TAHPDX: Great Decisions in U.S. History

Teaching American History: A partnership between Portland State University and the Beaverton, Hillsboro and Forest Grove School Districts (funded by the U.S. Department of Education)

HISTORICAL TOPIC: Building and Dropping the Atomic Bomb

Disclaimer: *This is one of twenty-four topic summaries included in the TAH program and is designed to orient readers to the breadth and depth of the subject. These summaries are by no means exhaustive. Each one is a brief overview of a complex historical topic. Because of the informal nature of a summary, they are not necessarily based on primary sources nor do they employ the full range of scholarly techniques, such as foot- or endnotes. This style of presentation is merely one of the varieties of historical writing that readers will encounter as they explore history.*

Abstract: In the history of technology, no decision has been comparable in consequences to the United States' choice to build and eventually drop the Atomic Bomb on Hiroshima and Nagasaki, Japan. As some historians have noted, there was only one decision involved in the eventual use of the weapon, because the decision to build the bomb was, in essence, the decision to drop it. There were two key decision makers in this story: President Franklin Roosevelt, who had to be convinced by several of the world's most prestigious nuclear physicists, including Albert Einstein, to undertake a nuclear development project through the Manhattan Project, and his successor, Harry S. Truman, who knew nothing of the existence of this terrible weapon until he took office, just a few months before he deployed it. Teachers and students will learn critical lessons about America and its leaders through study of this episode. They will explore the organization of the mammoth project necessary to create the device, so difficult to mount and complete because of the necessity of the profound secrecy with which it had to be conducted. They will also glimpse the agony of the leadership role generated by the decision to unleash the most terrible weapon in the history of warfare and the controversy among politicians, the public, and historians that its use engendered. They will also study the discrepancy between current historians' views of the necessity of the bomb and the values of the day in which it was used. In addition, they will be able, through discussion of the history of the Hanford (Washington) Atomic Works, where the plutonium for the Nagasaki bomb was made, to grasp the immediacy of the Manhattan Project's goals at the local level.

Support Material: *The Atomic Bomb topic contains the subtopics listed below. Each subtopic includes a narrative with highlighted text* ***[resources]*** *and notations indicating that additional support material is available for viewing and/or downloading including primary documents, maps, spreadsheet data and informative websites.*

To access the material go to the TAHPDX: Great Decisions in U.S. History Website and use the links available on the **HISTORY TOPICS [Atomic Bomb]** ***page or the*** **QUICK NAVIGATION [Alpha List]** ***pages.***

URL: http://www.upa.pdx.edu/IMS/currentprojects/TAHv3/Home.html or search "TAHPDX" on the internet.

SUBTOPICS:

1. Introduction

Probably no technological innovation in the history of the world has altered the course of human events as abruptly and as radically as the invention of the atomic bomb. Certainly, no decision in the history of mankind had an impact comparable to President Harry S. Truman's choice to use atomic weapons on the Japanese cities of Hiroshima, a city of about 300,000 on the island of Honshu, and Nagasaki, about 200,000 in population, on the island of Kyushu.

Map Resource: Mission Map of the Bombing of Japan showing the location of Hiroshima and Nagasaki.
Web Resource: Hiroshima and Nagasaki Remembered. Contains a narrative and good links to historical documents and photographs.

When the American B-29 bomber the Enola Gay [**graphic resource**] released its payload, the bomb known as Little Boy [**graphic resource**], over Hiroshima on 6 August 1945, the world was changed forever, especially in terms of the relationship of the United States to all other nations. A second bomb, known as Fat Man [**graphic resource**], was dropped on Nagasaki three days later, and an emphatic exclamation point was placed beside the transformation the world had witnessed three days previously. Although the immediate death toll from the bombs will never be known precisely, the best estimates indicate that 70,000 lives were lost in the Hiroshima explosion and 40,000 in the Nagasaki blast, even though the Nagasaki bomb yielded an explosion that was later estimated at 21 kilotons, 40 percent greater than that of the Hiroshima bomb. Subsequent deaths, some occurring years and even decades later -- attributable to burns, radiation sickness, and wounds -- in both cities put the mortality totals at considerably higher figures [**Bomb Casualties at Hiroshima and Nagasaki: pdf resource**].

Hirohito, the Emperor of Japan [**graphic resource**], quickly came to grips with enormity of the situation facing his military forces and his people, so immense was the devastation in the two cities. Previously pledged to resist capitulation at all costs, even in the face of the certain defeat that loomed in the summer of 1945 before the atomic bomb was used, the emperor said to his people that they would henceforth have to persevere "by enduring the unendurable and suffering what is insufferable," [**Hirohito Surrenders: pdf resource**] by which he meant the humiliation of defeat. Subsequently, on 2 September 1945, Japanese officials came aboard the battleship USS Missouri anchored in Tokyo Bay [**Japanese Surrender on USS Missouri: graphic resource**], where they signed the documents of unconditional surrender that officially ended World War II.

At the time, despite the shock accompanying the virtual obliteration of two heavily populated cities, the general attitude among Americans and their allies was jubilation. The alternative to the bombs, which only a handful of American civilian and military officials knew of before they

were deployed, was a full-scale invasion of Japan's home islands (codenamed Operation Downfall). Inasmuch as the implacable resolve of the Japanese was well publicized, Americans generally believed that such an undertaking would result in a staggering loss of life (approaching two million casualties, military and civilian on both sides, in subsequent estimates). The record of Japanese resistance in the so-called "island hopping" campaign initiated by General Douglas MacArthur seemed to bear out this estimate. Repeatedly, in such actions as the invasions of the Philippines, the Marshall Islands, Iwo Jima, and Okinawa, to name a few, the Japanese had proved themselves to be fierce, fanatical fighters, inflicting heavy casualties on allied forces, even as they took a murderous pounding themselves.

PDF Resource: Operation Downfall (includes a short description and an estimate of potential Allied casualties).

Among those who were in the dark about the existence of atomic weaponry in the months before its use, was then Vice President of the United States, Harry S. Truman. Only after the death of President Franklin D. Roosevelt on 12 April 1945 was Truman, now the successor to the late president, apprised of the bomb's existence. Indeed, only after 16 July, when the new weapon was successfully tested in the New Mexico desert, did he (or anyone else, including the scientists and engineers who invented it), know that it would actually work. Truman's ignorance of the weapon was the consequence of the need-to-know basis on which the development of the atomic bomb under the Manhattan Project was conducted. The top secret developmental activities leading to the creation of the bomb constituted the largest, most complex project ever undertaken by the federal government to date.

PDF Resource (primary document): Stimson (Secretary of War) memo to President Truman (April 25, 1945). Memo regarding the "secret" atomic bomb project, requesting an immediate meeting.

Fraught as it was with moral, ethical, geopolitical, and other implications, the remarkable thing about the decision to drop the bomb was the extent to which it was a choice made by default. In many respects, the decision to build the bomb was the decision to drop it. That is to say, there is no document from that time which definitively states that the United States military forces would make use of the weapon on the Japanese homeland in specific or general circumstances, or in any circumstances at all. This is actually not unusual in the history of technology. The invention or discovery of a technology is often not accompanied by forethought concerning the indirect or secondary impacts or consequences of its use, let alone a definite decision to use it. Instead, a new technology is employed because it is available and addresses some immediate need or desire.

Thus, the history within which the dropping of the bomb occurred provides an important context to the understanding of why it was used by the US—in some accounts, in such an apparently thoughtless and arbitrary way and, in others, as the only rational choice in the face of fanatical resistance by an irrational enemy. As in the full story of any historical episode of consequence, the backdrop to the use of the atomic bomb is a compelling weave of many different narrative strands—in this case, strands of science, technology, geopolitics, military imperatives, in addition to morality and ethics.

2. The Spirit of Inquiry Meets Geopolitical Realities

The story begins with science. At the dawn of the twentieth century, the United States, measured against Europe, lagged in scientific achievement. Other than geology and hard sciences such as chemistry and physics, the country was a scholarly backwater. But, in Europe scientists were beginning to crack the secrets of the atom. In 1896, the French physicist Henri Becquerel found that the element uranium gave off a seemingly endless and powerful radiation. In 1905, Albert Einstein, a German working in the Geneva patent office at the time, calculated that small amounts of matter could be transformed into huge amounts of energy and atomic theory was born. In 1911, the Englishman Ernest Rutherford discovered the atomic nucleus and showed that some could be split by bombarding them with atomic particles.

The Third Reich under Adolph Hitler emerged in Germany in 1933, casting an ominous shadow over all of Europe. Because of its renowned culture of science, many who were wary of Nazism worried that Germany would develop advances in weaponry that would embolden the Nazis and make them dangerous to the tenuous international peace. In 1938, their fears seemed to be confirmed by the announcement that the German radiochemists Otto Hahn and Fritz Strassman had discovered nuclear fission which, if properly controlled, could lead to a powerful chain reaction. Not long afterward, their Austrian co-worker, Lise Meitner, and her nephew Otto Robert Frisch confirmed for the scientific community the results of this work.

By the time Hahn and Strassman's work was revealed, the United States had become home to a large number of accomplished European scientists, including many Jews and Einstein himself (he had emigrated to the U.S. in 1933). Fleeing Hitler's oppression, they had come to the US and Great Britain throughout the 1930s instantly elevating the scientific status of their host countries, especially of American science and particularly physics. Such physics luminaries as Leo Szilard, Eugene Wigner, and Edward Teller, all Hungarian refugees, and Enrico Fermi, who had escaped Mussolini's tyranny in Italy, worried that Hitler's scientists were on the verge of creating an atomic weapon that would put the rest of the world at an enormous disadvantage in any conflict or future negotiations with the dictator. Consequently, they wanted the United States to commit itself to its own program of atomic development. To that end, they urged Einstein to write to President Franklin D. Roosevelt imploring him to begin such a program. Einstein agreed and on 2 August 1939, he sent a note to FDR that read in part:

> *Sir:*
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> *Some recent work by E. Fermi and L. Szilard… leads me to expect that the element uranium may be turned into a new and important source of energy in the immediate future. Certain aspects of the situation … seem to call for watchfulness and if necessary, quick action on the part of the Administration. I believe therefore that it is my duty to bring to your attention the following facts and recommendations.*
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> *In the course of the last four months it has been made probable through the work of Joliot in France as well as Fermi and Szilard in America—that it may be possible to set up a nuclear chain reaction in a large mass of uranium, by which vast amounts of power*

and large quantities of new radium-like elements would be generated. Now it appears almost certain that this could be achieved in the immediate future.

This new phenomenon would also lead to the construction of bombs, and it is conceivable--though much less certain—that extremely powerful bombs of this type may thus be constructed.

Einstein went on to detail steps he thought Roosevelt might want to take to ensure that America did not fall behind in the development of such weapons. He recommended that the president speed up the experimental work, which was at the time being carried on within the limits of the budgets of University laboratories, by providing funds, if such funds be required, through his contacts with private persons who are willing to make contributions for this cause, and perhaps also by obtaining co-operation of industrial laboratories which had the necessary equipment.

PDF Resource (primary document): Full transcript of Einstein's letter to President Roosevelt (August, 1939) from the atomicarchives.com (National Science Foundation). A photocopy of the original letter can be found at the National Archives (Einstein Letter to FDR, 8-2-1939).

Soon after Einstein's letter was received by Roosevelt, Europe was plunged into war when Hitler's army invaded Poland on 1 September 1939. The next year, the German émigré physicists Rudolph Peierels and Otto Frisch, working in England, reported that small amounts of uranium, if brought together correctly at the right speed to form a critical mass, could produce an explosion equal to thousands of tons of TNT. Only a few years later, plutonium was identified as a fissionable material.

Web Resources:

Harnessing of Nuclear Fission: The Making of the Atomic Bomb (1934-45). A good synopsis from the scientific perspective on the harnessing of the atom with numerous pictures of the scientists.

Race for the Hydrogen Bomb. Part of a comprehensive website on the Atomic Bomb developed with NSF funds.

PDF Resource: Martin J. Sherwin, *The Atomic Bomb and the Origins of the Cold War*. Sherwin does a good job of documenting the geopolitical climate that existed during the development of atomic energy -- in Europe and the United States. He also explores the idea that not only were the bombs dropped to bring a speedy conclusion to the war with Japan, but also that American leaders understood their potential diplomatic value and viewed them as a lever against the Soviet Union.

3. Negotiating the Bureaucracy

For the American-based scientists, these scientific developments and geopolitical circumstances convinced them of the necessity of immediate action on an atomic weapons program. But FDR did not share their view. Skeptical of the feasibility of a bomb, and despite several more letters from Einstein, the president delayed committing to the development of an atomic bomb, although he did set up the so-called Uranium Committee [**web resource**] to encourage continued research on nuclear technology. At this point, however, the US had not yet entered the war and despite the fact that it had access to the military services' scientific bureaus, a sense of urgency was missing from the group's work and it only asked for $6,000 in its first year of

operation. Restrictions preventing refugees from working on top secret military projects left the Army and Navy far behind in atomic research as many of the top nuclear physicists were immigrants, but they also put the refugee scientists in a position to work independently on fission technology in their own laboratories at the universities where they were employed. The problem remained, however, that American physicists lagged behind the Germans in atomic research, some claimed by as much as two years or more, and because nobody could promise that a working bomb could be produced if America entered the war, the great bulk of government money for weapons research was being steered into other initiatives.

Meanwhile in England, Frisch and Peierls' research had led them to important conclusions with ramifications for the production of a practical prototype of a bomb. They found that a small amount of either pure U-235 or plutonium would generate the fast neutrons necessary for a chain reaction that would result in an explosion. This meant that a bomb utilizing this technology could be made compact enough to be delivered by existing aircraft.

PDF Resource: Frisch & Peierls Memorandum (March 1940) in which they discuss the construction of a "super bomb" based on a nuclear chain reaction.

The news of these conclusions was a critical turning point. It signaled that a nuclear bomb was, indeed, a realistic goal. As a result, FDR felt more confident about the feasibility of a bomb and when Vannevar Bush, an engineer with a doctorate from MIT and Harvard and the Chair of the National Defense Research Committee (NDRC), told him some time later that, "If such an explosive were made it would be thousands of times more powerful than existing explosives, and its use might be determinative," the president was galvanized into action. America had entered the war following the attack on Pearl Harbor in December 1941 and was now fighting battles on both the European and Pacific fronts. Now seeing the building of a bomb as a matter of national survival, Roosevelt created a new agency called the Office of Scientific Research and Development (OSRD), which subsumed the NDRC. Bush became its head. Another group, known as the S-1 Uranium Committee [**pdf resource**] was formed as a replacement for the impotent Uranium Committee. Its membership included Bush, Vice President Henry Wallace, Secretary of War Henry Stimson, Armed Forces Chief of Staff General George Marshall, and James Conant, President of Harvard and successor to Bush at the NDRC. These were powerful figures in science, government, and the military. In combination, they could get things done and the S-1 Project became the real beginning of the American commitment to build an atomic bomb and the forerunner of what ultimately became the Manhattan Project.

Book Resource: For a further discussion of the acceleration of the atomic energy program under FDR and the source of the quotes above see Lori Lyn Bogle, *The Cold War: Origins of the Cold War, the great historical debate* (Routledge, Feb. 2007).

During the first half of 1942, S-1 conducted fundamental neutron physics research under the leadership of the physicist Arthur Compton [**web resource**], in parallel with work on the development of industrial scale processes for producing fissile materials. As time went on, however, it became clear that since the project had to be done on a massive scale, an experienced project manager would be required to run it. Moreover, as a weapons project, it had to be

handled by people who knew how to produce weapons. Accordingly, in June of 1942, the reins of the mission were turned over to the fledgling Army Corps of Engineers, specifically to an entity created in August called the Manhattan Engineer District, an intentionally obfuscatory name referring to the research going on in the physics labs of Columbia University and in other locations around New York City. The organization and its work were eventually shortened to the name we now know: the Manhattan Project.

4. The Manhattan Project Takes Wing

In September of 1942, control of the project passed from Compton to Colonel Leslie Groves (who was quickly promoted to the rank of Brigadier General). Groves was, by all accounts, an overbearing, cold and boorish man, but he was an undeniably experienced project manager, having just completed leading the construction of the Pentagon. Throughout the years of the project, he was detested by the scientists who worked for him, but nobody could criticize his bureaucratic and organizational skills. Whereas Compton had dithered over a number of key decisions, Groves made them in a few days, including securing high quality Belgian uranium (from the Congo) and buying a huge parcel of land in Oak Ridge, Tennessee for a future laboratory site. A few weeks later, he hired the physicist Dr. J. Robert Oppenheimer of the University of California at Berkeley to run Project Y at Los Alamos [**pdf resource**], the planned central laboratory for weapons physics research and design. Oppenheimer had shown a great talent for leading groups of scientists that worked on the S-1 Program. He and Groves were able to sustain a good working relationship over the duration of the Manhattan Project, although by all accounts they couldn't have been more different in personality. Oppenheimer was sensitive, well-read, polite, dynamic, and almost worshiped by his colleagues.

Web Resource: J. Robert Oppenheimer Centennial at Berkeley (includes a brief biography and some links to historical documents).

As these events were unfolding, Enrico Fermi, working in a squash court at the University of Chicago code named the Metallurgical Laboratory (Met Lab), was designing CP-1, the world's first nuclear reactor. The atomic pile inside the squash court "went critical" on 2 December 1942. Early in 1943, Groves bought land in Hanford, Washington for construction of plutonium production facilities (reactors and chemical processing); the uranium enrichment plants (gaseous diffusion and electromagnetic separation) would be at Oak Ridge, Tennessee. A large experimental graphite reactor (the X-10) was also constructed at Oak Ridge to provide research quantities of plutonium, and went critical on 4 November 1943. Refinement of gun-assembly based weapon designs occurred at the main laboratory at Los Alamos, New Mexico under Oppenheimer's supervision. In 1944, work on all the major parts of the effort—weapons development, fissile material production, combat delivery preparations—proceeded apace at their dedicated sites despite numerous and ongoing logistical and design challenges. In August, Groves was able to make his first estimate of when a bomb might be available for use – mid-spring 1945. In the meantime, the Army-Air Force began modification of 17 B-29s for combat delivery of atomic weapons.

Web Resource: The Manhattan Project: An Interactive History (from the Department of Energy, Office of History and Heritage Resources). Excellent links to narrative, maps, images and other historical documents.
Map Resource: Manhattan Project Facilities.
PDF Resources: *Recommendations of the Immediate Use of Nuclear Weapons*, June 16, 1945 (from the Oppenheimer Group) and *The Franck Report*, June 1945.

5. The Eve of Decision

As the first months of 1945 passed, it became clear that the Allies would win the war in Europe. The Germans had launched a counter-offensive in Belgium against the Allied push eastward following the invasion of Normandy. Known as the Battle of the Bulge, the Wehrmacht's push-back was at one point perilously close to succeeding. But its momentum was broken by General George Patton and his troops who, by February, were dashing almost unimpeded toward Berlin.

From the east, the Soviet Union's Red Army was rolling through Poland and threatening the German homeland, as well. Roosevelt, Churchill, and Stalin were holding a series of talks planning the disposition of post-war Europe. Roosevelt and Churchill (who, from its inception, was fully aware of the progress of the Manhattan Project because it involved the pooling of British and American scientific knowledge) had said nothing to Stalin of the effort to build an atomic bomb. Even as their discussions turned toward the remaining struggle with Japan, they made no indication of the existence of a weapon that might end the war abruptly. Instead, they let the Soviets believe that their continued involvement in the war following Hitler's defeat would be necessary to expedite Japan's surrender. Ironically, Stalin was well aware of the Manhattan Project. He had two spies, Klaus Fuchs and Theodore Hall, both physicists, who had infiltrated it and were reporting to the Soviets on its progress.

Web Resources:
Klaus Fuchs. A short biography (from the Atomic Archive at www.atomicarchive.com/Bios/Fuchs.shtml).
Letter from Chadwick to Peierls about Klaus Fuchs - 14 July 1944. A n interesting letter and short commentary about Fuch's relationship to the British Atomic Energy Program and his eventual transfer to the Los Alamos facility (http://nuclearweaponarchive.org/Usa/Med/FuchsLetter.html).
Obituary: Theodore Hall. An interesting obituary by "The Independent" (London) in November 1999 that details the circumstances surrounding Theodore Hall and his involvement in the spy controversy over the atomic weapons program (www.independent.co.uk/arts-entertainment/obituary-theodore-hall-1125267.html).
Book Resource: Joseph Albright, *Bombshell: The Secret Story of America's Unknown Atomic Spy Conspiracy* (Crown, 1977).

President Franklin Roosevelt died on 12 April 1945, shortly after the Yalta Conference (one of several meetings among Roosevelt, Churchill and Stalin that dealt with the subsequent reorganization of post-war Europe). On the 13th of April Truman, the new US president, was told by Secretary of War Stimson of the Manhattan Project's existence. Truman was FDR's third Vice President. The others had been treated by the president as necessary evils and Truman was no different, although Truman's predecessor, Henry Wallace, was in a policy-making position with respect to the bomb. Truman had been purposefully kept outside of FDR's inner circle and

was mainly “out of the loop” with regard to critical information. When Truman ascended to the highest office in the land he was almost totally uninformed and unprepared for the tasks that lay ahead of him. He was guided by Stimson, the Secretary of War who, though a Republican, had served Roosevelt well and was held in the highest regard throughout the government.

PDF Resource (primary document): Stimson (Secretary of War) memo to President Truman (April 25, 1945). Memo regarding the "secret" atomic bomb project, requesting an immediate meeting.

As head of the S-1 Committee, Stimson was in deliberations on the use of the bomb with the committee and an advisory panel of distinguished physicists. The committee and panel reached three unanimous conclusions by the beginning of June about the bomb: 1) It should be used against Japan as soon as possible; 2) it should be used against war plants surrounded by workers’ homes or other buildings susceptible to damage so that it would make a deep psychological impression on as many Japanese as possible; and 3) the Japanese should be given no warning.

Web Resource: Notes on the Interim Committee Meeting of June 1, 1945 (detailing the discussion about the deployment of atomic weapons against Japan).

Despite the firm view of the situation expressed by the committee, doubts had begun to creep into the minds of some associated with the building and deployment of the weapon. O.C. Brewster, an engineer who had worked on the project, had sent a letter to the president, which eventually found its way to Stimson. Since the defeat of Germany that summer, his fervor for the creation and use of the bomb had diminished considerably. He knew the race to complete it before the Germans was crucial, but once the German threat was gone, he had come to see the destructive power of atomic weaponry as a far greater menace to humanity than the already severely weakened Japanese. He urged that rather than drop the bomb on a Japanese target, a demonstration of its power on a uninhabited target somewhere else be undertaken, followed by a halt to the production of nuclear material. Stimson was greatly affected by the letter which eventually was passed to Truman. The president made no direct comment on it, although he later said that he realized that an atomic explosion would wreak havoc “beyond imagination.”

PDF Resource: Letter from O.C. Brewster to President Truman, May 24, 1945.

In fact, as the first atomic weapon was in the final stages of assembly in the late spring and early summer of 1945, nobody had a clear idea what the result of a nuclear explosion might be. Forecasts from the scientific panel about the force of a blast varied between an equivalency of 2,000 to 20,000 tons of TNT. As the first test of the bomb drew near, the fear was expressed by a number of project scientists that the explosion might set off a chain reaction in the atmosphere and literally burn up the world. Stimson, perhaps affected by Brewster’s thoughts, was sure of the radical change politically, scientifically and socially use of the weapon would bring. He said at the final meeting of the S-1 Committee that it was critical to think of the bomb not “as a new weapon merely but as a revolutionary change in the relations of man to the universe.”

PDF Resource: Henry Stimson Diary entries for the period May 31 - June 6, 1945 including his thoughts on the ramifications of the development and use of atomic weapons.

The only way to discover what the destructive power of the atomic bomb would be—and to find out if it would actually work—was to test it. On Monday, 16 July 1945 5:29 AM Mountain Time at the Trinity site near Alamogordo, New Mexico, with observers some twenty miles away, the first atomic bomb was detonated. The historian Frank Szasz described it this way:

> *The explosion created a brilliant flash that was seen in three states. It lit up the sky like the sun throwing out a multicolored cloud that surged 38,000 feet into the atmosphere within about seven minutes…. The heat at the center of the blast approximated that at the center of the sun, and the light created equaled almost twenty suns…. Where the fireball touched the ground, it created a crater half a mile across, fusing the sand into a greenish gray glass…. Every living thing within a radius of a mile was annihilated—plants, snakes, ground squirrels, lizards, even the ants. The stench of death lingered about the area for three weeks.*

Web Resource: The Trinity Test. A good site (from the Atomic Archives) that has commentary and links to numerous photos taken of the preparation and actual tesing of "The Gadget."
Web Resource: Trinity Test -- Eyewitness Accounts.
Video Resources: Rather dramatic and a bit biased youTube videos, but nonetheless contain historical footage of the Trinity Test (preparation and explosion) including some interviews and impressive footage of the actual explosion. Provides an interesting juxtaposition between the media accounts depicted at the time and the current attitudes (and fears) about atomic weaponry.

- The First Atomic Bomb Explosion: Trinity Test 1945
- The Trinity Test
- Nuclear Bomb - First H Bomb Test

The Trinity test was all the confirmation that many of the scientists who had been working on the Manhattan Project needed to reach the conclusion that the weapon was too terrible ever to contemplate using on a real target. Leo Szilard, who had in many ways instigated the race to create the bomb, was a leading voice in the subsequent attempt to stop the deployment of the weapon. He had actually been campaigning since the spring to head off its use, writing to both FDR and later Truman to implore them not to unleash nuclear power and arguing that rather than cowing the Soviets, use of the bomb would only catalyze a dangerous arms race. James Franck, another prominent physicist, wrote that “The military advantages and the saving of American lives achieved by the sudden use of atomic bombs against Japan may be outweighed by the ensuing loss of confidence and by a wave of horror and repulsion sweeping over the rest of the world and perhaps even dividing public opinion at home." [**pdf resource: The Franck Report, June 11, 1945**] He urged a demonstration project before delegates from the newly formed United Nations in a desert or on an uninhabited island. Others, who were not privy to the bomb’s development, such as General Dwight D. Eisenhower, Supreme Commander of Allied Forces in Europe, volunteered to Truman that he hoped the United States would not be the first to use such a destructive weapon. General Omar Bradley who attended the lunch at which Eisenhower made this declaration nevertheless later said that his impression was that the president had already decided to use the bomb. Other highly credible persons gave the president analyses that ran along

a staggering gamut of opinion. Admiral William Leahy, Truman's chief of staff, bluntly told the president that "…the damn thing will never work." Shockingly, Oppenheimer's opinion was (according to his colleague Szilard) that "…the atomic bomb is shit… a weapon which has no military significance. It will make a big bang—a very big bang—but it is not a weapon that is useful in war."

Web Resource: Leo Szilard Interview: *President Truman Did Not Understand* (US News & World Report, August 15, 1960).

But these views were only one end of the spectrum of advice Truman was receiving.

6. The Choice

On 18 June 1945, a meeting was held at the White House concerning the strategy for dealing with Japan. In his diary for this period, Truman did not mention the bomb and in the meeting at least one participant, John J. McCloy, the Assistant Secretary of War, was struck by the fact that throughout the discussion the bomb was never brought up as a viable military option. Various invasion strategies were debated that entailed assaults on Japan's southernmost island of Kyushu and later of Honshu, the main island, incurring by one estimate upwards of a quarter of a million casualties. This figure was underpinned by the assumption that the Honshu invasion (to be initiated in March 1946) would require the dropping of more bombs on Japan than had been dropped on Germany in the entire course of the war in Europe. Another estimate argued for avoiding an invasion altogether through some means, thus saving, according to the memorandum, up to 1 million lives. By the meeting, Stimson had come to embrace this figure, based on his certainty that the Japanese, both soldiers and civilians, would fight to the last ditch. He later went beyond that estimate, believing that American losses alone in an invasion of the Japanese home islands could reach a million. McCloy, who spoke last, argued that the best idea might be to simply threaten use of the bomb in order to avoid an invasion altogether. He advocated describing its destructive power and then telling the Japanese the surrender terms. If they refused the offer, the moral ground on which the US stood would be firm and the bomb could be used with a clear conscience. McCloy later wrote that a hush fell over the room and the president said he would think about his proposal.

Web Resource: The Final Months of the War With Japan: Signals Intelligence, U.S. Invasion Planning, and the A-Bomb Decision from the CIA, Center for the Study of Intelligence. Contains a detailed account of the decision-making process regarding the final invasion of Japan with easy to read tables about Japanese and U.S. troop deployments and estimated casualties.

On 18 July 1945, two days after the Trinity test, the Big Three (US, Great Britain and the Soviet Union) held a final wartime conference at Potsdam in Germany. Truman, thinking Stalin knew nothing about the bomb, waited until 25 July to vaguely advise him of it and then said only that the United States had just tested a weapon "of unusually destructive force." Stalin later said he was offended that Truman had not been forthcoming earlier about the bomb and outraged by this perfidy. He blamed this incident for the underlying lack of trust that characterized the subsequent Cold War between his nation and the West.

It seems that Truman's reticence about giving Stalin a frank description of the bomb's power was based on his and Churchill's urgent desire to get Stalin to declare war on Japan, in order to strengthen the Allied invasion forces for the great assault currently in the works. They had a different attitude after the talks because of Stalin's obstinacy about a number of issues relating to Eastern Europe. Eisenhower had counseled Truman not to be too eager to persuade Stalin to enter the war, because the Soviets were bound to come in anyway. They coveted Japanese-held prizes, such as the Kurile Islands, which as victors they could eventually claim. But the President's actions at Potsdam suggest that, despite the Trinity test and contrary to his own diary entries for the period wherein he stated categorically that the bomb would end the war, he seemed less than certain about the weapon.

On 26 July 1945, the Allies issued the Potsdam Declaration [**pdf resource**], which promised (without reference to the atomic bomb) the complete and utter destruction of their homeland unless the Japanese promptly accepted "unconditional surrender." Unconditional surrender was an obsession of the Allies because of the defects of the Treaty of Versailles that ended World War I. The rationale was that in its opacity about blame for the war, the treaty had provided a seedbed of hostility toward the victors that allowed German resentments to fester, ultimately convincing Germany to re-arm and ultimately producing Hitler and Nazi Party. The Allies wanted to be sure to fix blame and create the post-war conditions that would ensure a lasting peace.

The Potsdam Declaration was not totally draconian. It also carefully stipulated that following disarmament, Japanese troops could return to their homes and resume normal lives and that the Japanese people would be neither, "enslaved as a race or destroyed as a nation." But because the ultimatum did not preserve the status of the emperor (considered divine by many), the Japanese quickly rejected its terms.

Web Resource: *"Why Did the Japanese Delay Surrendering?"* Herbert P. Bix, author of Hirohito and the Making of Modern Japan (HarperCollins, 2000) writes an illuminating essay on the politics of Japan during this critical period and how it influenced their decisions regarding the Potsdam Declaration and surrender.

Events were closing in on Truman, narrowing his options on the bomb even as the Allies verged on victory. Before the end of the Potsdam Conference, Churchill left office, having been defeated at the polls by the Laborite Clement Atlee, who in the last days of the meeting took over the reins of the British government. Atlee was not an assertive personality and Truman could not rely on him for sound advice. Indeed, Churchill in a famous quip, referred to him as "a sheep in sheep's clothing." Churchill, the one person who understood the entire ebb and flow of events in the six years since the beginning of the war and in whom Truman could confide with complete candor and from whom he could seek forthright guidance, was gone. At the same time, the Soviets were showing alarming eagerness to get into the fight and their ultimate intentions were less than clear. The Japanese, though clearly weakened, were also showing a renewed resolve to continue the fight and defend their emperor and country.

It should be pointed out that as the summer of 1945 wore on, a peace faction within the Japanese cabinet emerged and secret negotiations on surrender were occurring in Geneva, Switzerland

between Prince Konoye and the American diplomat, John Foster Dulles. The Japanese were also making inquiries to the Soviet Union about the possibility of a negotiated peace. Stalin, it appears, was unwilling to negotiate with Japan prior to obtaining coveted territory on its eastern borders and maintained that the Japanese were determined to "fight to the death." The Truman administration could not rely on them for an accurate gauge of Japanese intentions, but given Japan's rejection of the Potsdam Declaration, Stalin's assessment seemed entirely credible.

The sticking point in the Geneva negotiations was, as it had chronically been, the status of the emperor. The initiative went nowhere. Those who later condemned the use of the atomic bomb as tragically unnecessary and barbaric have, however, pointed to these negotiations as proof that the war was close to a resolution and could have been ended on a far less savage note with a little more patience on the American side. Whether this is true or not is a "what if" scenario that will, unfortunately, never be answered.

PDF Resource: Gerhard Krebs*, "Operation Super Sunrise? Japanese-United States Peace Feelers in Switzerland, 1945."* Journal of Military History, 60:4 (Oct. 2005), pp. 1081-1120.

Truman wrote in his diary around the end of the Potsdam Conference that he told Stimson to deploy the bomb by August 10, 1945 On Tuesday, 24 July, General Groves drafted the only official document we have concerning the implementation of atomic warfare. It was a directive releasing the bomb for use [**pdf resource: Grove's Directive on Deployment of the Atomic Bomb**].

Why did Truman decide to drop the bomb? To provide the Japanese with incontrovertible evidence that the Potsdam Declaration meant what it said? To prevent the unnecessary loss of life on both sides inevitably associated with an invasion of the home islands? To appease the pressure of public opinion in America, weary of war but hungry for victory who increasingly demanded a decisive end to the fighting -- sooner rather than later? To warn the Russians that the United States of the post-war world, in possession of the weapon to end all weapons, would not be bullied? To make the bomb pay for itself and validate to the US Congress the expenditure of the $2 billion required to create it? Or was it simply because, like all technological innovations, it was an elegant invention ready for use that could not be denied employment? Or perhaps, all of these reasons?

Web Resource: Harry S. Truman Library & Museum: The Decision to Drop the Atomic Bomb. Excellent commentary and links to key primary documents from 1945-1964.
PDF Resource: Debate on Dropping the Atomic Bomb (a good list of contemporary comments and interviews that provide perspective on the dropping of the atomic bomb, both pro and con).
Web Resource: PBS American Experience: Victory in the Pacific (Online Forum with Historians). Posted questions and replies from a panel of experts commenting on the Pacific Campaign and the dropping of the atomic bomb.

7. Hanford Engineer Works

Everyone familiar with the history of the atomic bomb knows that the name of the B-29 that delivered the Hiroshima bomb was the Enola Gay. Few people know that the B-29 that delivered the Nagasaki bomb was Bockscar, named for the plane's usual commander, Charles Bock, who happened not to be in the pilot's seat on the momentous mission. Similarly, when we think of the laboratories at which the bomb—actually, bombs; there were two different types—was created, the name that comes most readily to mind is Los Alamos in New Mexico. But there were several key sites at which the work of the Manhattan Project was completed in utmost secrecy. Los Alamos was where Little Boy, the U-235 bomb dropped on Hiroshima, was built under the auspices of J. Robert Oppenheimer and other famous physicists. The plutonium bomb, Fat Man, which was dropped on Nagasaki, was built at the Hanford Engineer Works in Washington State. For a variety of reasons, including the lack of fame of most of the leading scientists located there (probably the best known was the chemist Glenn Seaborg, who later became known as the head of the Atomic Energy Commission), Hanford has led an obscure life in the history of the race to build the weapon that decisively ended World War II and ushered in a new era of warfare. Yet the Hanford Engineer Works played a crucial role in that drama.

Hanford was constructed because its remoteness afforded a relatively safe place to produce plutonium, which required a nuclear reactor which, in the event of malfunction, could have had catastrophic consequences. In addition, Hanford's climate was temperate enough to allow for year-long construction operations to occur, a necessity in light of the fact that the facility was only coming off the drawing board in January of 1943 and the completed bombs were dropped on Japan in August of 1945.

Map Resource: Map of the Hanford Engineer Works (Site W) from the Atomic Archives.
Graphic Resource: Photo of the Hanford Production Facilities (January 1960).
PDF Resource: Louis Chesnut, Siting the Hanford Engineering Works: I was there! From "People's Histories" at HistoryLink.org. Louis Chesnut served in the Federal Land Bank system for 35 years. This is his recollection of his involvement in the selection of the Hanford site for the development of the atomic energy project in 1943.Chesnut's account originally appeared in the Spring 1986 issue of The Pacific Northwesterner, published by the Westerners of Spokane.

The seizure of some one half million acres by the federal government angered the ranchers, farmers, and other residents affected by the action. Although none of the locals could find any definitive figures, they were aware that the cost of the construction project must have been staggering (eventually the cost was calculated to be $350 million). The purpose of the immense buildings that came to occupy the site was never explained to the locals and almost all of the workers recruited to build the plants or later to work at them came from outside the area. Few who worked at Hanford knew what the ultimate purpose of their job was. The basic explanation given (by those "in the know") was simply they were doing "something to win the war."

Following the war, a number of scientists at Los Alamos and Oak Ridge attracted attention for their achievements in working on the bomb and for the venues at which they worked through memoirs and biographies written about them. Nobody at Hanford wrote at length about their

work there and little has been written by others about their wartime work. Yet the history of Hanford was an important element in the overall success of the atomic bomb project.

That said, it is ironically post-war Hanford which has received the greatest notoriety because of the pollution of the Columbia at Hanford Reach by the many radioactive materials from the project's production processes. The plant did not stop production after the conclusion of WWII. During the Cold War, the project was expanded to include nine nuclear reactors and five massive plutonium processing complexes, which produced plutonium for most of the 60,000 weapons in the U.S. nuclear arsenal. Nuclear technology developed rapidly during this period, and Hanford scientists produced many notable technological achievements. However, many of the early safety procedures and waste disposal practices were woefully inadequate. Government documents have since confirmed that Hanford's operations released significant amounts of radioactive materials into the air and the Columbia River, which now threatens the health of residents and surrounding ecosystems.

The weapons production reactors were decommissioned at the end of the Cold War (the last reactor was closed down in 1987) and most of the Hanford reactors have been entombed ("cocooned") to allow the radioactive materials to decay (an incredibly lengthy process). The surrounding structures have been removed and buried. Hanford's manufacturing process left behind 53 million U.S. gallons (204,000 m^3) of high-level radioactive waste that remains at the site. This represents two-thirds of the nation's high-level radioactive waste by volume. Today, Hanford is the most contaminated nuclear site in the United States and is the focus of the nation's largest environmental cleanup. Since 1989, about 11,000 workers have been on site to consolidate, clean up, and mitigate waste, contaminated buildings, and contaminated soil. Originally scheduled to be complete within thirty years, the cleanup was less than half finished by 2008.

Beginning in the 1960s, scientists with the U.S. Public Health Service published reports about radioactivity released from Hanford, and there were protests from the health departments of Oregon and Washington. By February 1986, mounting citizen pressure forced the U.S. Department of Energy (which had taken over control of the site in 1977) to release to the public 19,000 pages of previously unavailable historical documents about Hanford's operations. The Washington State Department of Health collaborated with the citizen-led Hanford Health Information Network (HHIN) to publicize data about the health effects of Hanford's operations. HHIN reports concluded that residents who lived downwind from Hanford or who used the Columbia River downstream were exposed to elevated doses of radiation that placed them at increased risk for various cancers and other diseases. A class-action lawsuit brought by two thousand Hanford "downwinders" against the federal government has been in the court system for many years.

Graphic Resources: Hanford Reach on the Columbia River and Spent Nuclear Fuel Rods at the Hanford site (public domain images).
Web Resource: Hanford Challenge - a website devoted to public disclosure of the clean-up activities at the Hanford Facilities.

8. Bibliography

General

Butow, Robert J. C., *Japan's Decision to Surrender* (Stanford University Press, 1954).

Rhodes, Richard, *The Making of the Atomic Bomb* (New York: Simon & Schuster, 1989).

Sherwin, Martin, *A World Destroyed: Hiroshima and its Legacies,* 3rd edition (Stanford University Press, 2003).

Szasz, Ferenc, *The Day the Sun Rose Twice: The Story of the Trinity Site Nuclear Explosion July 16, 1945* (University of New Mexico Press, 1987).

Memoirs, Biographies, Letters

Bird, Kai and Martin Sherwin, *American Prometheus: The Triumph and Tragedy of J. Robert Oppenheimer* (Vintage Books, 2006).

Bix, Herbert P., *Hirohito and the Making of Modern Japan* (Harper Collins, 2000).

Groves, General Leslie R., *Now It Can Be Told: The Story of the Manhattan Project* (De Capo Press, 1983).

Kelly, Cynthia C. (ed), *The Manhattan Project: The Birth of the Atomic Bomb in the Words of Its Creators, Eyewitnesses, and Historians* (Black Dog & Leventhal Publishers, 2007). An excellent book that has primary sources from the period (including the Einstein letters referred to in this summary).

McCulloch, David, *Truman* (Simon & Schuster, 1992).

Smith, Alice and Charles Weiner (eds), *Robert Oppenheimer: Letters and Recollections* (Stanford University Press, 1995).

Stimson, Henry, *On Active Service in Peace and War* (Hippocrene Books, 1947 reprint 1971).

Weart, Spencer and Gertrude Weiss Szilard (eds), *Leo Szilard: His Version of the Facts* (Cambridge, MA: MIT Press, c1978).

Truman, Harry S., *Memoirs of Harry S. Truman: 1945, Year of Decision* (William S. Konecky Associates, 1999).

Hanford

Sanger, S. L., *Working on the Bomb: An Oral History of WWII Hanford* (Portland, OR: Portland State University, 1995).

Gerber, Michelle Stenehjem, *On the Home Front: The Cold War Legacy of the Hanford Nuclear Site* (Lincoln, NE: University of Nebraska Press, 1997).