

EG:200-L1
Unit main title

THE DECISION TO DROP THE BOMB

#

EG:200-L2
Unit main text

While Americans and Japanese alike expected the war to end only after a bloody invasion of Japan, the U.S. government was readying a secret weapon that would dramatically affect the war's outcome: the atomic bomb. In the spring and summer of 1945, American leaders had to decide whether to use this new weapon against Japan.

According to British Prime Minister Winston Churchill, however, "the decision whether or not to use the atomic bomb...was never even an issue." Upon becoming President in April 1945, Harry Truman inherited an expensive bomb project that had always aimed at producing a military weapon. Truman saw the bomb as a way to end the war and save lives by avoiding a costly invasion of Japan. He wanted, he said, to prevent casualties on the scale of "an Okinawa from one end of Japan to the other."

#

DECIDING TO BUILD THE BOMB

EG:210-L1
Main title

#

EG:210-L2
Main text

The atomic bomb was ultimately used against Japan, but it was built as a response to a German threat. In late 1938, German scientists discovered how to split ("fission") the uranium atom, releasing nuclear energy. When physicists in the United States learned of this discovery, many feared that Hitler might acquire a frightening new weapon: an atomic bomb. Refugees from the Nazis, most notably the Hungarian physicists Leo Szilard and Eugene Wigner, feared this possibility so much that they began to search for a way to warn Western governments.

#

EG:210-L2a-P2a

The prospect of Adolf Hitler with an atomic bomb drove all Allied efforts to acquire nuclear weapons.

#

EG:210-L2b-P2b
Day One

German scientists Otto Hahn (right) and Lise Meitner (left) were among the co-discoverers of uranium fission. Meitner was a Jewish refugee in Sweden at the time of the discovery, but she was in communication with Hahn.

#

EG:210-L3

THE EINSTEIN LETTER

Searching for a way to warn the U.S. government, Szilard and Wigner sought the help of famous physicist Albert Einstein, himself a refugee from Nazi Germany. In August 1939, Einstein signed a letter to President Roosevelt regarding the possibility of creating an atomic bomb. It was conveyed to Roosevelt in October.

The letter helped initiate the American atomic-bomb project, but the United States did not immediately begin a crash program to build nuclear weapons. Until 1941, efforts proceeded quite slowly.

#

EG:210-L3a-P3a

After the war, Albert Einstein and Leo Szilard reenacted their famous letter signing in August 1939.

Courtesy of

#

EG:210-L3b-S3b
Original (facsimile after
3 months)

This is the original letter from Albert Einstein to President Roosevelt.

Lent by the Franklin Delano Roosevelt Library

#

EG:210-L3c-P3c
bio. picture

Leo Szilard (1898-1964) in 1949. In 1933 the Hungarian refugee physicist first conceived of a nuclear chain reaction as a means of liberating atomic energy and creating an atomic bomb. He had only recently left Germany because of Hitler's rise to power. During World War II, Szilard worked for the Manhattan Project's Chicago laboratory. Throughout his life he believed that scientists needed to take a leading political role in society. After the war, he devoted much of his energy to warning the world of the dangers of the nuclear arms race.

#

EG:210-L4

A CRASH PROGRAM BEGINS

In 1941, even before the Japanese attack on Pearl Harbor, the American atomic bomb program was accelerating. Independent research in Britain strongly supported the feasibility of a bomb. Furthermore, Vannevar Bush, the head of American civilian scientific research for the military, received a report that German scientists were pushing ahead on their own bomb project. On October 9, 1941, President Roosevelt approved intensified research into the feasibility of an atomic bomb.

#

EG:210-L4a-P4a

Key scientific leaders of the American atomic bomb effort: from the left, Ernest O. Lawrence, Arthur H. Compton, James B. Conant, and Vannevar Bush.

Courtesy of the National Archives

#

EG:210-L5

THE GERMANS DECIDE NOT TO BUILD A BOMB

In June 1942, soon after the American decision to proceed with the atomic bomb, the German authorities (unaware of that decision) judged that the huge investment required to produce a bomb was too large for their war economy to support. They also expected to win the war before such an effort would bear fruit. The United States and Britain were unaware of Germany's decision and continued to assume that the Nazis would acquire the atomic bomb, possibly before the Allies did.

Japan also investigated nuclear weapons, but its efforts never proceeded beyond small-scale laboratory research and had no impact on the Anglo-American decision to build an atomic bomb. Still, there is little doubt that if Japan (or Germany) had been able to construct such a weapon, it would have been used against the Allies.

#

EG:210-L5a-P5a

American and British intelligence officers dismantle the last German nuclear reactor experiment in April 1945. Research on reactors continued during the war, but the small German atomic program never advanced to the point of creating a working reactor.
Courtesy of Brookhaven National Laboratory

#

EG:210-L5b-P5b

Dr. Yoshio Nishina led one of the Japanese projects to investigate the possibility of an atomic bomb. He did not get beyond small-scale laboratory experiments before his laboratory was destroyed by an American air raid on Tokyo in April 1945.
Nishina Memorial Foundation, courtesy of the American Institute of Physics, Emilio Segrè Visual Archives

#

EG:210-L6

THE MANHATTAN PROJECT: A GIGANTIC ENGINEERING ENTERPRISE

In June 1942, President Roosevelt transferred the atomic bomb project to the War Department's Army Corps of Engineers. To disguise this super-secret project, the Corps created a Manhattan Engineer District, with a headquarters initially based in New York City. Three months later, Brig. Gen. Leslie Groves was appointed to head the "Manhattan Project."

Groves' major task was to build the huge industrial facilities needed to separate the small amounts of uranium and plutonium needed for a bomb. Although the Manhattan Project is best remembered for its brilliant scientific leadership, it was, above all, a massive engineering enterprise. At the height of construction in mid-1944, the project employed nearly 129,000 people. No other nation in the world had the massive industrial capacity to make this possible.

#

EG:210-L6a-P6a

The huge K-25 plant was only one of the facilities built at Oak Ridge, Tennessee, to separate uranium 235 for a bomb. K-25 was nearly 1 kilometer (0.6 miles) long and covered an area of 17 hectares (43 acres).

#

EG:210-L6b-P6b

At Hanford, Washington, the Corps of Engineers supervised the construction of a giant facility that used nuclear reactors to generate plutonium 239, which became the principal bomb fuel. The D and F reactors are shown here in December 1944.

#

EG:210-L6c-P6c

Workers eating in a canteen at the Hanford, Washington, plutonium production plant.

#

EG:210-L6d

Manhattan Project photographs courtesy of the National Archives

#

EG:210-L7

A MOST SECRET PLACE

In late 1942, Manhattan Project chief General Groves chose physicist J. Robert Oppenheimer to head a new laboratory devoted to designing atomic bombs. Oppenheimer recommended a remote site in New Mexico for the new facility, where project scientists, many of them world-famous, could work together in complete secrecy. The Los Alamos Laboratory was opened in April 1943.

During the last two years of World War II, the Los Alamos staff made a crash effort to create two different kinds of bombs, one using uranium, the other plutonium. The plutonium bomb proved to be Los Alamos' most difficult challenge.

#

EG:210-L7a-P7a

This picture of the technical area at Los Alamos shows the rough, temporary character of the buildings at the New Mexico desert site.

Courtesy of the National Archives

#

EG:210-L7b-S7b

Los Alamos identification card of Dr. Norma Ramsey, later a Nobel Prize winner in physics.

Lent by the National Museum of American History

#

EG:210-L7c-S7c

Button worn by Dr. Ramsey for admittance into
a classified area at Los Alamos.

Lent by the National Museum of American
History.

=

EG:210-L7d-P7d
Picture over paired
biographies.

Dr. Robert Oppenheimer and Maj. Gen. Leslie Groves in September 1945 at the site of the world's first nuclear explosion.

J. Robert Oppenheimer (1904-1967) was born into a wealthy New York Jewish family and became a brilliant student of theoretical physics. The Nazi persecution of the Jews and the rise of fascism in Europe turned him into an activist with personal ties to Communists--ties that would cost him during the anti-Communist climate of the 1950s. In 1942 he became Groves' inspired choice to head the Los Alamos Laboratory. The young physicist proved to be a superb leader and scientific manager. After the war, he played an important role in advising the U.S. government about nuclear weapons.

Leslie R. Groves (1896-1970) graduated from West Point in 1918 with a degree in civil engineering. During the U.S. military buildup, Groves served as the deputy commander of all Army construction projects and was a key figure in the building of the Pentagon. In September 1942, he was assigned to lead the Manhattan Project. Though some found him authoritarian, his technical competence and decisive leadership proved essential to the success of the massive program.

Courtesy of the National Archives

#

EG:210-L8

AN EXPECTATION OF MILITARY USE

The few decision-makers who knew about the Manhattan Project always assumed that the atomic bomb would be used against either Germany or Japan. Some, like Major General Groves, thought that it could be decisive in ending the war. That alone could justify the United States' huge investment in the bomb-- \$2 billion, or roughly \$20 billion in 1990s dollars--but the project's great expense also motivated him to have it ready as soon as possible. In the spring of 1945, Groves accelerated the production of fissionable materials.

#

EG:210-L8a

"At no time, from 1941 to 1945 did I ever hear it suggested by the President, or any other responsible member of the government, that atomic energy should not be used in the war."

Henry Stimson, Secretary of War (1940-45)

#

EG:210-L8b

"If this weapon fizzles, each of you can look forward to a lifetime of testifying before congressional investigating committees."

Major General Groves to his staff, December 24, 1944

#

EG:211-L1

THE "FAT MAN" ATOMIC BOMB

The Manhattan Project produced two different types of atomic bombs. The "Little Boy" type, which was dropped on Hiroshima, triggered a nuclear explosion by firing one piece of uranium 235 into another. The "Fat Man" type, which was dropped on Nagasaki, was more complex. It contained a sphere of plutonium 239, around which were arrayed blocks of high explosives. These were designed to produce a highly accurate and symmetrical implosion, which would compress the plutonium sphere to a critical density and set off a nuclear chain-reaction.

Scientists at Los Alamos were not entirely confident in the plutonium bomb design, so they scheduled a test of "Fat Man" for July 1945.

#

No label needed.

#

EG:211-L1a-P1a
redraw "Fat Man Assembly"
diagram from U.S. Nuclear
Weapons

EG:211-L2-S2

"FAT MAN" ATOMIC BOMB CASING

This is an actual atomic bomb casing similar to the one dropped on Nagasaki. It contains no nuclear material and presents no radiation hazard.

Lent by The Navy Museum, Washington Navy Yard

#

EG:211-L2a
specifications block

"FAT MAN" ATOMIC BOMB

Weight: 4,680 kg (10,300 lb)
Diameter: 1.5 m (5 ft)
Length: 3.25 m (10 ft 8 in)
Yield: About 22 kilotons (the equivalent of 22,000 tons of TNT)
Manufacturer: Manhattan Project (1944-46),
Atomic Energy Commission
(1947-49)

#

EG:211-L3

NUCLEAR FISSION AND CHAIN REACTION

The atomic nucleus contains elementary particles called protons and neutrons. The nuclear energy holding them together is thousands of times stronger than the chemical energy binding atoms together in molecules (like TNT, for example). For certain very heavy elements (uranium 235 and plutonium 239), the nucleus is almost unstable. When hit by a neutron, it will split, or "fission," into two smaller nuclei, which fly violently apart, releasing nuclear energy and more neutrons.

If a "critical mass" of such an element (about a kilogram, or a few pounds) is rapidly brought together in a bomb, the neutrons cannot escape from the mass but will collide with other nuclei, causing more fission. If each neutron splits one nucleus and releases two neutrons, the number of neutrons (and the rate of fission) will double with each "generation." The result is a runaway "chain reaction" that burns through the nuclear fuel in a millionth of a second, liberating energy equal to that from many tons of conventional explosives.

All nuclear weapons use fission as the basic process to make a nuclear explosion. Most current nuclear weapons, however, use a

fission bomb to trigger the "fusion" of hydrogen nuclei. The resulting "thermonuclear" or "hydrogen" bombs are far more destructive than atomic bombs. There is in principle no limit to the power of hydrogen bombs.

#

EG:211-L3a-IL3a
Diagram

The principle of nuclear fission.

#

EG:211-L4

**AT THE CORE OF THE BOMBS: URANIUM 235 AND
PLUTONIUM 239**

Most natural uranium is in a relatively stable form called uranium 238. But a small fraction is uranium 235 (with three fewer neutrons), which can undergo nuclear fission. Because the two forms are chemically identical, the problem of separating enough pure uranium 235 to make a bomb was extremely difficult, and required an enormous industrial plant.

If a "critical mass" of uranium 235 is brought together, it will produce neutrons faster than they can escape, resulting in a nuclear explosion. The critical mass must be assembled very rapidly, or the heat released at the start of the reaction will blow the fuel apart before it is all consumed. To prevent such an inefficient "pre-detonation," the uranium bomb uses a gun to fire one piece of uranium 235 down the barrel into another.

Manhattan Project scientists found that if natural uranium is assembled in a specially constructed pile (or reactor), its own radioactivity converts some of the uranium 238 into a new element, plutonium 239, which can also be used to make a fission bomb. Plutonium is chemically distinct from uranium, so it is easily separated from the

pile. But it naturally emits so many neutrons that even a gun-type bomb would be too slow to prevent "pre-detonation." This problem was solved by using explosives to symmetrically squeeze a solid sphere of plutonium, instantly increasing its density. This traps the neutrons inside, allowing them to multiply in a fission chain reaction.

For the uranium bomb, the fuel was very difficult to produce but relatively easy to explode. For the plutonium bomb, the opposite was true. The Manhattan Project pursued both tracks simultaneously. Today, almost all atomic bombs are made from plutonium produced in nuclear reactors.

#

EG:220-L1
main title

**"THE MOST TERRIBLE WEAPON EVER KNOWN IN HUMAN
HISTORY"**

Secretary of War Henry L. Stimson

#

EG:220-L2
main text

On April 12, 1945, President Roosevelt died unexpectedly in Warm Springs, Georgia. Vice President Harry S Truman, in office for less than three months, was sworn in the same day. Truman was quickly confronted with the need to approve the use of the atomic bomb, which was expected to be ready by August.

Truman confronted a complicated situation in Europe and the Far East. Japan, although weakened, was not willing to surrender. The atomic bomb offered a way to change that. A bloody invasion loomed if atomic bombs did not force Japan to surrender.

#

EG:220-L2a-P2a

Servicemen in New York City read about President Roosevelt's death, April 12, 1945.

Courtesy of

#

EG:220-L2b-P2b

President Truman is sworn in by Chief Justice Harlan F. Stone in the presence of Mrs. Truman and cabinet members.

Courtesy of the National Archives

#

EG:220-L3

TRUMAN AND THE ATOMIC BOMB

President Truman entered office with no knowledge of the atomic bomb, because Roosevelt had never told him about it. Shortly after Truman's swearing-in, Secretary of War Henry Stimson mentioned it to him briefly. On April 25, Stimson and Groves gave him a more extensive briefing.

Truman had inherited a project that had always aimed at making a practical weapon. He saw the atomic bomb principally as a means to end the war quickly and save American lives.

#

EG:220-L3a-P3a

President Truman and Secretary of War Stimson discuss the atomic bomb, August 8, 1945.

Courtesy of the National Archives

#

EG:220-L3b-P3b
bio. picture

Senator **Harry S Truman (1884-1972)** with Senators Ralph Brewster and Homer Ferguson, 1943. A World War I veteran and Missouri farmer and politician, Truman achieved prominence in the U.S. Senate as chairman of the powerful Truman Committee, which watched over the U.S. industrial and military buildup during World War II. As President, he held ultimate responsibility for the decision to use the atomic bomb.

#

EG:220-L3c-S3c
original or facsimile
document

An original copy of the memorandum Stimson presented to Truman on April 25, 1945. It reads in part, "Within four months we shall in all probability have completed the most terrible weapon ever known in human history, one bomb of which could destroy a whole city.... It is extremely probable that the future will make it possible [for such a weapon] to be constructed by smaller nations or even groups, or at least by a large nation in a much shorter time."

#

EG:220-L3d-P3d
bio. picture

Secretary of War **Henry L. Stimson (1867-1950)** tours the battlefield in France with Gen. Omar Bradley in 1944. A prominent statesman for over 40 years, Stimson served as Secretary of War for William Howard Taft, Governor-General of the Philippines for Calvin Coolidge, and Secretary of State for Herbert Hoover. Although Stimson was a lifelong Republican, he became Roosevelt's Secretary of War in 1940 and soon became a key policy advisor on the atomic bomb.

Courtesy of the National Archives

#

EG:230-L1
main title

JAPAN SEEKS A NEGOTIATED PEACE

=

EG:230-L2
main text

On April 5, 1945, one week before Roosevelt's death, Japanese Prime Minister Kuniaki Koiso and his cabinet resigned because of the increasingly disastrous course of the war--the second such resignation in less than a year. A peace faction in the military-dominated Japanese government had begun to realize that a way had to be found to negotiate an end to the war. The Allied demand for "unconditional surrender" was, however, regarded as intolerable.

Emperor Hirohito approved the appointment of the aged Adm. Kantaro Suzuki as the new Prime Minister. But Suzuki's government was hobbled by severe tensions between the peace faction and militarists who vowed to fight to the bitter end. As a result, direct negotiations with the United States could not be undertaken, and Japan lost an opportunity to try to end the war early.

#

EG:230-L2a-P2a

Admiral Suzuki walks behind Japanese Emperor Hirohito.

Courtesy of the National Archives

#

EG:230-L3

PEACE THROUGH MOSCOW?

The Soviet Union and Japan had remained at peace, although they were allied with opposing sides in the European war. In the fall of 1944, growing desperation drove the Japanese government to approach Joseph Stalin's Communist regime for help in fending off defeat. After the Suzuki cabinet was appointed in April 1945, these initiatives were renewed.

Two key civilian politicians--Marquis Kido, the Emperor's closest adviser, and Shigenori Togo, the new foreign minister--hoped to use this initiative to negotiate a conditional surrender with the Allies. But they had to conceal this intention from the militarists, who vowed to fight on until the Allies gave Japan more concessions. As a result, the Moscow initiative remained weak and indecisive.

#

EG:230-L3a-P3a

Marquis Koichi Kido, Lord Privy Seal and closest political adviser to Japanese Emperor Hirohito.

Courtesy of

#

EG:230-L3b-P3b

Shigenori Togo (right), foreign minister in the Suzuki cabinet, with munitions minister Teijiro Toyoda.

Courtesy of the Imperial War Museum

#

EG:230-L3c-P3c

Emperor Hirohito (1901-1989) inspects bomb damage in Tokyo after a major air raid, 1945. A retiring and bookish man, the Emperor had traditionally been portrayed as a "living god" who exercised little real authority over affairs of state. The reality was more complex. While he was opposed to war with the United States and Britain prior to 1941, he did not discourage Japanese expansionist policies in Asia. Although he tentatively encouraged the Moscow peace initiative in 1945, he also listened to military advisors who argued that one final victory would force Allied leaders to offer improved peace terms. He failed to take decisive action until the atomic bombs had been dropped and the Soviets had declared war.

#

EG:230-L4

THE ALLIED POLICY OF UNCONDITIONAL SURRENDER

The demand that the Axis powers surrender unconditionally was first proposed by President Roosevelt at the Casablanca Conference in early 1943. This policy was quickly accepted by the Allies because it made war aims clear. It became especially important in the troubled relationship between the Western powers and the Soviet Union. It reassured Soviet dictator Joseph Stalin, who suspected Britain and the United States of wanting to make a compromise peace with the Nazis, leaving his country to bear the brunt of the German war machine.

Unconditional surrender was also a popular policy in America, because of the fear that anything less than total victory would fail to root out the causes of fascism and militarism in Germany, Italy and Japan-- just as the Versailles Treaty after World War I had failed to prevent the resurgence of German power.

#

EG:230-L5

THE EMPEROR AND "UNCONDITIONAL SURRENDER"

A key obstacle to any Japanese surrender was the Emperor's position. To the Japanese warlords, the Allied demand for unconditional surrender meant the total destruction of their political system, including a "divine" monarchy that had survived for more than a thousand years.

To most Americans, Hirohito was a hated symbol of Japanese military aggression. Many wanted him executed, or at least imprisoned or exiled. Undersecretary of State Joseph Grew and other Japanese experts in the State Department nonetheless argued that the Emperor should be left on the throne as "the sole stabilizing force" capable of making the Japanese armed forces accept a surrender order. Truman did not accept Grew's arguments because he foresaw much resistance to modifying the Allied policy.

#

EG:230-L5a-S5a

The cover of this December 1942 Collier's magazine depicts Japanese Emperor Hirohito as an evil bat creature.

#

EG:230-L5b-S5b
button reads: "To Hell
with Hirohito"

A button distributed in World War II
Lent by the National Museum of American
History

#

EG:230-L5c-P5c
bio. picture

Joseph C. Grew (1880-1965) was the last U.S. ambassador to Tokyo before the war. In 1944-45, he served as deputy head of the State Department and Acting Secretary of State. Grew understood the mentality of the Japanese leadership and wanted to end the war early in part to minimize Soviet influence in Asia.
Courtesy of the National Archives

#

EG:230-L6

"MAGIC" AND "ULTRA": TWO PICTURES OF JAPANESE INTENTIONS

In 1940 American intelligence experts cracked the Japanese diplomatic code. This operation, codenamed "Magic," allowed the deciphering of messages between Tokyo and the Japanese Embassy in Moscow and gave the United States knowledge of the Japanese peace initiative in the spring of 1945. The intercepted messages showed that Japan was seeking Russian mediation to end the war, but also showed that it rejected "unconditional surrender" and hoped for significant Allied concessions. These ranged from preservation of the Emperor to the retention of captured territories.

American military intelligence was also deciphering Japanese military communications. These intercepts, codenamed "Ultra," revealed in the summer of 1945 that the Japanese had achieved an alarming buildup of forces in southern Japan--precisely in the areas American forces were scheduled to invade late in the year. To the U.S. military leadership, a costly battle for the Japanese home islands thus seemed inevitable.

#

EG:230-L6a-P6a

An Army cryptanalyst deciphers a Japanese
diplomatic message, circa 1945.

Courtesy of the National Security Agency

#