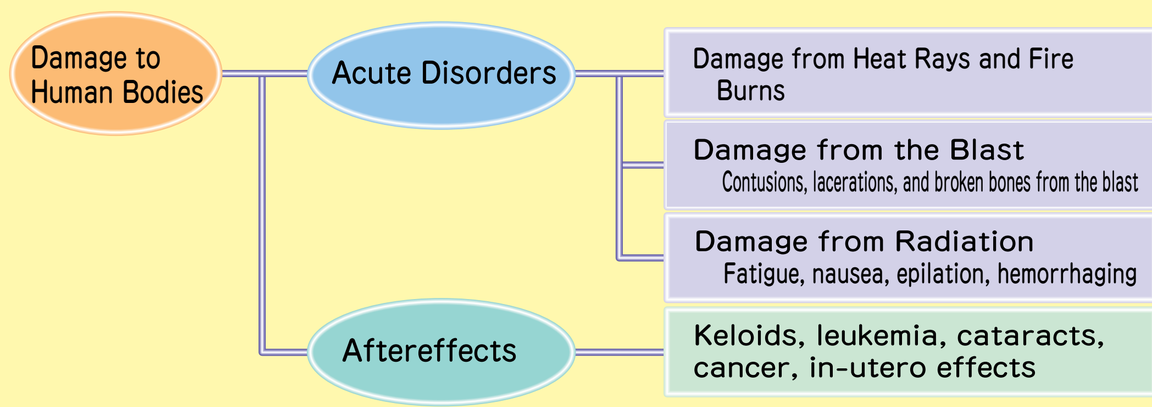
▲ **Downtown Hiroshima in Flames** Taken from the Army Ship Training Division Grounds, about 4 km (2.2 miles) south of the hypocenter. (August 6, 1945-Photo: Gonichi Kimura)

▲ **The Burned Plain** (Hiroshima) The view from the hypocenter extends unobstructed all the way to Ninoshima Island, about 10 km (5.4 miles) away in Hiroshima Bay. (October 1945-Photo: US Army)

Damage to Human Bodies Acute Disorders

The symptoms inflicted by the A-bomb are broadly divided into acute disorders and aftereffects. Most acute disorders were caused by complex interactions of heat ray and fire burns, blast contusions and lacerations, and radiation damage.

"Aftereffects" refers to symptoms that manifested after the acute disorders. They are assumed to be caused mainly by radiation.



Burns from Heat Rays and Fire

The intense heat rays from the fireball inflicted normally inconceivable burns. In severe cases, the surface layer of skin was burned crisp and slid off the body, exposing the tissues beneath, sometimes down to the bone. The burns of victims directly exposed within 1.2 km (0.7 miles) of the hypocenter extended into internal tissues and organs. The vast majority of these victims died within a few days.

Nearly every building in the city collapsed, so thousands were trapped inside or under heavy debris. Unable to escape, they were burned alive by the sea of fire.

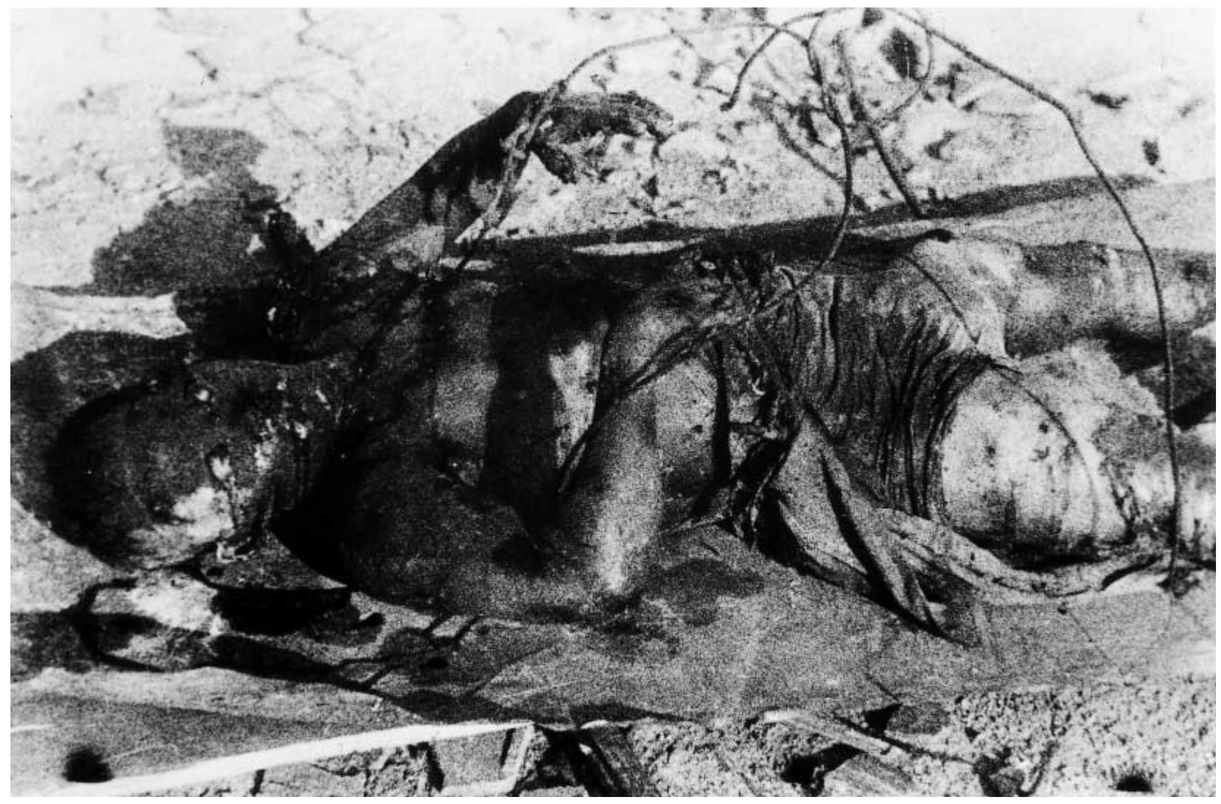
▲**A Boy of 16 Exposed while Riding His Bicycle** (Nagasaki, 1.8 km (1.1 miles) from the hypocenter)
This boy survived, but spent an agonizing year and nine months lying face down in bed.
(January 1946-Photo: US Army)

▲**Man Burned over His Entire Body** (Hiroshima, about 1 km (0.6 miles) from the hypocenter)
His unburned waist was protected by a waistband.
(August 7, 1945-Photo: Masami Onuka)

Damage from the Blast

The blast hurled people through the air and crushed them under collapsed buildings. Many found their skin filled with glass fragments from shattered windows.

▲**Patient with Hundreds of Glass Fragments in His Back** (Nagasaki)
(August 10, 1945-Photo: Masao Shiotsuki)



▲**Body with Eyes Popped Out by the Blast** (Hiroshima, 500 m (550 yards) from the hypocenter)
(August 10, 1945-Photo: Satsuo Nakata)

Damage from Radiation

The A-bomb released massive amounts of radiation, far beyond levels normally found in nature. This radiation is what made the A-bomb qualitatively different from conventional bombs. Victims exposed to radiation suffered serious injury, and even today, radiation damage continues to cause great suffering to many.
The immediate effects of radiation poisoning include the destruction of cells, damage to blood-forming and other organs, weakened immune functions, and loss of hair.

▲**A Soldier on the Verge of Death** (Hiroshima, exposed 1 km (0.6 miles) from the hypocenter)
Subcutaneous bleeding, stomatitis, and hair loss.
(September 3, 1945-Photo: Gonichi Kimura)

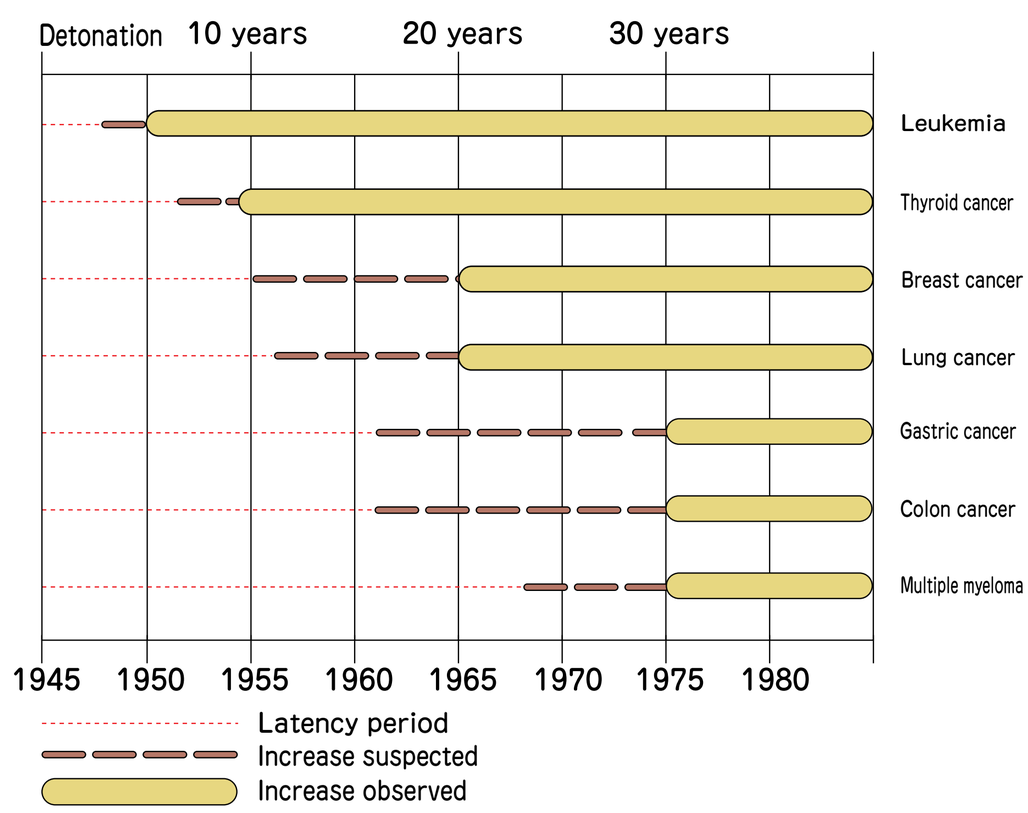
▲**A Girl Who Has Lost Her Hair** (Nagasaki)
Suddenly, about two weeks after the bombing, large numbers of survivors began losing their hair. This symptom was prevalent for the following 1 to 2 weeks.
(Late August 1945) Courtesy: Asahi Shimbun Company

Aftereffects

Most acute disorders either killed victims or healed in 4 to 5 months. However, the aftereffects, including a distinct increase in leukemia five or six years after the bombing, have continued to cause serious problems. The most common aftereffects include keloids (abnormally thick scar tissue over burns), cataracts, leukemia, as well as thyroid, breast, lung, and other cancers. Some in-utero survivors were born with microcephaly, often accompanied by mental and developmental impairment.

Even today we have much to learn about the full range of effects produced over the years by radioactive substances taken into the body. We do know that survivors continue to suffer from radiation aftereffects.

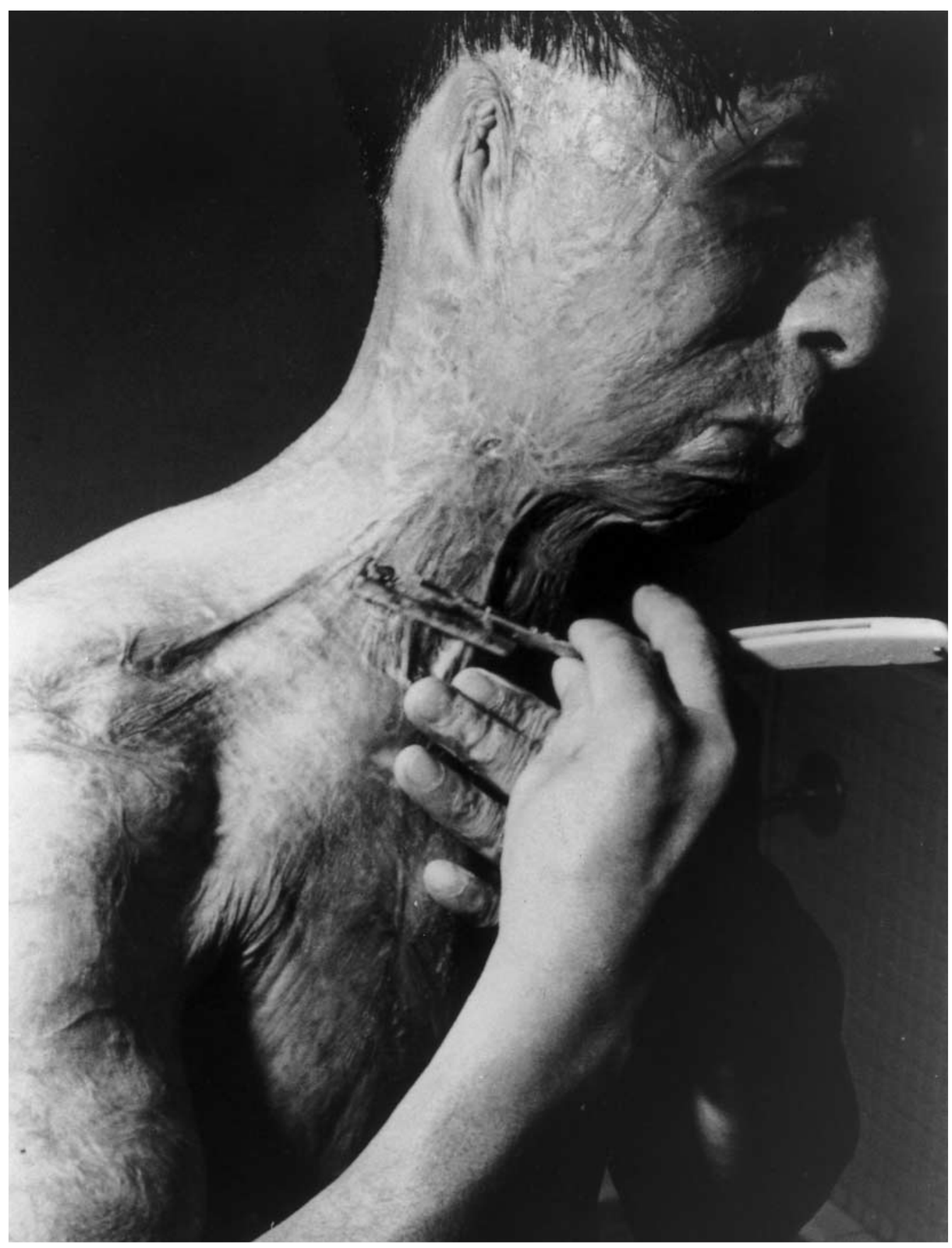
Years of Cancer Onset



Source: Effects of A-bomb Radiation on the Human Body,
Hiroshima International Council for Medical Care of the Radiation-Exposed

▲**A Man with Skin Cancer on His Right Hip** (Hiroshima, exposed 1.2 km (0.8 miles) from the hypocenter)
Courtesy: Hiroshima Red Cross and Atomic-bomb Survivors Hospital

▲**A Woman with Microcephaly and Her Mother** (Hiroshima)
The A-bomb radiation had numerous adverse effects on fetuses exposed in their mothers' wombs. Those born with mental or physical impairment have survived thus far through the loving care of their parents. However, as these survivors age and their relatives die, many are unable to live independently. Their care has become a major issue.
(1975) Courtesy: Takaharu Narita



▲**A Man with Keloids on His Face and Neck** (Nagasaki, exposed 1 km (0.6 miles) from the hypocenter)
(June 1970-Photo: Nagasaki Chapter of the Japan Realist Photographers)

Sadako A Young Girl's Death

▲A Few of Sadako's Paper Cranes (May 20, 1997-Photo: Michio Ide)

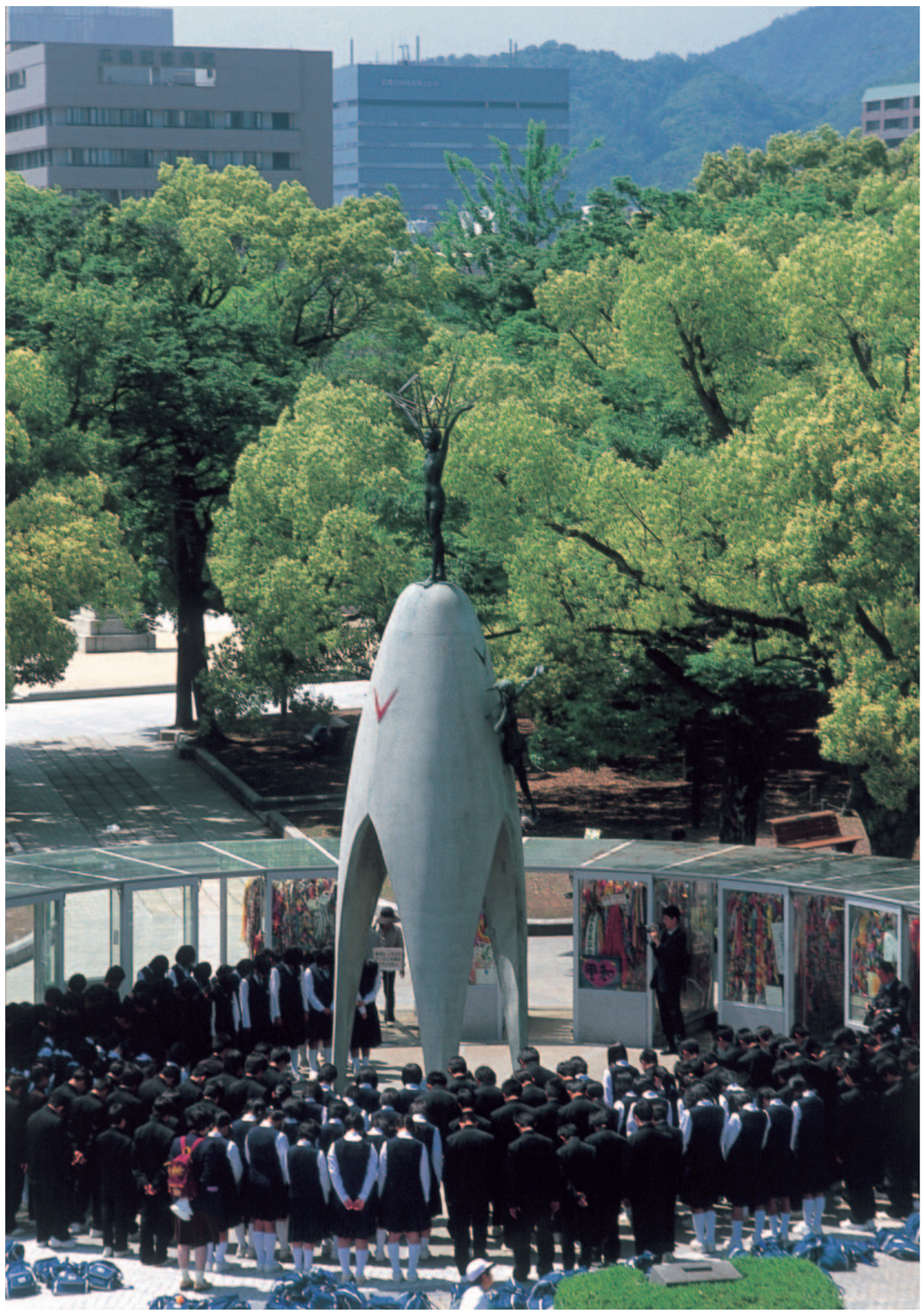
▲Sadako in the Sixth Grade
Courtesy: Chugoku Shimbun Company

Sadako Sasaki was two years old at the time of the bombing. She grew up strong and healthy, but ten years later (1955), when she was in the sixth grade in elementary school, she was hospitalized with leukemia.

Sadako believed that folding 1,000 paper cranes would cure her illness. While in the hospital she folded cranes whenever she could, but her hope was in vain. She died after fighting the disease for eight months. Her death reveals the great horror of radiation –its ability to injure and kill many years after exposure.

Sadako's classmates were terribly shocked by her death and the story of her paper cranes, so they started collecting money to build a monument to comfort her soul and the souls of the many children killed by the A-bomb, and to express their hope that there would never be another war. This campaign spread to schools around the nation and around the world. In 1958, the Children's Peace Monument was erected in Hiroshima Peace Memorial Park, depicting a young girl lifting a paper crane high over her head.

Beneath the monument, carved in black granite, are the words, "This is our cry. This is our prayer. For peace in this world." The area around this statue is always full of paper cranes sent by peace-loving people throughout world.



▲Children's Peace Monument (August 5, 2005-Photo: Michio Ide)

▲Children Collecting Funds to Build the Children's Peace Monument (1956)
Courtesy: Chugoku Shimbun Company

Under the Mushroom Cloud

▲People Who Lived beneath the Epicenter
Courtesy: Chugoku Shimbun Company

Revival from Ruins Getting Back on their Feet

▲ **A Boy Carrying His Injured Brother** (August 10, 1945-Photo: Yosuke Yamahata)

▲ **Young Girls Hurrying Home with Bags of Rationed Food on Their Shoulders** (Nagasaki) (Early September 1945) Courtesy: Asahi Shimbun Company

The A-bombings were followed by a time of chaos and confusion. Japan's surrender and the Allied Occupation brought tremendous change. Despite dire shortages of food, capital, and materials of all kinds, the people of Hiroshima and Nagasaki fought off their despair and struggled to rebuild their lives.

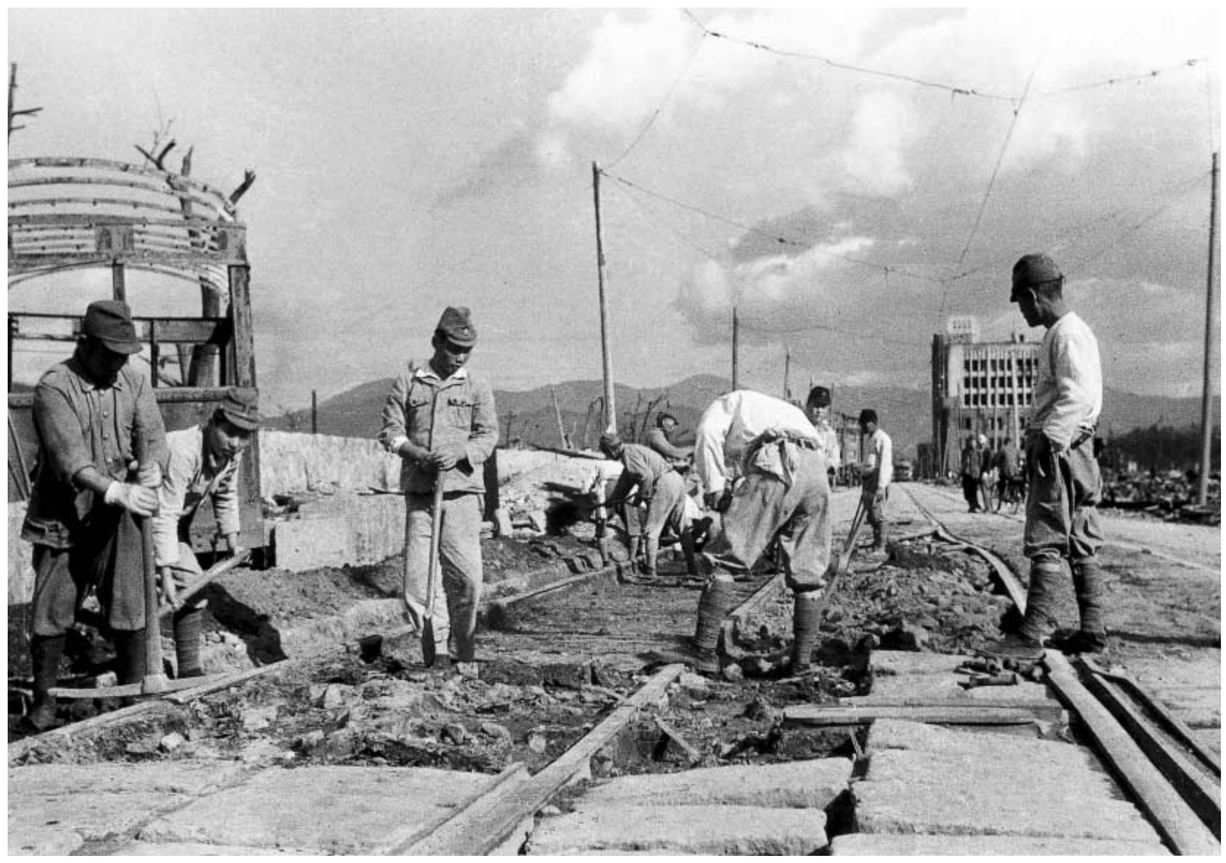
▲ **Shacks near Nagasaki Station** (Nagasaki)
One month after the bombing. These shacks were built with any unburned materials available.
(September 1945-Photo: Torahiko Ogawa)

▲ **Shacks near Yokogawa Station** (Hiroshima)
The outskirts recovered more quickly than the center of town.
(October 15, 1945-Photo: Shunkichi Kikuchi)

Reviving the Cities

▲ **Reconstruction of Aioi Bridge** (Hiroshima)
Workers making temporary repairs on Aioi Bridge. Its railings were blown away and much of the roadway was destroyed. (1949-Photo: Yoshita Kishimoto)

▲ **Building a Temporary Urakami Cathedral** (Nagasaki)
Surviving parishioners set about building a temporary cathedral.
(August 1946-Photo: Yasuo Tomishige)



▲ **Replacing Streetcar Track** (Hiroshima)
A burned-out streetcar appears on the left. The A-bomb dealt a devastating blow to Hiroshima's streetcars, but three days later, service was restored to a portion of the line. Section after section was reopened and, though only a limited number of cars were running, operation resumed on all lines by the following October.
(October 1945-Photo: Shunkichi Kikuchi)

Assistance from Overseas

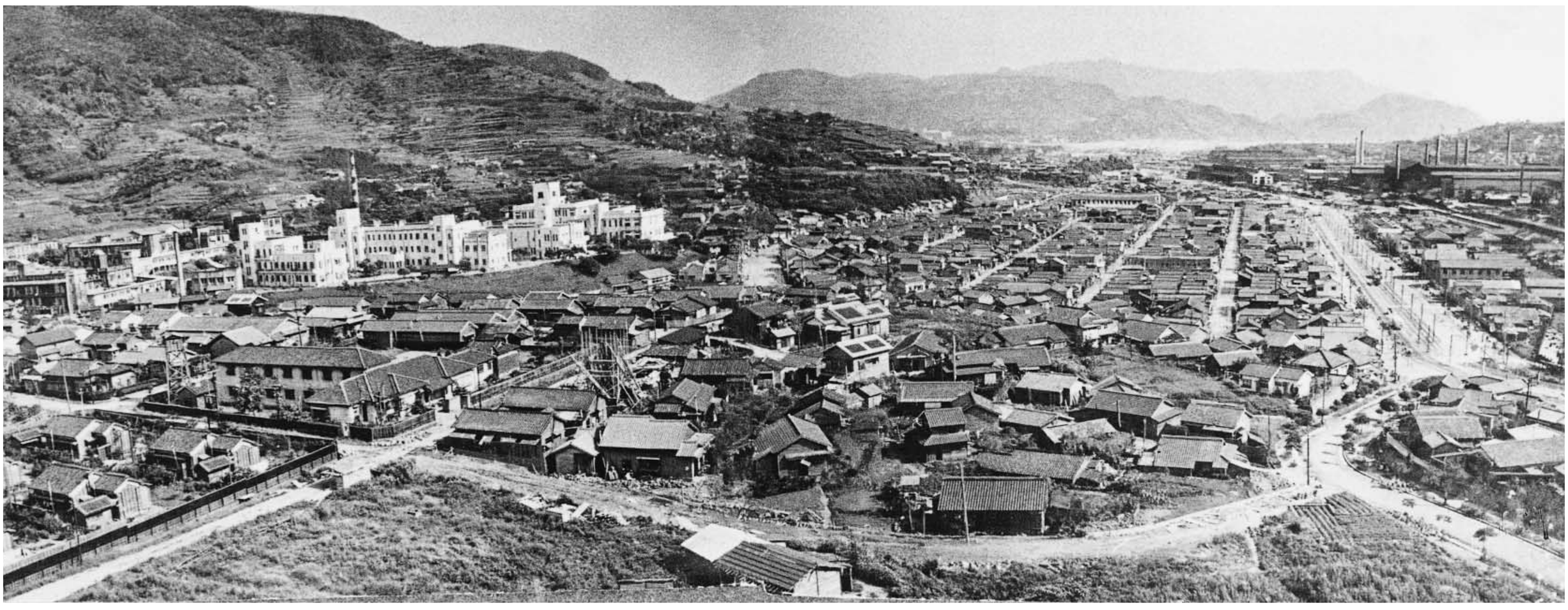
▲**Norman Cousins and the Orphans** (Hiroshima)
Norman Cousins, editor-in-chief of the American magazine Saturday Review, proposed a Spiritual Adoption Movement. By the end of November 1951, he sent over $12,000 to 263 children. On March 3, 1964, the city of Hiroshima made him an honorary citizen.
(January 9, 1951) Courtesy: Chugoku Shimbun Company

▲**One of the Female Survivors Receiving Treatment in the US** (Hiroshima)
Twenty-five young women traveled to the US for treatment of their keloid scars.
(May 1955) Courtesy: Chugoku Shimbun Company

▲**Orphans at Seibo no Kishi Children's Home** (Nagasaki)
Many children lost their families in the war and were abruptly left to fend for themselves. At Seibo no Kishien, these war orphans were warmly welcomed and cared for.
(May 1947) Courtesy: Seibo no Kishi, a friary of the Franciscan Friars

▲**Children's Library** (Hiroshima)
This library was built with money sent from the Hiroshima Prefecture Association of California. It was later rebuilt but remains the Municipal Children's Library.
Courtesy: Chugoku Shimbun Company

▲**The City Seen from Hijiyama Hill** (Hiroshima)
The wide street stretching straight off into the distance is Peace Boulevard, then under construction. (April 1957-Photo: Yoshitaka Nakatani)



▲**South of the Hypocenter, Nine Years after the Bombing** (Nagasaki)
This photo was taken from the International Culture Hall, then under construction (now the site of the Nagasaki Atomic Bomb Museum). In accordance with the Nagasaki International Culture City Construction Project, the area was laid out on a grid for redevelopment.
(August 1954) Courtesy: Nagasaki Shimbun Company

Hiroshima and Nagasaki Today

▲ **Hiroshima Today** (April 18, 1996-Photo: Michio Ide)

Hiroshima

Having learned much from its historic tragedy, Hiroshima is striving to offer hope and courage to struggling people around the world.

▲ **Peace Memorial Ceremony** (Hiroshima)
(Held annually on August 6-Photo: Michio Ide)

Nagasaki

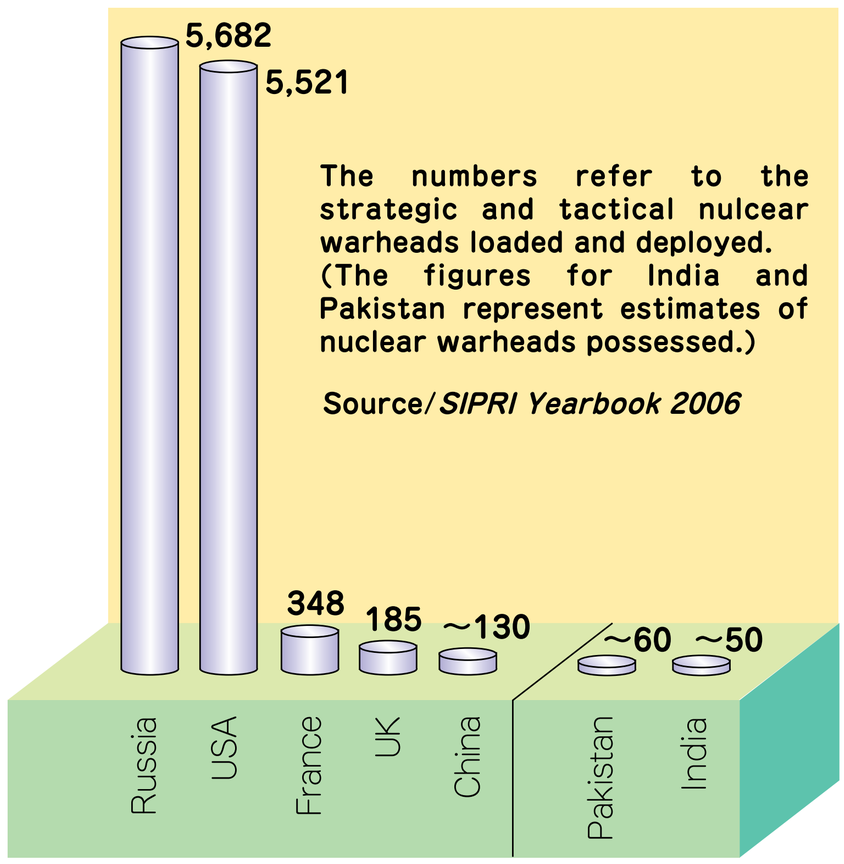
Nagasaki is deepening its interaction with people around the world and utilizing the energy generated by diversity and exchange to advance the cause of peace.

▲ **Nagasaki Peace Ceremony** (Nagasaki)
(Held annually on August 9) Courtesy: The City of Nagasaki

▲ **Nagasaki Today** (July 1997) Courtesy: The City of Nagasaki

Nuclear Weapons Now

Nuclear Warheads Possessed by the Nuclear Powers



The numbers refer to the strategic and tactical nulcear warheads loaded and deployed. (The figures for India and Pakistan represent estimates of nuclear warheads possessed.)

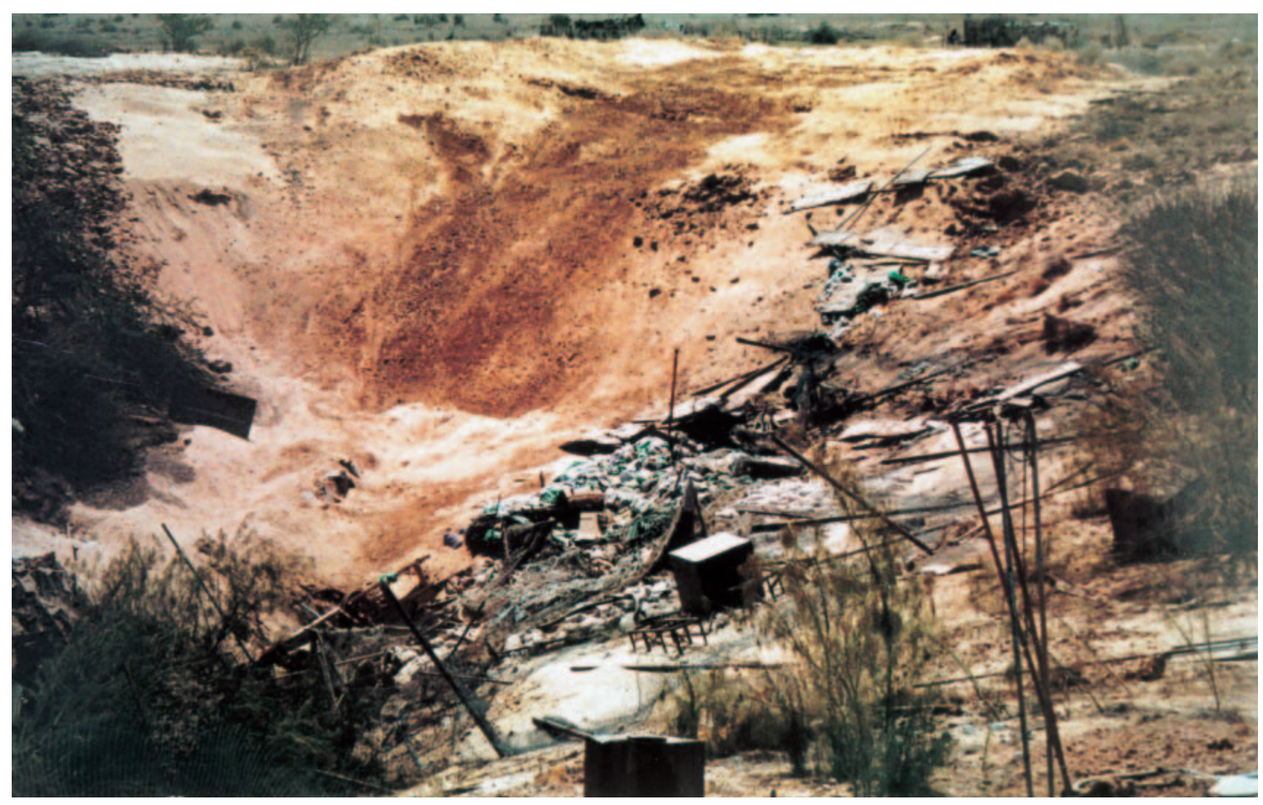
Source/*SIPRI Yearbook 2006*

Most experts believe that Israel is a nuclear weapon state, though the Israeli government has never admitted possessing nuclear weapons. North Korea reported a nuclear test on October 9, 2006.

Nuclear Deterrence Theory

The idea of nuclear deterrence is simple. "If I threaten my enemy with powerful weapons, I can keep him from attacking me." This idea requires that participating nations always have nuclear weapons powerful enough to destroy their opponent. Thus, for about 40 years after World War II, or until about 1985, the Soviet Union and the US led East and West camps in an ever-escalating nuclear arms race. During this race, they accumulated enough nuclear power to destroy each other many times over, and simultaneously created the potential for an all-out nuclear war that could annihilate the entire human race.

The international community has subsequently poured considerable energy into nuclear disarmament, but the nuclear powers still cling to their nuclear arsenals.



▲After the Nuclear Test in the Desert in the Western State of Rajasthan, India
(May 11, 1998) Courtesy: Reuters Sun

Nuclear Testing

The nuclear arms race escalated rapidly during the East-West Cold War that followed World War II. One by one, the USSR, England, France, and China conducted nuclear tests and joined the US as nuclear powers. In May 1998, India conducted its first test in 24 years, and Pakistan conducted its first ever.

More than 2,000 nuclear tests have been conducted to date.

▲17-year-old Girl Born and Raised Near the Semipalatinsk Nuclear Test Site in the Former Soviet Union
(1994-Photo: Yuri Ivanovich Kuidin)

The Hidden Cost of Nuclear Testing and Development

Radiation poisoning derived from the process of developing, manufacturing, testing, and deploying nuclear weapons has resulted in death for many innocent people around the world, and many more still suffer the aftereffects. Furthermore, it will take far more time and money to decontaminate nuclear test sites and factories, deal with the vast amount of existing fissionable material, and store, dismantle and dispose of radioactive waste than was spent in developing the weapons. Controlling the waste, which will remain dangerously radioactive for tens of thousands of years, presents serious hazards of radiation leakage due to container corrosion and explosion.

▲Drums Filled with Radioactive Waste Left Exposed to the Elements
(January 1994-Photo: US Dept. of Energy)

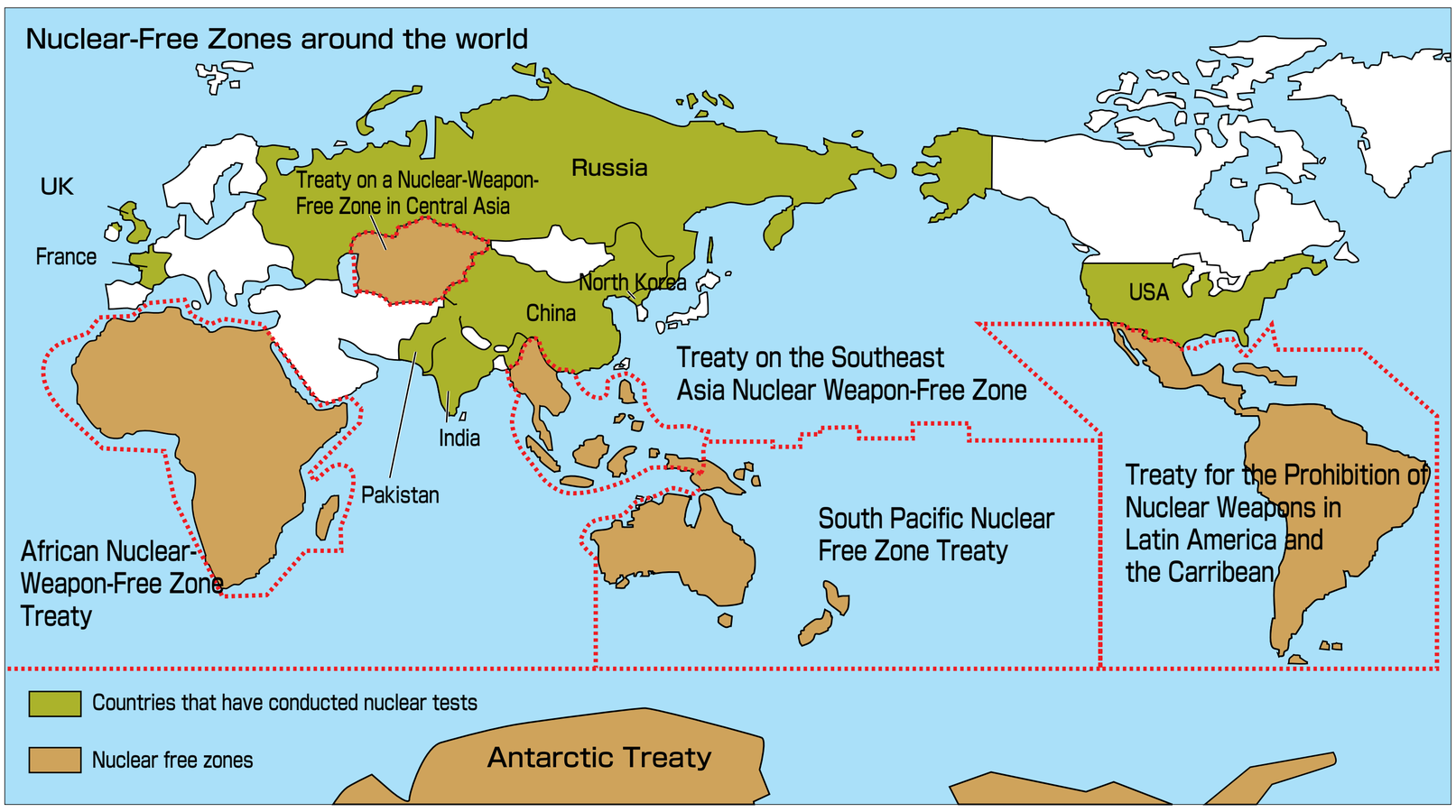
▲Land Contaminated by Radioactive Waste Stored in Underground Tanks
(January 1994-Photo: US Dept. of Energy)

Toward a Peaceful World Free From Nuclear Weapons

Expanding Nuclear-Free Zones

Nuclear-free zones are created through formal promises that countries within defined areas will never manufacture, test, acquire, or possess nuclear weapons. These treaties thus reduce the threat of nuclear war and ease international tensions.

Declaring a nuclear-free zone does not immediately solve the problem, but the spread of such zones reinforces the framework for preventing unclear proliferation. They are an effective means of moving the world toward nuclear abolition.

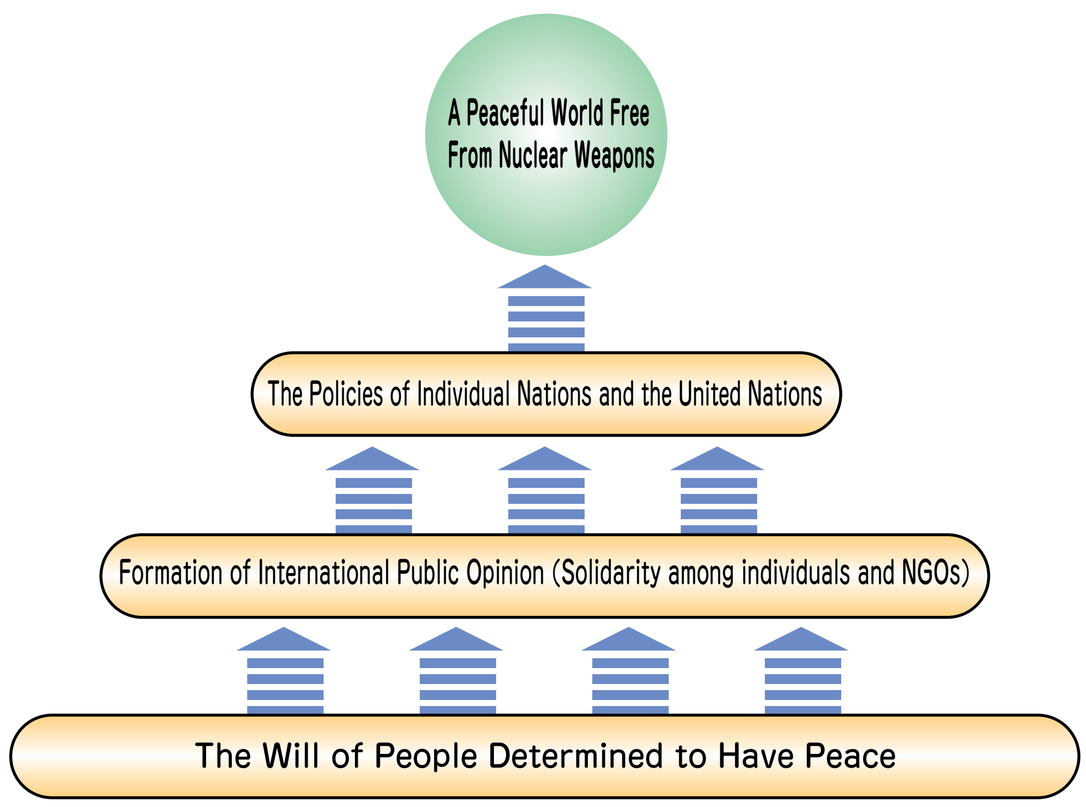


▲ **Peace Parade to Protest Nuclear Testing**
In September 1995, a meeting to protest and halt the resumption of nuclear testing by France in the South Pacific was held on the Island of Tahiti, French Polynesia. Legislators from many countries around the world attended the meeting, and local citizens held this parade.
(September 2, 1995) Courtesy: Kyodo News Service

▲ **Protest Demonstration against Nuclear Testing**
Held in Semipalatinsk in the Soviet Union in 1989, this was the first demonstration against testing at the Semipalatinsk test site. That test site was closed in 1991.
(1989-Photo: Yuri Ivanovich Kuidin)

Efforts by Citizens

The abolition of nuclear weapons cannot be left to nations alone. International public opinion must be formed to lead national policies toward disarmament. Individuals must be committed to peace and determined to build a society free from nuclear weapons. People engaged in a wide variety of related activities must strengthen their solidarity and work together with others around the world. The efficacy of such cooperation was amply demonstrated by the vital role played by non-governmental organizations (NGOs) in establishing the International Treaty Banning Anti-personnel Landmines and in promoting the World Court Project. The latter led to the advisory opinion from the International Court of Justice that says "...the threat or use of nuclear weapons would generally be contrary to the rules of international law." Only the collective power of an inspired populace can move nations, move the United Nations, and lead to a peaceful world free from nuclear weapons.



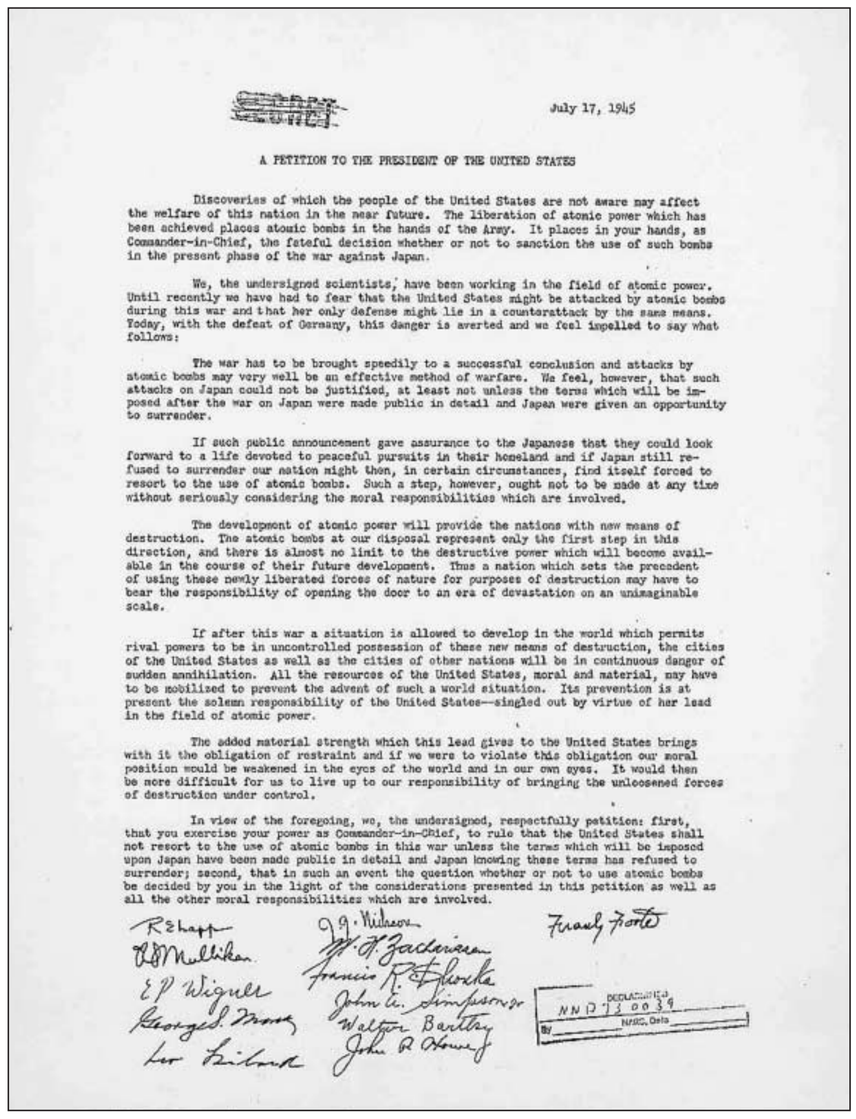
20th Century - Negative Heritage

▲ **After the World's First Nuclear Test**
Dr. Oppenheimer (center, wearing a hat) examines the remains of a 30-m (33-yard) steel tower.
(1945) Courtesy: PPS

At 05:29:45 on July 16, 1945, a blinding flash and an incredible wave of heat scorched the desert near Alamogordo, New Mexico. This was the first atomic explosion in human history.

Most of those involved in this test felt tremendous relief and shouted for joy. But already some feared that the success of this test would cover the Earth with a dark cloud. J. Robert Oppenheimer, who led the scientific effort that culminated in this test, reportedly quoted a line from a sacred Hindu sutra. "I am become Death. Destroyer of Worlds." Today, we still have tens of thousands of nuclear weapons, most of which are incomparably more powerful than this first little atomic bomb.

The 20th century was one of amazing scientific and technological progress, but it was also a "century of war." We must make the 21st a "century of peace."



July 17, 1945

A PETITION TO THE PRESIDENT OF THE UNITED STATES

Discoveries of which the people of the United States are not aware may affect the welfare of this nation in the near future. The liberation of atomic power which has been achieved places atomic bombs in the hands of the Army. It places in your hands, as Commander-in-Chief, the fateful decision whether or not to sanction the use of such bombs in the present phase of the war against Japan.

We, the undersigned scientists, have been working in the field of atomic power. Until recently we have had to fear that the United States might be attacked by atomic bombs during this war and that her only defense might lie in a counterattack by the same means. Today, with the defeat of Germany, this danger is averted and we feel impelled to say what follows:

The war has to be brought speedily to a successful conclusion and attacks by atomic bombs may very well be an effective method of warfare. We feel, however, that such attacks on Japan could not be justified, at least not unless the terms which will be imposed after the war on Japan were made public in detail and Japan were given an opportunity to surrender.

If such public announcement gave assurance to the Japanese that they could look forward to a life devoted to peaceful pursuits in their homeland and if Japan still refused to surrender our nation might then, in certain circumstances, find itself forced to resort to the use of atomic bombs. Such a step, however, ought not to be made at any time without seriously considering the moral responsibilities which are involved.

The development of atomic power will provide the nations with new means of destruction. The atomic bombs at our disposal represent only the first step in this direction, and there is almost no limit to the destructive power which will become available in the course of their future development. Thus a nation which sets the precedent of using these newly liberated forces of nature for purposes of destruction may have to bear the responsibility of opening the door to an era of devastation on an unimaginable scale.

If after this war a situation is allowed to develop in the world which permits rival powers to be in uncontrolled possession of these new means of destruction, the cities of the United States as well as the cities of other nations will be in continuous danger of sudden annihilation. All the resources of the United States, moral and material, may have to be mobilized to prevent the advent of such a world situation. Its prevention is at present the solemn responsibility of the United States—singled out by virtue of her lead in the field of atomic power.

The added material strength which this lead gives to the United States brings with it the obligation of restraint and if we were to violate this obligation our moral position would be weakened in the eyes of the world and in our own eyes. It would then be more difficult for us to live up to our responsibility of bringing the unloosened forces of destruction under control.

In view of the foregoing, we, the undersigned, respectfully petition: first, that you exercise your power as Commander-in-Chief, to rule that the United States shall not resort to the use of atomic bombs in this war unless the terms which will be imposed upon Japan have been made public in detail and Japan knowing these terms has refused to surrender; second, that in such an event the question whether or not to use atomic bombs be decided by you in the light of the considerations presented in this petition as well as all the other moral responsibilities which are involved.

▲ **A Petition from Scientists Opposed to Using the Atomic Bomb**
Courtesy: National Archives

HIROSHIMA & NAGASAKI

Material Witnesses

Shigeru's Lunch Box

Shigeru Orimen (then 13) was a first-year student at Second Hiroshima Prefectural Junior High School. Every day, he and his classmates were mobilized to clear away demolished buildings. On August 6 he left home in a hurry as usual, carrying the lunch his mother had made. It was a simple lunch, but one she had gone to great effort and expense to make.

Shigeru's worksite was 500 m (550 yards) from the hypocenter. After the bombing, his mother walked around the destroyed city searching for him. Early in the morning of August 9, on the bank of the Honkawa River, she found Shigeru's body doubled up, clutching this lunch box to his stomach. The lunch he never ate was burned black.

▲**Lunch Box** Courtesy: The City of Hiroshima

▲**Melted Rosary** Courtesy: The City of Nagasaki

Mother's Rosary

On the morning of August 9, Misaki Ide's mother went to work at the home of a relative who lived near the Urakami Cathedral, about 600 m (660 yards) from the hypocenter.

After the bombing, Misaki headed for that relative's house to search for his mother. He found her dead at the cathedral. He found his mother's rosary at the relative's house. The glass beads had melted like taffy. Misaki kept this rosary for forty years in memory of his mother, then donated it to the Nagasaki Atomic Bomb Museum.

Shinichi's Tricycle

Shinichi (then 3 years and 11 months) loved to ride his tricycle. On August 6, he was riding in front of his house 1.5 km (0.8 miles) from the hypocenter. When the A-bomb exploded, both Shinichi and his tricycle were badly burned. He died that evening.

His father felt that laying a 3-year-old alone in a distant grave was too painful, so he buried Shinichi with his tricycle in the backyard.

Forty years later, his father dug up Shinichi's remains and transferred them to the family grave. He donated this tricycle, Shinichi's favorite playmate, to the Peace Memorial Museum.

▲**Tricycle** Courtesy: The City of Hiroshima

Witnesses to History Conveying the Tragedy

▲ A-bomb Dome (Hiroshima) (January 1995-Photo: Michio Ide)

▲ One-legged Torii Gate of Sanno Shinto Shrine (Nagasaki) (October 19, 1995-Photo: Michio Ide)

HIROSHIMA & NAGASAKI