



Remembering Hiroshima and Nagasaki

Hiroshima, August 6, 1945

Monday morning, August 6, 1945, was clear, bright and cloudless. As the mid-summer sun climbed into the sky, the temperature rose rapidly. At 7:09 a.m. a yellow alert sounded, and many people retreated into air-raid shelters, but the attack turned out to be but one American plane flying at high altitude. The people left their shelters and started off to work.

That single plane had been observing the weather for the world's first atomic bombing.

The city of Hiroshima was the political and economic heart of the Chugoku Region. It was an educational centre as well as a major military base. On that day some 350,000 people, including over 40,000 military personnel, are thought to have been in the city.

The American B-29 bomber Enola Gay, carrying the atomic bomb called "Little Boy," left Tinian Island at 1:45 a.m., Japan time, on August 6, 1945. It took about six hours and 30 minutes to fly the 2,740 kilometres from Tinian Island to Hiroshima.

"Little Boy" 's name derived from its long, thin shape. The fissile material was uranium 235. The uranium was divided into two parts, both of which were below critical mass. It was a "gun-barrel-type" bomb that used an explosive device to slam one portion of uranium into the other, instantly creating a critical mass, setting off a chain reaction instantaneously, releasing energy far beyond the capacity of ordinary explosives. The energy released by "Little Boy" was originally thought to be equivalent to the destructive power of approximately 20,000 tons of TNT. Later estimates based on damage to buildings and studies of the bomb's structure have reduced that figure to approximately 15,000 tons. It is believed that this enormous energy was released by the fission of slightly less than one of the 10 to 35 kilograms of uranium 235 in the bomb.

After the yellow alert was cleared at 7:31, the Enola Gay entered Hiroshima City from the northeast and dropped its payload from an elevation of 8,500 metres (according to Japanese military records; U.S. records put the altitude at 9,600 metres). Then it quickly changed course and flew north. Based upon current research, it is believed that the atomic bomb exploded approximately 580 metres in the air over the Shima Hospital in Saiku-machi about 300 metres southeast of the Aioi Bridge.

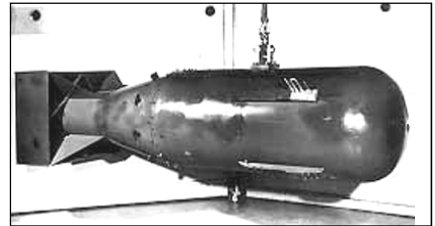
At the instant of detonation, the temperature of the air at the point of explosion exceeded a million degrees Celsius (the maximum temperature of conventional bombs is approximately 5,000 degrees). A white-hot fireball appeared only millionths of a second after detonation. After one second, the fireball reached a diameter of approximately 280 metres. For the following three seconds, it emitted powerful heat rays, and continued to shine visibly for approximately 10 seconds.

At the instant of explosion, intense heat rays and radiation were released in all directions. The pressure on the surrounding air created a blast of unimaginable force. The cloud generated by the explosion rose on powerful updrafts. As the pillar of radiation-laden soot and smoke reached the bottom of the stratosphere, it spread horizontally to a diameter of several kilometers, forming a giant mushroom cap.

The explosion's powerful heat rays burned exposed human skin up to 3.5 kilometres from the hypocenter. Anyone within 1.2 kilometres who was directly exposed received deep burns — not just to the skin but deep into the tissues and internal organs. Nearly all died instantly or within a few days. People caught in the open within one kilometre of the blast experienced temperatures so high that the dark, heat-absorbing pattern of their clothing was burned into their flesh.

At the instant of explosion, a super-high air pressure of several hundred thousand atmospheres was created at the epicenter, which generated a powerful shock wave. The wind blew at 440 metres per second (about 1,000 mph). Thousands of people were killed or injured as they were hurled through the air or were crushed under their collapsed houses. The blast also shattered windows, filling the air with glass fragments that penetrated deep into victims' bodies. Even quite recently glass fragments received that August 6 have been removed from survivors complaining of mysterious pains.

Nearly all wooden buildings within two kilometres of the hypocenter collapsed; even ferro-concrete buildings near the hypocenter were crushed. Because the A-bomb exploded close to the center of the city, and because 85 per cent of the buildings were within three kilometres of the hypocenter, destruction to the city was nearly complete, with 90 per cent of buildings collapsed or burned (August, 1946 Survey by the



**Top: The "Little Boy" Bomb
Above: "Little Boy" 's blast cloud
Bottom: Hiroshima after the blast**



Hiroshima City Government).

The intense heat rays emitted by the explosion caused the wood and paper houses and anything burnable in the downtown area to burst into flame. Fires were also started by toppled kitchen stoves. The city-wide conflagration reached its peak between 10:00 a.m. and 2:00 to 3:00 p.m., but fires continued to burn intensely all day.

Most combustible material within approximately two kilometres of the hypocenter was burned to ash. The extreme heat melted glass and metal like lava. When the flames died away, the city was nothing but a scorched plain.

The explosion produced massive, instantaneous destruction on a scale never before witnessed. Of Hiroshima's estimated population of 350,000 people, approximately 140,000 died.

Nagasaki, August 9, 1945

An atomic bomb exploded over Nagasaki on August 9, 1945, three days after the

explosion of the first atomic bomb over Hiroshima. The bomb was assembled at Tinian Island on August 6. On August 8, Field Order No. 17 issued from the 20th Air Force Headquarters on Guam called for its use the following day on either Kokura, the primary target, or Nagasaki, the secondary target. That same day, the Soviet Union declared war on Japan. The B-29 bomber Bockscar, carrying a plutonium-core atomic bomb and commanded by 25-year-old Major Charles Sweeney, reached the sky over Kokura on the morning of August 9, but abandoned the primary target because of smoke cover and changed course for Nagasaki, the secondary target, where it dropped its payload at 11:02 a.m. from a height of 9,600 metres.

Like the primary target Kokura, Nagasaki was overcast that morning. With barely enough fuel remaining to reach Okinawa, Major Sweeney and his crew had to pinpoint their target in the course of only one run over the city. By chance a crack opened in the clouds, revealing the industrial zone stretching from the Mitsubishi sports field in Hamaguchi-machi to the Mitsubishi Steel Works in Mori-machi. The actual explosion, however, occurred some five or six hundred metres to the north over a tennis court in Matsuyama-machi.

Compared to one used on Hiroshima, the Nagasaki bomb was rounder and fatter; so it was called "Fat Man." The fissile material was plutonium 239. The plutonium was divided into subcritical portions and packed into a spherical case. To cause the chain reaction, gunpowder around the periphery of the case was used to force the units to the center; thus, it was called an "implosion-type" bomb. The fission of slightly more than one kilogram of plutonium 239 is thought to have released destructive energy equivalent to about 21,000 tons of TNT.

The pattern of destruction in Nagasaki was shaped by the geography of the city. The bomb was dropped over the Urakami Valley, a residential and industrial area. The center of Nagasaki, the harbour, and the historic district were shielded from the blast by the hills flanking the Urakami River. In the affected area, however, an estimated 12,000 buildings were destroyed by blast or burned in the fires resulting from the bomb.

As a result of a more powerful bomb and the focusing effect of the surrounding hills, physical destruction in the Urakami Valley was even greater than in Hiroshima. Virtually nothing was left standing. Worshippers in neighbourhood shrines and temples and in the great Urakami Cathedral died at their prayers. Children died in their classrooms, prisoners in their cells, workers



**Top: The "Fat Man" Bomb
Bottom: Heat Ray Victim**

at their machines.

Out of a population of approximately 240,000 people, 73,884 perished and 74,909 were injured (from a 1950 study by the Committee for the Preservation of Atomic Bomb Artifacts).

The bombing inflicted a crushing blow on Nagasaki's existing medical system. The surviving doctors and nurses began relief activities, but the lack of equipment and supplies made it impossible to provide even first aid. Relief trains meanwhile traveled into the still-burning neighbourhoods near the hypocenter and carried victims to hospitals in nearby towns. A naval hospital relief team entered the city in the evening, and during the night rescue teams comprised mainly of volunteer guard and fire-fighting brigades from the neighbouring towns arrived to assist the victims.

August 6, 2003

All told nearly 300,000 people have died from either the direct impact of or radiation fallout from these two bombings. Many thousands more have died from radiation sickness and cancer since 1945.

Today, Russia, China, Great Britain, France, Israel, India and Pakistan have joined the United States as nuclear powers. Other nations are taking steps to produce nuclear weapons.

The Nuclear Non-Proliferation Treaty (NPT), formalized in 1970, created a pact between nuclear and non-nuclear states. In exchange for the promise of some 180 countries not to seek nuclear weapons, the nuclear states promised to work in good faith to dismantle their own nuclear weapons.

Now, 33 years after the signing of the NPT, the United States — the world's largest nuclear power with more than 6,000 warheads — condemns other nations for seeking nuclear weapons, while simultaneously taking many steps that undermine its own commitment to work toward nuclear disarmament:

- In 1999, the U.S. Senate failed to ratify the Comprehensive Nuclear Test Ban Treaty, which outlaws all nuclear explosions.

- At the end of 2001, the Bush Administration completed its "Nuclear Posture Review," which suggests possible first use of U.S. nuclear weapons against non-nuclear states like Syria, Libya, Iran and Iraq.

- In 2002, President Bush withdrew from the Anti-Ballistic Missile Treaty (ABM), so that the United States could develop a missile-defense shield. The ABM Treaty prohibits the unilateral development of missile-defense systems, believing this will cause other countries to seek more aggressive nuclear offensive capabilities.

- Also in 2002, a Bush Administration directive clarified that the United States might also use nuclear weapons in response to the use of chemical or biological weapons. (One positive development in 2002 was an agreement between the United States and Russia to reduce their nuclear arsenals to no more than 2,200 warheads each by the end of 2012. But this treaty allows warheads to be stored, rather than destroyed.)

- In 2003, while the U.S. military combed Iraq for weapons of mass destruction, the Bush Administration convinced Congress to provide research funding for two new U.S. nuclear weapons — "bunker busters" (30 to 70 times more powerful than the Hiroshima bomb) and "mini-nukes" (designed to destroy chemical and biological targets). Congress also approved the President's request to make it easier to resume U.S. nuclear testing. Some analysts believe testing will begin shortly after the 2004 presidential election.

Other countries view these U.S. actions as hypocritical. Certainly such actions mute any U.S. voice in calling for other nations to get rid of weapons of mass destruction. Furthermore, it violates the U.S. commitment under the 1968 Nuclear Non-Proliferation Treaty, which requires nuclear powers like the United States to work toward the elimination of nuclear weapons in exchange for a promise by non-nuclear states not to seek nuclear weapons.

Fifty-eight years after the explosions at Hiroshima and Nagasaki, a new nuclear arms race may be imminent.