**Annex A - Robert Oppenheimer Scientific Achievements**

By Francisco J. Collazo Beauchamp

January 22, 2016

**Abstract**

The report is comprised into three parts. Part I (Annex A) will address the significant achievements in the field of physics and nuclear and theoretical physics. Part II (Annex B) will address the development of the atomic bombs managed by the Manhattan Project who was the Program Technical Director under General Groves. Annex C looks at the allegations of Communist affiliations and FBI investigations.



**Figure 1** – Robert Oppenheimer

**Introduction**

J. (Julius) Robert Oppenheimer was born in New York City on April 22, 1904. His parents, Julius S. Oppenheimer, a wealthy German textile merchant, and Ella Friedman, an artist, were of Jewish descent but did not observe the religious traditions. He studied at the Ethical Culture Society School, whose physics laboratory has since been named for him, and entered Harvard in 1922 intending to become a chemist but soon switched to physics. He graduated summa cum laude in 1925 and went to England to conduct research at Cambridge University's Cavendish Laboratory, working under [J.J. Thomson](http://www.atomicarchive.com/Bios/Thomson.shtml).

In 1926, Oppenheimer went to the University of Gottingen to study under [Max Born](http://www.atomicarchive.com/Bios/Born.shtml), obtaining his Ph.D. at the age of 22. There, he published many important contributions to the then newly developed quantum theory, most notably a famous paper on the so-called Born-Oppenheimer approximation, which separates nuclear motion from electronic motion in the mathematical treatment of molecules.

He returned to Harvard in 1927 to study mathematical physics, and as a National Research Council Fellow, in early 1928, he studied at the California Institute of Technology. He accepted an assistant professorship in physics at the University of California, Berkeley and maintained a joint appointment with California Institute of Technology. In the ensuing 13 years, he "commuted" between the two universities, and many of his associates and students commuted with him.

Oppenheimer became credited with being a founding father of the American school of theoretical physics. He did important research in astrophysics, nuclear physics, and spectroscopy and quantum field theory. He made important contributions to the theory of cosmic ray showers, and did work that eventually led toward descriptions of quantum tunneling. In the 1930s, he was the first to write papers suggesting the existence of what we today call black holes.

In November 1940, Oppenheimer married Katherine Peuning Harrison, a radical Berkeley student, and by May 1941 they had their first child, Peter. When World War II began, Oppenheimer eagerly became involved in the efforts to develop an atomic bomb, which were already taking up much of the time and facilities of Lawrence's Radiation Laboratory at Berkeley.

In 1942, he was invited to take over work on neutron calculations, and General Leslie Groves appointed Oppenheimer as the scientific director of the Manhattan Project.

Under Oppenheimer's guidance, the laboratories at Los Alamos were constructed. There, he brought the best minds in physics to work on the problem of creating an atomic bomb. In the end, he was managing more than 3,000 people, as well as tackling theoretical and mechanical problems that arose. He is often referred to as the "father" of the atomic bomb. (In 1944, the Oppenheimers' second child, Katherine (called Toni), was born at Los Alamos.)

On July 16, 1945, the joint work of the scientists at Los Alamos resulted in the first nuclear explosion at Alamagordo, which Oppenheimer named "Trinity."

From 1947-1952, after the war, Oppenheimer was appointed Chairman of the General Advisory Committee to the Atomic Energy Commission (AEC). It was in this role that he voiced strong opposition to the development of the hydrogen bomb.

In 1953, at the height of U.S. anticommunist feeling, Oppenheimer was accused of having communist sympathies, and his security clearance was taken away. The scientific community, with few exceptions, was deeply shocked by the decision of the AEC.

In 1963, President Lyndon B. Johnson attempted to redress these injustices by honoring Oppenheimer with the Atomic Energy Commission's prestigious [Enrico Fermi Award](http://science.energy.gov/fermi/award-laureates/1960s/oppenheimer/).

From 1947 to 1966, Oppenheimer also served as Director of Princeton's Institute for Advanced Study. There, he stimulated discussion and research on quantum and relativistic physics in the School of Natural Sciences. Oppenheimer retired from the Institute in 1966 and died of throat cancer on February 18, 1967.

|  |
| --- |
| J. Robert Oppenheimer Demographic Summary |
| J. Robert Oppenheimer, c. 1944 |
| Born | (1904-04-22)April 22, 1904[New York City, New York](https://en.wikipedia.org/wiki/New_York_City%2C_New_York) |
| Died | February 18, 1967(1967-02-18) (aged 62)[Princeton, New Jersey](https://en.wikipedia.org/wiki/Princeton%2C_New_Jersey) |
| Nationality | American |
| Fields | [Theoretical physics](https://en.wikipedia.org/wiki/Theoretical_physics) |
| Institutions | [University of California, Berkeley](https://en.wikipedia.org/wiki/University_of_California%2C_Berkeley)[California Institute of Technology](https://en.wikipedia.org/wiki/California_Institute_of_Technology)[Los Alamos Laboratory](https://en.wikipedia.org/wiki/Los_Alamos_Laboratory)[Institute for Advanced Study](https://en.wikipedia.org/wiki/Institute_for_Advanced_Study) |
| [Alma mater](https://en.wikipedia.org/wiki/Alma_mater) | [Harvard University](https://en.wikipedia.org/wiki/Harvard_University)[Christ's College, Cambridge](https://en.wikipedia.org/wiki/Christ%27s_College%2C_Cambridge)[University of Gottingen](https://en.wikipedia.org/wiki/University_of_G%C3%B6ttingen) |
| [Thesis](https://en.wikipedia.org/wiki/Thesis) | *Zur Quantentheorie kontinuierlicher Spektren*  (1927) |
|  | [Nuclear weapons](https://en.wikipedia.org/wiki/Nuclear_weapons) development[Tolman-Oppenheimer-Volkoff limit](https://en.wikipedia.org/wiki/Tolman-Oppenheimer-Volkoff_limit)[Oppenheimer-Phillips process](https://en.wikipedia.org/wiki/Oppenheimer-Phillips_process) |
| Known for | [Born–Oppenheimer approximation](https://en.wikipedia.org/wiki/Born%E2%80%93Oppenheimer_approximation) |
| Notable awards | [Enrico Fermi Award](https://en.wikipedia.org/wiki/Enrico_Fermi_Award) (1963) |
| Spouse | Katherine "Kitty" Puening Harrison (1940–1967; his death; 2 children) |
|  |  |
| Signaturehttps://upload.wikimedia.org/wikipedia/commons/thumb/1/1a/J_Robert_Oppenheimer_signature.svg/192px-J_Robert_Oppenheimer_signature.svg.png |
| Notes |
| Brother of physicist [Frank Oppenheimer](https://en.wikipedia.org/wiki/Frank_Oppenheimer) |

**Facts about Oppenheimer**

1. Robert Oppenheimer was born on April 22, 1904 in New York City. He acquired his PhD from University of Gottingen in Germany in the spring of 1927.
2. He graduated from Harvard in 1925 and spent the next four years travelling and established himself as a theoretical physicist.
3. In 1929, Oppenheimer topped in all the units at the University of California and the California Institute of Technology. In 1930, he presented a cogent symmetry argument later recognized to be tantamount to the positive electron or position.
4. Robert Oppenheimer was the youngest human being to be admitted into the New York Mineralogical Society. He was an extraordinary teacher and an excellent theoretician.
5. On July 16, 1945, the first nuclear bomb was exploded at Alamogordo Air Force Base in southern New Mexico.
6. In 1947, Oppenheimer moved to Princeton, New Jersey to become director of the Institute for Advanced Study.
7. He opposed the hydrogen bomb in 1949 due to his conscience as he regretted making such weapons of mass destruction.
8. Robert Oppenheimer was awarded the Enrico Fermi Award for 1963, a prize awarded by the Atomic Energy Commission.
9. He spent the rest of his years performing his duties as the director of the Institute of Advanced Study.
10. Oppenheimer died of cancer at Princeton in 1967.

**Early Life and Education**

Oppenheimer was born in New York City on April 22, 1904, the son of Julius Oppenheimer, a wealthy [Jewish](https://en.wikipedia.org/wiki/Jew) textile importer who had immigrated to the United States from Germany in 1888, and Ella Friedman, a painter. Julius came to America with no money, no baccalaureate studies, and no knowledge of the English language. He got a job in a textile company and within a decade was an executive with the company.

Oppenheimer was initially schooled at Alcuin Preparatory School, and in 1911 entered the [Ethical Culture Society School](https://en.wikipedia.org/wiki/Ethical_Culture_Fieldston_School), whose motto was "Deed before Creed." Oppenheimer was a versatile scholar, interested in English and French literature, and particularly in [mineralogy](https://en.wikipedia.org/wiki/Mineralogy). He completed the third and fourth grades in one year, and skipped half the eighth grade. During his final year, he became interested in chemistry. He entered [Harvard College](https://en.wikipedia.org/wiki/Harvard_College) a year late, at age 18.

In addition to majoring in chemistry, he was also required by Harvard's rules to study history, literature, and philosophy or mathematics. He made up for his late start by taking six courses each term and was admitted to the undergraduate [honor society](https://en.wikipedia.org/wiki/Honor_society) [Phi Beta Kappa](https://en.wikipedia.org/wiki/Phi_Beta_Kappa). In his first year he was admitted to graduate standing in physics on the basis of independent study, which meant he was not required to take the basic classes and could enroll instead in advanced ones. A course on [thermodynamics](https://en.wikipedia.org/wiki/Thermodynamics) taught by [Percy Bridgman](https://en.wikipedia.org/wiki/Percy_Williams_Bridgman) attracted him to experimental physics. He graduated [summa cum laude](https://en.wikipedia.org/wiki/Summa_cum_laude) in three years.

**Early Illness**

Oppenheimer suffered an attack of [colitis](https://en.wikipedia.org/wiki/Ulcerative_colitis) while [prospecting](https://en.wikipedia.org/wiki/Prospecting) in [Joachimstal,](https://en.wikipedia.org/wiki/Joachimstal) Germany during a family summer vacation in Europe. He was sent to New Mexico, where Oppenheimer fell in love with horseback riding and the southwestern United States. Subsequent to his trip to Europe, Oppenheimer was marked by many of his friends as having self-destructive tendencies. Oppenheimer exhibited several episodes of deep psychological troubles. Plagued throughout his life by periods of depression, Oppenheimer once told his brother, "I need physics more than friends".

Studies in Europe



**Figure 2** - [Heike Kamerlingh Onnes](https://en.wikipedia.org/wiki/Heike_Kamerlingh_Onnes%22%20%5Co%20%22Heike%20Kamerlingh%20Onnes)' Laboratory, [Leiden](https://en.wikipedia.org/wiki/Leiden), Netherlands, 1926.

Oppenheimer second row, third from left.

In 1924, Oppenheimer was informed that he had been accepted into [Christ's College, Cambridge](https://en.wikipedia.org/wiki/Christ%27s_College%2C_Cambridge). Bridgman provided Oppenheimer with a recommendation to attend Cambridge because of his forte in theoretical physics and was accepted on the condition that he completes a basic laboratory course.

**Poisoned his Tutor**

He developed an antagonistic relationship with his tutor, [Patrick Blackett](https://en.wikipedia.org/wiki/Patrick_Blackett%2C_Baron_Blackett), who was only a few years his senior. While Patrick Blackett on vacation, Oppenheimer confessed that he had left an apple doused with noxious chemicals on Blackett's desk. Oppenheimer's parents were alerted by the university authorities who considered placing him on probation, a fate prevented by his parents successfully lobbying the authorities.

Oppeheimer left Cambridge in 1926 for the [University of Gottingen](https://en.wikipedia.org/wiki/University_of_G%C3%B6ttingen) to study under [Max Born](https://en.wikipedia.org/wiki/Max_Born). Gottingen was one of the world's leading centers for theoretical physics. Oppenheimer made friends who went on to great success, including [Werner Heisenberg](https://en.wikipedia.org/wiki/Werner_Heisenberg), [Pascual Jordan](https://en.wikipedia.org/wiki/Pascual_Jordan), [Wolfgang Pauli](https://en.wikipedia.org/wiki/Wolfgang_Pauli), [Paul Dirac](https://en.wikipedia.org/wiki/Paul_Dirac), [Enrico Fermi](https://en.wikipedia.org/wiki/Enrico_Fermi) and [Edward Teller](https://en.wikipedia.org/wiki/Edward_Teller). He was known for being too enthusiastic in discussion, sometimes to the point of taking over seminar sessions. His contemporaries objected of his behavior in class.

He obtained his Doctor of Philosophy degree in March 1927 at age 23, supervised by Born. After the oral exam, [James Franck](https://en.wikipedia.org/wiki/James_Franck), the professor administering, reportedly said, "I'm glad that's over. He was on the point of questioning *me*."

Oppenheimer published more than a dozen papers at Gottingen, including many important contributions to the new field of quantum mechanics. He and Born published a famous paper on the [Born–Oppenheimer approximation](https://en.wikipedia.org/wiki/Born%E2%80%93Oppenheimer_approximation), which separates nuclear motion from electronic motion in the mathematical treatment of molecules, allowing nuclear motion to be neglected to simplify calculations.

**Educational Work**

In September 1927, Oppenheimer was awarded a [United States National Research Council](https://en.wikipedia.org/wiki/United_States_National_Research_Council) fellowship to the [California Institute of Technology](https://en.wikipedia.org/wiki/California_Institute_of_Technology) (Caltech). Bridgman also wanted him at Harvard, so a compromise was reached whereby he split his fellowship for the 1927–28 academic years between Harvard in 1927 and Caltech in 1928.

At Caltech, he struck up a close friendship with [Linus Pauling](https://en.wikipedia.org/wiki/Linus_Pauling), and they planned to mount a joint attack on the nature of the [chemical bond](https://en.wikipedia.org/wiki/Chemical_bond), a field in which Pauling was a pioneer, with Oppenheimer supplying the mathematics and Pauling interpreting the results. Both the collaboration and their friendship were nipped in the bud when Pauling began to suspect Oppenheimer of becoming too close to his wife, [Ava Helen Pauling](https://en.wikipedia.org/wiki/Ava_Helen_Pauling).

Oppenheimer had offered Pauline’s wife an in-appropriate romance advances precipitating Pauline to end his professional relationship with Oppenheimer. Oppenheimer later invited him to become head of the Chemistry Division of the [Manhattan Project](https://en.wikipedia.org/wiki/Manhattan_Project), but Pauling refused, saying he was a pacifist. Oppenheimer respected and liked Pauli and may have emulated his personal style as well as his critical approach to problems.

In the autumn of 1928, Oppenheimer visited [Paul Ehrenfest](https://en.wikipedia.org/wiki/Paul_Ehrenfest)'s institute at the [University of Leiden](https://en.wikipedia.org/wiki/University_of_Leiden), the Netherlands, where he impressed by giving lectures in Dutch, despite having little experience with the language. From Leiden he continued on to the [ETH](https://en.wikipedia.org/wiki/ETH) in Zurich to work with [Wolfgang Pauli](https://en.wikipedia.org/wiki/Wolfgang_Pauli) on [quantum mechanics](https://en.wikipedia.org/wiki/Quantum_mechanics) and the [continuous spectrum](https://en.wikipedia.org/wiki/Continuous_spectrum).

From 1929-1943, Oppenheimer taught at the University of [University of California, Berkeley](https://en.wikipedia.org/wiki/University_of_California%2C_Berkeley%22%20%5Co%20%22University%20of%20California%2C%20Berkeley). On returning to the United States, Oppenheimer accepted an associate professorship from the [University of California, Berkeley](https://en.wikipedia.org/wiki/University_of_California%2C_Berkeley), where [Raymond T. Birge](https://en.wikipedia.org/wiki/Raymond_T._Birge) wanted him so badly that he expressed a willingness to share him with Caltech.

In early 1929, before his Berkeley professorship began, Oppenheimer was diagnosed with a mild case of [tuberculosis](https://en.wikipedia.org/wiki/Tuberculosis) and, with his brother Frank, spent some weeks at a ranch in New Mexico. Later he used to say that "physics and desert country" were his "two great loves".

After his recovery from tuberculosis and return to Berkeley, he prospered as an advisor and collaborator to a generation of physicists who admired him for his intellectual virtuosity and broad interests. His students and colleagues saw him as mesmerizing: hypnotic in private interaction, but often frigid in more public settings. His associates fell into two camps: one that saw him as an aloof and impressive genius and aesthete, the other that saw him as a pretentious and insecure poseur. His students almost always fell into the former category, adopting his walk, speech, and other mannerisms, and even his inclination for reading entire texts in their original languages.

**Tutoring Post-Doctoral Fellows**

Probably the most important ingredient he brought to his teaching was his exquisite taste. Oppenheimer always knew what the important problems were. Oppenheimer had a group of six Post-doctoral Fellows. He met this group once a day in his office, and discussed with one after another the status of the student's research problem. He was interested in everything, and in one afternoon they might discuss quantum electrodynamics, cosmic rays, electron pair production and nuclear physics. He truly lived with those problems, struggling for a solution, and he communicated his concern to the group.

**Promotion to Full Professor**

In 1936, Berkeley promoted him to full professor at a salary of $3300 per annum. In return he was asked to curtail his teaching at Caltech, so a compromise was reached whereby Berkeley released him for six weeks each year, enough to teach one term at Caltech.

**Scientific Achievements**

Oppenheimer did important research in [theoretical astronomy](https://en.wikipedia.org/wiki/Theoretical_astronomy) (especially as related to [general relativity](https://en.wikipedia.org/wiki/General_relativity) and nuclear theory), [nuclear physics](https://en.wikipedia.org/wiki/Nuclear_physics), [spectroscopy](https://en.wikipedia.org/wiki/Spectroscopy), and [quantum field theory](https://en.wikipedia.org/wiki/Quantum_field_theory), including its extension into [quantum electrodynamics](https://en.wikipedia.org/wiki/Quantum_electrodynamics). The [formal mathematics](https://en.wikipedia.org/wiki/Formalism_%28mathematics%29) of [relativistic](https://en.wikipedia.org/wiki/Special_relativity) [quantum mechanics](https://en.wikipedia.org/wiki/Quantum_mechanics) also attracted his attention. His work predicted many later finds, which include the [neutron](https://en.wikipedia.org/wiki/Neutron), [meson](https://en.wikipedia.org/wiki/Meson) and [neutron star](https://en.wikipedia.org/wiki/Neutron_star).

In 1926, his major interest was the theory of the continuous spectrum as discussed in his first published paper expressing concerns about the quantum theory of molecular band spectra. He developed a method to carry out calculations of its [transition probabilities](https://en.wikipedia.org/wiki/Transition_probabilities). He calculated the [photoelectric effect](https://en.wikipedia.org/wiki/Photoelectric_effect) for [hydrogen](https://en.wikipedia.org/wiki/Hydrogen) and [X-rays](https://en.wikipedia.org/wiki/X-rays), obtaining the [absorption coefficient](https://en.wikipedia.org/wiki/Absorption_coefficient) at the [K-edge](https://en.wikipedia.org/wiki/K-edge). His calculations accorded with observations of the X-ray absorption of the sun, but not hydrogen. Years later it was realized that the sun was largely composed of hydrogen and that his calculations were indeed correct.



**Figure 3** - [Albert Einstein](https://en.wikipedia.org/wiki/Albert_Einstein) with Oppenheimer circa 1950

**Cosmic Ray Showers**

Oppenheimer also made important contributions to the theory of [cosmic ray](https://en.wikipedia.org/wiki/Cosmic_ray) showers and started work that eventually led to descriptions of [quantum tunneling](https://en.wikipedia.org/wiki/Quantum_tunneling). In 1931, he co-wrote a paper on the "Relativistic Theory of the Photoelectric Effect" with his student Harvey Hall, in which, based on empirical evidence, he correctly disputed Dirac's assertion that two of the [energy levels](https://en.wikipedia.org/wiki/Energy_level) of the [hydrogen](https://en.wikipedia.org/wiki/Hydrogen) atom have the same energy. Subsequently, one of his doctoral students, [Willis Lamb](https://en.wikipedia.org/wiki/Willis_Lamb), determined that this was a consequence of what became known as the [Lamb shift](https://en.wikipedia.org/wiki/Lamb_shift), for which Lamb was awarded the Nobel Prize in Physics in 1955.

[**Oppenheimer-Phillips Process**](https://en.wikipedia.org/wiki/Oppenheimer-Phillips_process)

Oppenheimer worked with his first doctoral student, [Melba Phillips](https://en.wikipedia.org/wiki/Melba_Phillips), on calculations of artificial radioactivity under bombardment by [deuterons](https://en.wikipedia.org/wiki/Deuterons). When [Ernest Lawrence](https://en.wikipedia.org/wiki/Ernest_Lawrence) and [Edwin McMillan](https://en.wikipedia.org/wiki/Edwin_McMillan) bombarded [nuclei](https://en.wikipedia.org/wiki/Atomic_nucleus) with deuterons they found the results agreed closely with the predictions of [George Gamow](https://en.wikipedia.org/wiki/George_Gamow), but when higher energies and heavier nuclei were involved, the results did not conform to the theory. In 1935, Oppenheimer and Phillips worked out a theory now known as the [Oppenheimer-Phillips process](https://en.wikipedia.org/wiki/Oppenheimer-Phillips_process) to explain the results, a theory still in use today.

**Positron Theory**

As early as 1930, Oppenheimer wrote a paper essentially predicting the existence of the [positron](https://en.wikipedia.org/wiki/Positron), after a paper by [Paul Dirac](https://en.wikipedia.org/wiki/Paul_Dirac) proposed that electrons could have both a positive charge and negative energy. Dirac's paper introduced an equation, known as the [Dirac equation](https://en.wikipedia.org/wiki/Dirac_equation), which unified quantum mechanics, [special relativity](https://en.wikipedia.org/wiki/Special_relativity) and the then-new concept of electron [spin](https://en.wikipedia.org/wiki/Spin_%28physics%29), to explain the [Zeeman effect](https://en.wikipedia.org/wiki/Zeeman_effect). Oppenheimer, drawing on the body of experimental evidence, rejected the idea that the predicted positively charged electrons were [protons](https://en.wikipedia.org/wiki/Proton). He argued that they would have to have the same mass as an electron, whereas experiments showed that protons were much heavier than electrons. Two years later, [Carl David Anderson](https://en.wikipedia.org/wiki/Carl_David_Anderson) discovered the positron, for which he received the 1936 Nobel Prize in Physics.

**Astro Physics**

In the late 1930s, Oppenheimer became interested in [astrophysics](https://en.wikipedia.org/wiki/Astrophysics), probably through his friendship with [Richard Tolman](https://en.wikipedia.org/wiki/Richard_Tolman), resulting in a series of papers. In the first of these, a 1938 paper co-written with [Robert Serber](https://en.wikipedia.org/wiki/Robert_Serber) entitled "On the Stability of Stellar Neutron Cores," Oppenheimer explored the properties of [white dwarfs](https://en.wikipedia.org/wiki/White_dwarf). This was followed by a paper co-written with one of his students, [George Volkoff](https://en.wikipedia.org/wiki/George_Volkoff), "On Massive Neutron Cores", in which they demonstrated that there was a limit, the so-called [Tolman-Oppenheimer-Volkoff limit](https://en.wikipedia.org/wiki/Tolman-Oppenheimer-Volkoff_limit), to the [mass](https://en.wikipedia.org/wiki/Mass) of stars beyond which they would not remain stable as [neutron stars](https://en.wikipedia.org/wiki/Neutron_stars) and would undergo gravitational collapse.

**Gravitational Attraction**

In 1939, Oppenheimer and [Hartland Snyder](https://en.wikipedia.org/wiki/Hartland_Snyder) (student), produced a paper "On Continued Gravitational Attraction", which predicted the existence of what are today known as [black holes](https://en.wikipedia.org/wiki/Black_hole). After the Born–Oppenheimer approximation paper, these papers remain his most cited, and were key factors in the rejuvenation of astrophysical research in the United States in the 1950s, mainly by [John A. Wheeler](https://en.wikipedia.org/wiki/John_A._Wheeler).

As a scientist, Oppenheimer is remembered by his students and colleagues as being a brilliant researcher and engaging teacher, the founder of modern theoretical physics in the United States. Because his scientific attentions often changed rapidly, he never worked long enough on any one topic and carried it to fruition to merit the Nobel Prize, although his investigations contributing to the theory of black holes may have warranted the prize had he lived long enough to see them brought into fruition by later astrophysicists. An asteroid, [67085 Oppenheimer](https://en.wikipedia.org/wiki/67085_Oppenheimer), was named in his honor, as was the lunar crater [Oppenheimer](https://en.wikipedia.org/wiki/Oppenheimer_%28crater%29).

As a military and public policy advisor, Oppenheimer was a [technocratic](https://en.wikipedia.org/wiki/Technocracy_%28bureaucratic%29) leader in a shift in the interactions between science and the military and the emergence of "[Big Science](https://en.wikipedia.org/wiki/Big_Science)." During World War II, scientists became involved in military research to an unprecedented degree. Because of the threat [fascism](https://en.wikipedia.org/wiki/Fascism) posed to Western civilization, they volunteered in great numbers both for technological and organizational assistance to the Allied effort, resulting in such powerful tools as [radar](https://en.wikipedia.org/wiki/Radar), the [proximity fuse](https://en.wikipedia.org/wiki/Proximity_fuse) and [operations research](https://en.wikipedia.org/wiki/Operations_research). As a cultured, intellectual, theoretical physicist who became a disciplined military organizer, Oppenheimer represented the shift away from the idea that scientists had their "head in the clouds" and that knowledge on such previously esoteric subjects as the composition of the atomic nucleus had no "real-world" applications.

Two days before the Trinity test, Oppenheimer expressed his hopes and fears in a quotation from the *Bhagavad Gita*:

“In battle, in the forest, at the precipice in the mountains,
On the dark great sea, in the midst of javelins and arrows,
In sleep, in confusion, in the depths of shame,
The good deeds a man has done before defend him.“

**Evaluation of Oppenheimer Scientific Papers**

Oppenheimer's papers were considered difficult to understand even by the standards of the abstract topics he was expert in. He was fond of using elegant, if extremely complex, mathematical techniques to demonstrate physical principles, though he was sometimes criticized for making mathematical mistakes, presumably out of haste. "His physics was good", said his student Snyder, "but his arithmetic awful."

After World War II, Oppenheimer published only five scientific papers, one of which was in biophysics. [Murray Gell-Mann](https://en.wikipedia.org/wiki/Murray_Gell-Mann) a later Novelist who, as a visiting scientist, worked with him at the [Institute for Advanced Study](https://en.wikipedia.org/wiki/Institute_for_Advanced_Study) in 1951, offered this opinion:

He didn't have *Sitzfleisch*, 'sitting flesh,' when you sit on a chair. As far as I know, he never wrote a long paper or did a long calculation, anything of that kind. He didn't have patience for that; his own work consisted of little *apercus*, but quite brilliant ones. But he inspired other people to do things, and his influence was fantastic.

Oppenheimer's diverse interests sometimes interrupted his focus on projects. In 1933 he learned [Sanskrit](https://en.wikipedia.org/wiki/Sanskrit) and met the Indologist [Arthur W. Ryder](https://en.wikipedia.org/wiki/Arthur_W._Ryder) at Berkeley. He read the *Bhagavad Gita* in the original Sanskrit and later he cited it as one of the books that most shaped his philosophy of life. His close confidant and colleague, Nobel Prize winner [Isidor Rabi](https://en.wikipedia.org/wiki/Isidor_Rabi), later gave his own interpretation:

Oppenheimer was overeducated in those fields, which lie outside the scientific tradition such as his interest in religion, in the [Hindu](https://en.wikipedia.org/wiki/Hindu) religion in particular, which resulted in a feeling of mystery of the universe that surrounded him like a fog. He saw physics clearly, looking toward what had already been done, but at the border he tended to feel there was much more of the mysterious and novel than there actually was … [he turned] away from the hard, crude methods of theoretical physics into a mystical realm of broad intuition.

**Luis Alvarez Opinion on Oppenheimer**

In spite of this, observers such as Nobel Prize-winning physicist [Luis Alvarez](https://en.wikipedia.org/wiki/Luis_Walter_Alvarez) have suggested that if he had lived long enough to see his predictions substantiated by experiment, Oppenheimer might have won a Nobel Prize for his work on [gravitational collapse](https://en.wikipedia.org/wiki/Gravitational_collapse), concerning neutron stars and black holes. In retrospect, some physicists and historians consider this to be his most important contribution, though it was not taken up by other scientists in his own lifetime. The physicist and historian [Abraham Pais](https://en.wikipedia.org/wiki/Abraham_Pais) once asked Oppenheimer what he considered to be his most important scientific contributions; and Oppenheimer cited his work on electrons and positrons, not his work on gravitational contraction.

His accomplishments in the Manhattan project are addressed in Annex A - Manhattan Project Accomplishments.

In conclusion, Oppenheimer was nominated for the Nobel Prize for physics three times, in 1945, 1951 and 1967 but never won a Nobel Prize.

**Private and Political Life**

During the 1920s, Oppenheimer remained aloof from worldly matters. He claimed that he did not read newspapers or listen to the radio, and had only learned of the [Wall Street crash of 1929](https://en.wikipedia.org/wiki/Wall_Street_crash_of_1929) some six months after it occurred while on a walk with Ernest Lawrence. He once remarked that he never cast a vote until the [1936 election](https://en.wikipedia.org/wiki/United_States_presidential_election%2C_1936). However, from 1934 on, he became increasingly concerned about politics and international affairs. In 1934, he earmarked three percent of his salary—about $100 a year—for two years to support German physicists fleeing from [Nazi Germany](https://en.wikipedia.org/wiki/Nazi_Germany).

Oppenheimer repeatedly attempted to get Bob Serber a position at Berkeley but was blocked by Dr. Raymond Thayer Birge, Chairman of the Physics Department at the University of Berkeley, who felt that "one Jew in the department was enough".

**Postwar Activities**

After the bombings of Hiroshima and Nagasaki, the Manhattan Project became public knowledge; and Oppenheimer became a national spokesman for science, emblematic of a new type of technocratic power. He became a household name and his face appeared on the covers of [*Life*](https://en.wikipedia.org/wiki/Life_%28magazine%29) and [*Time*](https://en.wikipedia.org/wiki/Time_%28magazine%29). Nuclear physics became a powerful force as all governments of the world began to realize the strategic and political power that came with nuclear weapons. Like many scientists of his generation, he felt that security from atomic bombs would come only from a transnational organization such as the newly formed [United Nations](https://en.wikipedia.org/wiki/United_Nations), which could institute a program to stifle a [nuclear arms race](https://en.wikipedia.org/wiki/Nuclear_arms_race).

**Institute for Advanced Study**

In November 1945, Oppenheimer left Los Alamos to return to Caltech, but he soon found that his heart was no longer in teaching. In 1947, he accepted an offer from [Lewis Strauss](https://en.wikipedia.org/wiki/Lewis_Strauss) to take up the directorship of the [Institute for Advanced Study](https://en.wikipedia.org/wiki/Institute_for_Advanced_Study) in [Princeton, New Jersey](https://en.wikipedia.org/wiki/Princeton%2C_New_Jersey). This meant moving back east and leaving Ruth Tolman, the wife of his friend Richard Tolman, with whom he had begun an affair after leaving Los Alamos. The job came with a salary of $20,000 per annum, plus rent-free accommodation in the director's house, a 17th-century manor with a cook and [groundskeeper](https://en.wikipedia.org/wiki/Groundskeeper), surrounded by 265 acres (107 ha) of woodlands.



**Figure 4** - [Institute for Advanced Study](https://en.wikipedia.org/wiki/Institute_for_Advanced_Study) in [Princeton, New Jersey](https://en.wikipedia.org/wiki/Princeton%2C_New_Jersey)

Oppenheimer brought together intellectuals at the height of their powers and from a variety of disciplines to solve the most pertinent questions of the age. He directed and encouraged the research of many well-known scientists, including [Freeman Dyson](https://en.wikipedia.org/wiki/Freeman_Dyson), and the duo of [Chen Ning Yang](https://en.wikipedia.org/wiki/Chen_Ning_Yang) and [Tsung-Dao Lee](https://en.wikipedia.org/wiki/Tsung-Dao_Lee), who won a Nobel Prize for their discovery of [parity](https://en.wikipedia.org/wiki/Parity_%28physics%29) non-conservation. He also instituted temporary memberships for scholars from the humanities, such as [T. S. Eliot](https://en.wikipedia.org/wiki/T._S._Eliot) and [George F. Kennan](https://en.wikipedia.org/wiki/George_F._Kennan). Some of these activities were resented by a few members of the mathematics faculty, who wanted the institute to stay a bastion of pure scientific research. Abraham Pais said that Oppenheimer himself thought that one of his failures at the institute was being unable to bring together scholars from the natural sciences and the humanities.



**Figure 5** – Oppenheimer Addressed the Congress

Oppenheimer (far right) was invited to address the [Congress for Cultural Freedom](https://en.wikipedia.org/wiki/Congress_for_Cultural_Freedom)'s second Berlin conference in June 1960 together with (left to right): [George F. Kennan](https://en.wikipedia.org/wiki/George_F._Kennan), [Raja Rao](https://en.wikipedia.org/wiki/Raja_Rao), [Willy Brandt](https://en.wikipedia.org/wiki/Willy_Brandt), [Jacques Maritain](https://en.wikipedia.org/wiki/Jacques_Maritain), and [Arthur Schlesinger, Jr.](https://en.wikipedia.org/wiki/Arthur_Schlesinger%2C_Jr.).

From 1947 through 1949A series of conferences in New York saw physicists switch back from war work to theoretical issues. Under Oppenheimer's direction, physicists tackled the greatest outstanding problem of the pre-war years: infinite, divergent, and non-sensual expressions in the [quantum electrodynamics](https://en.wikipedia.org/wiki/Quantum_electrodynamics) of [elementary particles](https://en.wikipedia.org/wiki/Elementary_particle).

[Julian Schwinger](https://en.wikipedia.org/wiki/Julian_Schwinger), [Richard Feynman](https://en.wikipedia.org/wiki/Richard_Feynman) and [Shin'ichiro Tomonaga](https://en.wikipedia.org/wiki/Shin%27ichiro_Tomonaga) tackled the problem of [regularization](https://en.wikipedia.org/wiki/Regularization_%28physics%29), and developed techniques which became known as [renormalization](https://en.wikipedia.org/wiki/Renormalization).

Freeman Dyson was able to prove that their procedures gave similar results. The problem of meson absorption and [Hideki Yukawa](https://en.wikipedia.org/wiki/Hideki_Yukawa)'s theory of [mesons](https://en.wikipedia.org/wiki/Meson) as the carrier particles of the [strong nuclear force](https://en.wikipedia.org/wiki/Strong_nuclear_force) were also tackled.

Probing questions from Oppenheimer prompted [Robert Marshak](https://en.wikipedia.org/wiki/Robert_Marshak)'s innovative two-[meson](https://en.wikipedia.org/wiki/Meson) [hypothesis](https://en.wikipedia.org/wiki/Hypothesis): “that there were actually two types of mesons, [peons](https://en.wikipedia.org/wiki/Pion) and [muons](https://en.wikipedia.org/wiki/Muon).” This led to [Cecil Frank Powell](https://en.wikipedia.org/wiki/Cecil_Frank_Powell)'s breakthrough and subsequent Nobel Prize for the discovery of the pion.

**Atomic Energy Commission**

As a member of the Board of Consultants to a committee appointed by Truman, Oppenheimer strongly influenced the [Acheson–Lilienthal Report](https://en.wikipedia.org/wiki/Acheson%E2%80%93Lilienthal_Report). In this report, the committee advocated creation of an international Atomic Development Authority, which would own all fissionable material and the means of its production, such as mines and laboratories, and atomic power plants where it could be used for peaceful energy production. [Bernard Baruch](https://en.wikipedia.org/wiki/Bernard_Baruch) was appointed to translate this report into a proposal to the United Nations, resulting in the [Baruch Plan](https://en.wikipedia.org/wiki/Baruch_Plan) of 1946.

The Baruch Plan introduced many additional provisions regarding enforcement, in particular requiring inspection of the Soviet Union's uranium resources. The Baruch Plan was seen as an attempt to maintain the United States' nuclear monopoly and was rejected by the Soviets. With this, it became clear to Oppenheimer that an arms race was unavoidable, due to the mutual suspicion of the United States and the Soviet Union, which even Oppenheimer was starting to distrust.



**Figure 6** - Oppenheimer in 1946 with his trademark cigarette

After the Atomic Energy Commission (AEC) came into being in 1947 as a civilian agency in control of nuclear research and weapons issues, Oppenheimer was appointed as the Chairman of its General Advisory Committee (GAC). From this position he advised on a number of nuclear-related issues, including project funding, laboratory construction and even international policy—though the GAC's advice was not always heeded. As Chairman of the GAC, Oppenheimer lobbied vigorously for international arms control and funding for basic science, and attempted to influence policy away from a heated arms race. When the government questioned whether to pursue a crash program to develop an atomic weapon based on [nuclear fusion](https://en.wikipedia.org/wiki/Nuclear_fusion)—the [hydrogen bomb](https://en.wikipedia.org/wiki/Hydrogen_bomb)—Oppenheimer initially recommended against it, though he had been in favor of developing such a weapon during the Manhattan Project.

He was motivated partly by ethical concerns, feeling that such a weapon could only be used strategically against civilian targets, resulting in millions of deaths. He was also motivated by practical concerns, however, as at the time there was no workable design for a hydrogen bomb. Oppenheimer felt that resources would be better spent creating a large force of fission weapons. He and others were especially concerned about nuclear reactors being diverted from plutonium to [tritium](https://en.wikipedia.org/wiki/Tritium) production. They were overridden by Truman, who announced a crash program after the Soviet Union tested their first atomic bomb in 1949. Oppenheimer and other GAC opponents of the project, especially [James Conant](https://en.wikipedia.org/wiki/James_Bryant_Conant), felt personally shunned and considered retiring from the committee. They stayed on, though their views on the hydrogen bomb were well known.

In 1951, however, [Edward Teller](https://en.wikipedia.org/wiki/Edward_Teller) and mathematician [Stanislaw Ulam](https://en.wikipedia.org/wiki/Stanislaw_Ulam) developed what became known as the [Teller-Ulam design](https://en.wikipedia.org/wiki/Teller-Ulam_design) for a hydrogen bomb. This new design seemed technically feasible and Oppenheimer changed his opinion about developing the weapon. As he later recalled: The program we had in 1949 was a tortured thing that you could well argue did not make a great deal of technical sense. It was therefore possible to argue that you did not want it even if you could have it. The program in 1951 was technically so sweet that you could not argue about that. The issues became purely the military, the political and the humane problems of what you were going to do about it once you had it.

**Summary - Final Years**

On 5 June 1947, Harvard awarded honorary degrees to Oppenheimer, [George C. Marshall](https://en.wikipedia.org/wiki/George_C._Marshall), and [Omar N. Bradley](https://en.wikipedia.org/wiki/Omar_N._Bradley). The President of Harvard University, [James B. Conant](https://en.wikipedia.org/wiki/James_B._Conant), sat between Marshall and Bradley.

Oppenheimer Beach, in [St John](https://en.wikipedia.org/wiki/Saint_John%2C_United_States_Virgin_Islands), [US Virgin Islands](https://en.wikipedia.org/wiki/US_Virgin_Islands)

In 1954, Oppenheimer spent several months of the year living on the island of [St. John](https://en.wikipedia.org/wiki/Saint_John%2C_United_States_Virgin_Islands) in the [Virgin Islands](https://en.wikipedia.org/wiki/Virgin_Islands). In 1957, he purchased a 2-acre (0.81 ha) tract of land on [Gibney Beach](https://en.wikipedia.org/wiki/Gibney_Beach), where he built a Spartan home on the beach. He spent a considerable amount of time sailing with his daughter Toni and wife Kitty.

Increasingly concerned about the potential danger to humanity arising from scientific discoveries, Oppenheimer joined with [Albert Einstein](https://en.wikipedia.org/wiki/Albert_Einstein), [Bertrand Russell](https://en.wikipedia.org/wiki/Bertrand_Russell), [Joseph Rotblat](https://en.wikipedia.org/wiki/Joseph_Rotblat) and other eminent scientists and academics to establish what would eventually become the [World Academy of Art and Science](https://en.wikipedia.org/wiki/World_Academy_of_Art_and_Science) in 1960. Significantly, after his public humiliation, he did not sign the major open protests against nuclear weapons of the 1950s, including the [Russell–Einstein Manifesto](https://en.wikipedia.org/wiki/Russell%E2%80%93Einstein_Manifesto) of 1955, nor, though invited, did he attend the first [Pugwash Conferences on Science and World Affairs](https://en.wikipedia.org/wiki/Pugwash_Conferences_on_Science_and_World_Affairs) in 1957.

In his speeches and public writings, Oppenheimer continually stressed the difficulty of managing the power of knowledge in a world in which the freedom of science to exchange ideas was more and more hobbled by political concerns. Oppenheimer delivered the [Reith Lectures](https://en.wikipedia.org/wiki/Reith_Lectures) on the [BBC](https://en.wikipedia.org/wiki/BBC) in 1953, which were subsequently published as *Science and the Common Understanding*.

In 1955, Oppenheimer published *The Open Mind*, a collection of eight lectures that he had given since 1946 on the subject of nuclear weapons and popular culture. Oppenheimer rejected the idea of nuclear gunboat diplomacy. "The purposes of this country in the field of foreign policy," he wrote, "cannot in any real or enduring way be achieved by coercion."

In 1957, the philosophy and psychology departments at Harvard invited Oppenheimer to deliver the [William James Lectures](https://en.wikipedia.org/wiki/William_James_Lectures). An influential group of Harvard alumni led by [Edwin Ginn](https://en.wikipedia.org/wiki/Edwin_Ginn) that included [Archibald Roosevelt](https://en.wikipedia.org/wiki/Archibald_Roosevelt) protested against the decision. Some 1,200 people packed into [Sanders Theatre](https://en.wikipedia.org/wiki/Sanders_Theatre) to hear Oppenheimer's six lectures, entitled "The Hope of Order."

Deprived of political power, Oppenheimer continued to lecture, write and work on physics. He toured Europe and Japan, giving talks about the history of science, the role of science in society, and the nature of the universe. In September 1957, France made him an Officer of the [Legion of Honor](https://en.wikipedia.org/wiki/Legion_of_Honor).

In 1962, Oppenheimer delivered the [Whidden Lectures](https://en.wikipedia.org/wiki/Whidden_Lectures) at [McMaster University](https://en.wikipedia.org/wiki/McMaster_University), and these were published in 1964 as *The Flying Trapeze: Three Crises for Physicists*. On May 3, 1962, he was elected a [Foreign Member of the Royal Society](https://en.wikipedia.org/wiki/Foreign_Member_of_the_Royal_Society) in Britain.

In 1963, at the urging of many of Oppenheimer's political friends who had ascended to power, President [John F. Kennedy](https://en.wikipedia.org/wiki/John_F._Kennedy) awarded Oppenheimer the [Enrico Fermi Award](https://en.wikipedia.org/wiki/Enrico_Fermi_Award), as a gesture of political rehabilitation. Edward Teller, the winner of the previous year's award, had also recommended Oppenheimer to receive it, in the hope that it would heal the rift between them. A week after [Kennedy's assassination](https://en.wikipedia.org/wiki/Kennedy%27s_assassination), his successor, President [Lyndon Johnson](https://en.wikipedia.org/wiki/Lyndon_Johnson), presented Oppenheimer with the award, "for contributions to theoretical physics as a teacher and originator of ideas, and for leadership of the Los Alamos Laboratory and the atomic energy program during critical years." Oppenheimer told Johnson: "I think it is just possible, Mr. President, that it has taken some charity and some courage for you to make this award today."

The rehabilitation implied by the award was partly symbolic, as Oppenheimer still lacked a security clearance and could have no effect on official policy, but the award came with a $50,000 tax-free stipend, and its award outraged many prominent Republicans in Congress. The late President Kennedy's widow [Jacqueline](https://en.wikipedia.org/wiki/Jacqueline_Kennedy_Onassis), still living in the White House, made it a point to meet with Oppenheimer to tell him how much her husband had wanted him to have the medal. While still a senator in 1959, Kennedy had been instrumental in voting to narrowly deny Oppenheimer's enemy Lewis Strauss a coveted government position as [Secretary of Commerce](https://en.wikipedia.org/wiki/Secretary_of_Commerce), effectively ending Strauss' political career. This was partly due to lobbying by the scientific community on behalf of Oppenheimer.

In late 1965, Oppenheimer was diagnosed with [throat cancer](https://en.wikipedia.org/wiki/Head_and_neck_cancer) and, after inconclusive surgery, underwent unsuccessful radiation treatment and [chemotherapy](https://en.wikipedia.org/wiki/Chemotherapy) late in 1966. On February 15, 1967, Oppenheimer fell into a [coma](https://en.wikipedia.org/wiki/Coma), and died at his home in [Princeton, New Jersey](https://en.wikipedia.org/wiki/Princeton%2C_New_Jersey), on February 18, aged 62.

A memorial service was held at [Alexander Hall](https://en.wikipedia.org/wiki/Alexander_Hall_%28Princeton_University%29) at [Princeton University](https://en.wikipedia.org/wiki/Princeton_University) a week later, attended by 600 of his scientific, political and military associates including Bethe, Groves, Kennan, Lilienthal, Rabi, Smyth and Wigner. His brother Frank and the rest of his family were also there, as was the historian [Arthur M. Schlesinger, Jr.](https://en.wikipedia.org/wiki/Arthur_M._Schlesinger%2C_Jr.), the novelist [John O'Hara](https://en.wikipedia.org/wiki/John_O%27Hara), and [George Balanchine](https://en.wikipedia.org/wiki/George_Balanchine), the director of the [New York City Ballet](https://en.wikipedia.org/wiki/New_York_City_Ballet). Bethe, Kennan and Smyth gave brief eulogies. Oppenheimer was [cremated](https://en.wikipedia.org/wiki/Cremated) and his ashes were placed in an urn. Kitty took his ashes to St. John and dropped the urn into the sea off the coast, within sight of the beach house.

In October 1972, when Kitty died of an intestinal infection complicated by [pulmonary embolism](https://en.wikipedia.org/wiki/Pulmonary_embolism), Oppenheimer's ranch in New Mexico was inherited by their son Peter, and the beach property was inherited by their daughter Katherine "Toni" Oppenheimer Silber.

Toni was refused a security clearance for her chosen vocation as a United Nations translator after the FBI brought up the old charges against her father. In January 1977, three months after the end of her second marriage, she committed suicide at age 32. She left the property to "the people of St. John for a public park and recreation area." The original house, built too close to the coast, succumbed to a [hurricane](https://en.wikipedia.org/wiki/Hurricane), but today, the Virgin Islands Government maintains a Community Center in the area.

The following is a summary of all the books that Dr. Oppenheimer wrote during his life time:

*Oppenheimer, J. Robert (1954). Science and the Common Understanding. New York: Simon and Schuster.* [*OCLC*](https://en.wikipedia.org/wiki/OCLC)[*34304713*](https://www.worldcat.org/oclc/34304713)*.*

*Oppenheimer, J. Robert (1955). The Open Mind. New York: Simon and Schuster.* [*OCLC*](https://en.wikipedia.org/wiki/OCLC)[*297109*](https://www.worldcat.org/oclc/297109)*.*

*Oppenheimer, J. Robert (1964). The Flying Trapeze: Three Crises for Physicists. London: Oxford University Press.* [*OCLC*](https://en.wikipedia.org/wiki/OCLC)[*592102*](https://www.worldcat.org/oclc/592102)*.*

*Oppenheimer, J. Robert; Rabi, I.I (1969). Oppenheimer. New York: Scribner.* [*OCLC*](https://en.wikipedia.org/wiki/OCLC)[*2729*](https://www.worldcat.org/oclc/2729)*.*  (*Posthumous*)

*Oppenheimer, J. Robert; Smith, Alice Kimball; Weiner, Charles (1980). Robert Oppenheimer, Letters and Recollections. Cambridge, Massachusetts: Harvard University Press.* [*ISBN*](https://en.wikipedia.org/wiki/International_Standard_Book_Number)[*0-674-77605-4*](https://en.wikipedia.org/wiki/Special%3ABookSources/0-674-77605-4)*.* [*OCLC*](https://en.wikipedia.org/wiki/OCLC)[*5946652*](https://www.worldcat.org/oclc/5946652)*.*  (*Posthumous*)

*Oppenheimer, J. Robert; Metropolis, N.; Rota, Gian-Carlo; Sharp, D. H. (1984). Uncommon Sense. Cambridge, Massachusetts: Birkhäuser Boston.* [*ISBN*](https://en.wikipedia.org/wiki/International_Standard_Book_Number)[*0-8176-3165-8*](https://en.wikipedia.org/wiki/Special%3ABookSources/0-8176-3165-8)*.* [*OCLC*](https://en.wikipedia.org/wiki/OCLC)[*10458715*](https://www.worldcat.org/oclc/10458715)*.*  (*Posthumous*)

*Oppenheimer, J. Robert (1989). Atom and Void: Essays on Science and Community. Princeton, New Jersey: Princeton University Press.* [*ISBN*](https://en.wikipedia.org/wiki/International_Standard_Book_Number)[*0-691-08547-1*](https://en.wikipedia.org/wiki/Special%3ABookSources/0-691-08547-1)*.* [*OCLC*](https://en.wikipedia.org/wiki/OCLC)[*19981106*](https://www.worldcat.org/oclc/19981106)*.*  (*Posthumous*)

**Annex B - Manhattan Project, the Development of the Atomic Bomb**

**Los Alamos**

On October 9, 1941, shortly before the United States entered World War II, President [Franklin D. Roosevelt](https://en.wikipedia.org/wiki/Franklin_D._Roosevelt) approved a crash program to develop an [atomic bomb](https://en.wikipedia.org/wiki/Atomic_bomb). In May 1942, [National Defense Research Committee](https://en.wikipedia.org/wiki/National_Defense_Research_Committee) Chairman [James B. Conant](https://en.wikipedia.org/wiki/James_B._Conant), who had been one of Oppenheimer's lecturers at Harvard, invited Oppenheimer to take over work on fast neutron calculations, a task that Oppenheimer threw himself into with full vigor. He was given the title "Coordinator of Rapid Rupture," specifically referring to the propagation of a fast neutron chain reaction in an atomic bomb. One of his first acts was to host a summer school for bomb theory at his building in Berkeley. The mix of European physicists and his own students—a group including Robert Serber, [Emil Konopinski](https://en.wikipedia.org/wiki/Emil_Konopinski), [Felix Bloch](https://en.wikipedia.org/wiki/Felix_Bloch), [Hans Bethe](https://en.wikipedia.org/wiki/Hans_Bethe) and [Edward Teller](https://en.wikipedia.org/wiki/Edward_Teller)—busied themselves calculating what needed to be done, and in what order, to make the bomb.



**Figure 1** - A group of physicists,1946, [Los Alamos](https://en.wikipedia.org/wiki/Los_Alamos_National_Laboratory) colloquium

In the front row are [Norris Bradbury](https://en.wikipedia.org/wiki/Norris_Bradbury), [John Manley](https://en.wikipedia.org/wiki/John_H._Manley), [Enrico Fermi](https://en.wikipedia.org/wiki/Enrico_Fermi) and [J.M.B. Kellogg](https://en.wikipedia.org/w/index.php?title=J.M.B._Kellogg&action=edit&redlink=1). Behind Manley is Oppenheimer (wearing jacket and tie), and to his left is [Richard Feynman](https://en.wikipedia.org/wiki/Richard_Feynman). The army colonel on the far left is [Oliver Haywood](https://en.wikipedia.org/wiki/Oliver_Haywood). In the third row between Haywood and Oppenheimer is [Edward Teller](https://en.wikipedia.org/wiki/Edward_Teller).

In June 1942, the [US Army](https://en.wikipedia.org/wiki/US_Army) established the [Manhattan Engineer District](https://en.wikipedia.org/wiki/Manhattan_Engineer_District) to handle its part in the atom bomb project, beginning the process of transferring responsibility from the [Office of Scientific Research and Development](https://en.wikipedia.org/wiki/Office_of_Scientific_Research_and_Development) to the military.

In September 1942, Groves was appointed director of what became known as the Manhattan Project. General Groves selected Oppenheimer to head the project's secret weapons laboratory, a choice which surprised many, as Oppenheimer was not known to be politically aligned with the conservative military, or to be an efficient leader of large projects. The fact that he did not have a Nobel Prize, and might not have the prestige to direct fellow scientists, did concern Groves.

However, he was impressed by Oppenheimer's singular grasp of the practical aspects of designing and constructing an atomic bomb, and by the breadth of his knowledge. As a [military engineer](https://en.wikipedia.org/wiki/Military_engineer), Groves knew that this would be vital in an interdisciplinary project that would involve not just physics, but chemistry, [metallurgy](https://en.wikipedia.org/wiki/Metallurgy), [ordnance](https://en.wikipedia.org/wiki/Explosive_weapon) and [engineering](https://en.wikipedia.org/wiki/Engineering). Groves also detected in Oppenheimer something that many others did not, an "overweening ambition" that Groves reckoned would supply the drive necessary to push the project to a successful conclusion. Isidor Rabi considered the appointment "a real stroke of genius on the part of General Groves, who was not generally considered to be a genius." Oppenheimer and Groves decided that for security and cohesion they needed a centralized, secret research laboratory in a remote location.

In late 1942, scouting for a site in late 1942, Oppenheimer was drawn to New Mexico, not far from his ranch. On November 16, 1942, Oppenheimer, Groves and others toured a prospective site. Oppenheimer feared that the high cliffs surrounding the site would make his people feel [claustrophobic](https://en.wikipedia.org/wiki/Claustrophobic), while the engineers were concerned with the possibility of flooding.

Then, Oppenheimer suggested and championed a site that he knew well: a flat [mesa](https://en.wikipedia.org/wiki/Mesa) near [Santa Fe, New Mexico](https://en.wikipedia.org/wiki/Santa_Fe%2C_New_Mexico), which was the site of a private boys' school called the [Los Alamos Ranch School](https://en.wikipedia.org/wiki/Los_Alamos_Ranch_School). The engineers were concerned about the poor access road and the water supply, but otherwise felt that it was ideal. [Los Alamos Laboratory](https://en.wikipedia.org/wiki/Los_Alamos_National_Laboratory) was built on the site of the school, taking over some of its buildings, while many others were erected in great haste. There Oppenheimer assembled a group of the top physicists of the time, which he referred to as the "luminaries".

Initially Los Alamos was supposed to be a military laboratory, and Oppenheimer and other researchers were to be commissioned into the Army. Army doctors considered him underweight at 128 pounds (58 kg), diagnosed his chronic cough as [tuberculosis](https://en.wikipedia.org/wiki/Tuberculosis) and were concerned about his chronic [lumbosacral joint](https://en.wikipedia.org/wiki/Lumbosacral_joint) pain. The plan to commission scientists fell through when [Robert Bacher](https://en.wikipedia.org/wiki/Robert_Bacher) and Isidor Rabi balked at the idea. Subsequently, Conant, Groves, and Oppenheimer devised a compromise whereby the laboratory was operated by the University of California under contract to the [War Department](https://en.wikipedia.org/wiki/United_States_Department_of_War). It soon turned out that Oppenheimer had hugely underestimated the magnitude of the project; Los Alamos grew from a few hundred people in 1943 to over 6,000 in 1945.

Oppenheimer at first had difficulty with the organizational division of large groups, but rapidly learned the art of large-scale administration after he took up permanent residence on the mesa. He was noted for his mastery of all scientific aspects of the project and for his efforts to control the inevitable cultural conflicts between scientists and the military. He was an iconic figure to his fellow scientists, as much a symbol of what they were working toward as a scientific director. [Victor Weisskopf](https://en.wikipedia.org/wiki/Victor_Weisskopf) put it thus:

Oppenheimer directed these studies, theoretical and experimental, in the real sense of the words. Here his uncanny speed in grasping the main points of any subject was a decisive factor; he could acquaint himself with the essential details of every part of the work.

Oppenheimer was intellectually and physically present at each decisive step. He was present in the laboratory or in the seminar rooms, when a new effect was measured, when a new idea was conceived. It was not that he contributed so many ideas or suggestions; but his main influence came from something else. His continuous and intense presence produced a sense of direct participation in all of us; it created that unique atmosphere of enthusiasm and challenge that pervaded the place throughout its time.



**Figure 2** - Presentation of the [Army-Navy "E" Award](https://en.wikipedia.org/wiki/Army-Navy_%22E%22_Award) at Los Alamos

On October 16, 1945, Oppenheimer (left) gave his farewell speech as director on this occasion. [Robert Gordon Sproul](https://en.wikipedia.org/wiki/Robert_Gordon_Sproul) front, in suit, accepted the award on behalf of the University of California.

Development efforts were directed to a [plutonium](https://en.wikipedia.org/wiki/Plutonium) [gun-type fission weapon](https://en.wikipedia.org/wiki/Gun-type_fission_weapon) called "[Thin Man](https://en.wikipedia.org/wiki/Thin_Man_%28nuclear_bomb%29)." Initial research on the properties of plutonium was done using [cyclotron](https://en.wikipedia.org/wiki/Cyclotron)-generated [plutonium-239](https://en.wikipedia.org/wiki/Plutonium-239), which was extremely pure but could only be created in tiny amounts. In April 1944, when Los Alamos received the first sample of plutonium from the [X-10 Graphite Reactor](https://en.wikipedia.org/wiki/X-10_Graphite_Reactor) a problem was discovered. The reactor-bred plutonium had a higher concentration of [plutonium-240](https://en.wikipedia.org/wiki/Plutonium-240), making it unsuitable for use in a gun-type weapon.”

In July 1944, Oppenheimer abandoned the gun design in favor of an [implosion-type](https://en.wikipedia.org/wiki/Nuclear_weapon_design) weapon. Using chemical [explosive lenses](https://en.wikipedia.org/wiki/Explosive_lens), a sub-critical sphere of fissile material could be squeezed into a smaller and denser form. The metal needed to travel only very short distances, so the critical mass would be assembled in much less time.

In August 1944, Oppenheimer implemented a sweeping reorganization of the Los Alamos laboratory to focus on implosion. He concentrated the development efforts on the gun-type device, a simpler design that only had to work with [uranium-235](https://en.wikipedia.org/wiki/Uranium-235), in a single group. In February 1945, this device became [Little Boy](https://en.wikipedia.org/wiki/Little_Boy) Atomic Bomb.

After a mammoth research effort on February 28, 1945, the more complex design of the implosion device, known as the "Christy gadget" after [Robert Christy](https://en.wikipedia.org/wiki/Robert_Christy) was formalized in Oppenheimer’s office. 1945.

In May 1945, an [Interim Committee](https://en.wikipedia.org/wiki/Interim_Committee) was created to advise and report on wartime and postwar policies regarding the use of nuclear energy. In turn, the Interim Committee established a scientific panel consisting of [Compton](https://en.wikipedia.org/wiki/Arthur_Compton), Fermi, Lawrence and Oppenheimer to advise it on scientific issues. In its presentation to the Interim Committee the scientific panel offered its opinion not just on the likely physical effects of an atomic bomb, but on its likely military and political impact. This included opinions on such sensitive issues as whether or not the Soviet Union should be advised of the weapon in advance of its use against Japan.

**The Trinity Bomb Nuclear Test**



**Figure 3** - The Fireball at the Trinity Nuclear Test

On July 16, 1945, the joint work of the scientists at Los Alamos resulted in the first artificial [nuclear explosion](https://en.wikipedia.org/wiki/Nuclear_explosion) near [Alamogordo](https://en.wikipedia.org/wiki/Alamogordo) codenamed "[Trinity](https://en.wikipedia.org/wiki/Trinity_%28nuclear_test%29)." Oppenheimer later recalled that, while witnessing the explosion, he thought of a verse from the [Hindu](https://en.wikipedia.org/wiki/Hindu) holy book, the *Bhagavad Gita* (XI,12): “If the radiance of a thousand suns were to burst at once into the sky that would be like the splendor of the mighty one….”

Years later he would explain that another verse had also entered his head at that time, namely the famous verse from the: *Bhagavad Gita X1-32*, which he translated as "I am become Death, the destroyer of worlds." In 1965, he was persuaded to quote again for a television broadcast: “I remembered the line from the Hindu scripture, the *Bhagavad Gita”* [Vishnu](https://en.wikipedia.org/wiki/Vishnu) is trying to persuade the [Prince](https://en.wikipedia.org/wiki/Arjuna) that he should do his duty and, to impress him, takes on [his multi-armed form](https://en.wikipedia.org/wiki/Vishvarupa) and says, 'Now I am become Death, the destroyer of worlds.”

According to his brother, at the time Oppenheimer simply exclaimed, "It worked." A contemporary account by Brigadier General [Thomas Farrell](https://en.wikipedia.org/wiki/Thomas_Farrell_%28general%29)’s observations about Dr. Oppenheimer behavior during the test: “Dr. Oppenheimer had rested a very heavy burden, grew tenser as the last seconds ticked off. He scarcely breathed. He held on to a post to steady himself. For the last few seconds, he stared directly ahead and then when the announcer shouted "Now!" and there came this tremendous burst of light followed shortly thereafter by the deep growling roar of the explosion, his face relaxed into an expression of tremendous relief.

Physicist Isidor Rabi noticed Oppenheimer's disconcerting triumphalism: "I'll never forget his walk; I'll never forget the way he stepped out of the car ... his walk was like *High Noon* ... this kind of strut. He had done it." On August 6, 1945, at an assembly in Los Alamos (the evening of the [atomic bombing of Hiroshima](https://en.wikipedia.org/wiki/Atomic_bombings_of_Hiroshima_and_Nagasaki)), Oppenheimer took to the stage and clasped his hands together "like a prize-winning boxer" while the crowd cheered.

He noted his regret the weapon had not been available in time to use against Nazi Germany. However, he and many of the project staff were very upset about the bombing of Nagasaki, as they did not feel the second bomb was necessary from a military point of view.

On August 17, 1945, Oppenheimer traveled to Washington to hand-deliver a letter to Secretary of War [Henry L. Stimson](https://en.wikipedia.org/wiki/Henry_L._Stimson) expressing his revulsion and his wish to see nuclear weapons banned. Oppenheimer was granted an interview with President [Harry S Truman](https://en.wikipedia.org/wiki/Harry_S_Truman). The meeting, however, went badly, after Oppenheimer remarked he felt he had "blood on my hands." The remark infuriated Truman and put an end to the meeting. Truman later told his Undersecretary of State [Dean Acheson](https://en.wikipedia.org/wiki/Dean_Acheson) "I don't want to see that son-of-a-bitch in this office ever again."

In 1946, for his services as director of Los Alamos, Oppenheimer was awarded the [Medal for Merit](https://en.wikipedia.org/wiki/Medal_for_Merit) from President [Harry S Truman](https://en.wikipedia.org/wiki/Harry_S_Truman).

**Annex C - Dr. Oppenheimer Congressional Hearing and FBI Investigation**

**Communist Affiliations**

Like many young intellectuals in the 1930s, he was a supporter of social reforms that were later alleged to be [communist](https://en.wikipedia.org/wiki/Communism) ideas. He donated to many progressive efforts which were later branded as "[left-wing](https://en.wikipedia.org/wiki/Leftist)" during the [McCarthy](https://en.wikipedia.org/wiki/Joseph_McCarthy) era. The majority of his allegedly radical work consisted of hosting fund raisers for the [Republican](https://en.wikipedia.org/wiki/Second_Spanish_Republic) cause in the [Spanish Civil War](https://en.wikipedia.org/wiki/Spanish_Civil_War) and other [anti-fascist](https://en.wikipedia.org/wiki/Anti-fascist) activity. He never openly joined the [Communist Party](https://en.wikipedia.org/wiki/Communist_Party_USA), though he did pass money to [liberal](https://en.wikipedia.org/wiki/Liberalism) causes by way of acquaintances who were alleged to be Party members. In 1936, Oppenheimer became involved with [Jean Tatlock](https://en.wikipedia.org/wiki/Jean_Tatlock), the daughter of a Berkeley literature professor and a student at [Stanford University School of Medicine](https://en.wikipedia.org/wiki/Stanford_University_School_of_Medicine). The two had similar political views.

Tatlock broke up with Oppenheimer in 1939 after a tempestuous relationship. In June 1939, Kitty and Harrison Tolman moved to [Pasadena, California](https://en.wikipedia.org/wiki/Pasadena%2C_California), where he became chief of radiology at a local hospital and she enrolled as a graduate student at the [University of California, Los Angeles](https://en.wikipedia.org/wiki/University_of_California%2C_Los_Angeles). Oppenheimer and Kitty created a minor scandal by sleeping together after one of Tolman's parties. In the summer of 1940, she stayed with Oppenheimer at his ranch in New Mexico. She finally asked Harrison for a divorce when she found out she was pregnant. When he refused, she obtained an instant divorce in [Reno, Nevada](https://en.wikipedia.org/wiki/Reno%2C_Nevada), and took Oppenheimer as her fourth husband on November 1, 1940.

Their first child Peter was born in May 1941, and their second child, Katherine ("Toni"), was born in [Los Alamos, New Mexico](https://en.wikipedia.org/wiki/Los_Alamos%2C_New_Mexico), on December 7, 1944. During his marriage, Oppenheimer continued his affair with Jean Tatlock. Later their continued contact became an issue in his security clearance hearings because of Tatlock's Communist associations.

Many of Oppenheimer's closest associates were active in the Communist Party in the 1930s or 1940s. They included his brother Frank, Frank's wife Jackie, Kitty, Jean Tatlock, his landlady Mary Ellen Washburn, and several of his graduate students at Berkeley.

When he joined the Manhattan Project in 1942, Oppenheimer wrote on his personal security questionnaire that he had been "a member of just about every Communist Front organization on the West Coast."

Years later he claimed that he did not remember saying this, that it was not true, and that if he had said anything along those lines, it was "a half-jocular overstatement." He was a subscriber to the [*People's World*](https://en.wikipedia.org/wiki/People%27s_World), a Communist Party organ, and he testified in 1954 that he was associated with the Communist movement. From 1937 to 1942, Oppenheimer was a member at Berkeley of what he called a "discussion group," which was later identified by fellow members, [Haakon Chevalier](https://en.wikipedia.org/wiki/Haakon_Chevalier) and Gordon Griffiths, as a "closed" (secret) unit of the Communist Party for Berkeley faculty.

[**Federal Bureau of Investigation**](https://en.wikipedia.org/wiki/Federal_Bureau_of_Investigation) **(FBI) Probe**

In December 1940, the FBI recorded that he attended a meeting in December 1940 at Chevalier's home that was also attended by the Communist Party's California state secretary William Schneiderman, and its treasurer [Isaac Folkoff](https://en.wikipedia.org/wiki/Isaac_Folkoff). In March 1941, the FBI opened a file on Oppenheimer.

The FBI noted that Oppenheimer was on the Executive Committee of the [American Civil Liberties Union](https://en.wikipedia.org/wiki/American_Civil_Liberties_Union), which it considered a Communist front organization. Shortly thereafter, the FBI added Oppenheimer to its [Custodial Detention Index](https://en.wikipedia.org/wiki/Custodial_Detention_Index) for arrest in case of national emergency. Debates over Oppenheimer's Party membership or lack thereof have turned on very fine points. Almost all historians agree he had strong left-wing sympathies during this time and interacted with Party members, though there is considerable dispute over whether he was officially a member of the Party. At his 1954 security clearance hearings, he denied being a member of the Communist Party, but identified himself as a [fellow traveler](https://en.wikipedia.org/wiki/Fellow_traveler), which he defined as someone who agrees with many of the goals of Communism without being willing to blindly follow orders from any Communist party apparatus.

Throughout the development of the atomic bomb, Oppenheimer was under investigation by both the FBI and the Manhattan Project's internal security arm for his past left-wing associations. He was followed by Army security agents during a trip to [California](https://en.wikipedia.org/wiki/California) in June 1943 to visit his former girlfriend, Jean Tatlock, who was suffering from [depression](https://en.wikipedia.org/wiki/Major_depressive_disorder). Oppenheimer spent the night in her apartment. In August 1943, he volunteered to Manhattan Project security agents that George Eltenton, whom he did not know, had solicited three men at Los Alamos for nuclear secrets on behalf of the [Soviet Union](https://en.wikipedia.org/wiki/Soviet_Union). When pressed on the issue in later interviews, Oppenheimer admitted that the only person who had approached him was his friend Haakon Chevalier, a Berkeley professor of French literature, who had mentioned the matter privately at a dinner at Oppenheimer's house. [Brigadier General](https://en.wikipedia.org/wiki/Brigadier_General_%28United_States%29) [Leslie R. Groves, Jr.](https://en.wikipedia.org/wiki/Leslie_R._Groves%2C_Jr.), the director of the Manhattan Project, thought Oppenheimer was too important to the project to be ousted over this suspicious behavior. On July 20, 1943, he wrote to the Manhattan Engineer District:

In accordance with my verbal directions of July 15, it is desired that clearance be issued to Julius Robert Oppenheimer without delay irrespective of the information which you have concerning Mr. Oppenheimer. He is absolutely essential to the project.

Tatlock committed suicide on January 4, 1944, which left Oppenheimer deeply grieved.

[**Oppenheimer Security Hearing**](https://en.wikipedia.org/wiki/Oppenheimer_security_hearing)

The FBI, under [J. Edgar Hoover](https://en.wikipedia.org/wiki/J._Edgar_Hoover), had been following Oppenheimer since before the war, when he showed Communist sympathies as a professor at Berkeley and had been close to members of the Communist Party, including his wife and brother. In early 1940, he had been under close surveillance, his home and office were bugged, his phone tapped, and his mail opened. The FBI furnished Oppenheimer's political enemies with incriminating evidence about his Communist ties. These enemies included Strauss, an AEC commissioner, who had long harbored resentment against Oppenheimer both for his activity in opposing the hydrogen bomb and for his humiliation of Strauss before Congress some years earlier regarding Strauss' opposition to the export of radioactive isotopes to other nations. Oppenheimer had memorably categorized these as "less important than electronic devices but more important than, let us say, vitamins."

March 30, 1954, President [Dwight D. Eisenhower](https://en.wikipedia.org/wiki/Dwight_D._Eisenhower) received a report from [Lewis L. Strauss](https://en.wikipedia.org/wiki/Lewis_L._Strauss), Chairman of the [Atomic Energy Commission](https://en.wikipedia.org/wiki/United_States_Atomic_Energy_Commission), on the [Operation Castle](https://en.wikipedia.org/wiki/Operation_Castle) hydrogen bomb tests in the Pacific. Strauss pressed for Oppenheimer's security clearance to be revoked.

On June 7, 1949, Oppenheimer testified before the [House Un-American Activities Committee](https://en.wikipedia.org/wiki/House_Un-American_Activities_Committee), where he admitted that he had associations with the Communist Party in the 1930s. He testified that some of his students, including [David Bohm](https://en.wikipedia.org/wiki/David_Bohm), [Giovanni Rossi Lomanitz](https://en.wikipedia.org/wiki/Giovanni_Rossi_Lomanitz), [Philip Morrison](https://en.wikipedia.org/wiki/Philip_Morrison), Bernard Peters and Joseph Weinberg, had been Communists at the time they had worked with him at Berkeley. Frank Oppenheimer and his wife Jackie testified before the HUAC and admitted that they had been members of the Communist Party. Frank was subsequently fired from his [University of Minnesota](https://en.wikipedia.org/wiki/University_of_Minnesota) position. Unable to find work in physics for many years, he became instead a cattle rancher in [Colorado](https://en.wikipedia.org/wiki/Colorado). He later taught high school physics and was the founder of the San Francisco [Exploratorium](https://en.wikipedia.org/wiki/Exploratorium).

From 1949-1953, Oppenheimer found himself in the middle of more than one controversy and power struggle. In 1951, Edward Teller, who had been so disinterested in work on the atomic bomb at Los Alamos during the war that Oppenheimer had given him time instead to work on his own project on the hydrogen bomb, eventually left Los Alamos to found a nuclear weapons laboratory. The Laboratory was founded in 1952. Henceforth, Dr. Teller controlled the development of the hydrogen bomb. Long-range thermonuclear "strategic" weapons delivered by jet bombers would necessarily be under control of the new [United States Air Force](https://en.wikipedia.org/wiki/United_States_Air_Force) (USAF). Oppenheimer had for some years pushed for smaller "tactical" nuclear weapons which would be more useful in a limited theater against enemy troops and which would be under control of the Army. The two services fought for control of nuclear weapons, often allied with different political parties. The USAF, with Teller pushing its program, gained ascendance in the [Republican](https://en.wikipedia.org/wiki/Republican_Party_%28United_States%29)-controlled administration following the election of [Dwight D. Eisenhower](https://en.wikipedia.org/wiki/Dwight_D._Eisenhower) as president in 1952.

In 1954, Oppenheimer's former colleague, physicist [Edward Teller](https://en.wikipedia.org/wiki/Edward_Teller), testified on behalf of the government at Oppenheimer's security hearing.

Strauss and Senator [Brien McMahon](https://en.wikipedia.org/wiki/Brien_McMahon), author of the 1946 [McMahon Act](https://en.wikipedia.org/wiki/McMahon_Act), pushed Eisenhower to revoke Oppenheimer's security clearance. On December 21, 1953, Strauss told Oppenheimer that his security clearance had been suspended, pending resolution of a series of charges outlined in a letter, and discussed his resigning. Oppenheimer chose not to resign and requested a hearing instead. The charges were outlined in a letter from [Kenneth D. Nichols](https://en.wikipedia.org/wiki/Kenneth_D._Nichols), General Manager of the AEC. The hearing that followed in April–May 1954, which was initially confidential and not made public, focused on Oppenheimer's past Communist ties and his association during the Manhattan Project with suspected disloyal or Communist scientists. The US [Department of Energy](https://en.wikipedia.org/wiki/United_States_Department_of_Energy) made public the full text of the transcript in October 2014.

One of the key elements in this hearing was Oppenheimer's earliest testimony about George Eltenton's approach to various Los Alamos scientists, a story that Oppenheimer confessed he had fabricated to protect his friend Haakon Chevalier. Unknown to Oppenheimer, both versions were recorded during his interrogations of a decade before. He was surprised on the witness stand with transcripts of these, which he had not been given a chance to review. In fact, Oppenheimer had never told Chevalier that he had finally named him, and the testimony had cost Chevalier his job. Both Chevalier and Eltenton confirmed mentioning that they had a way to get information to the Soviets. Eltenton admitted he said this to Chevalier and Chevalier admitted he mentioned it to Oppenheimer, but both put the matter in terms of gossip and denied any thought or suggestion of treason or thoughts of espionage, either in planning or in deed. Neither was ever convicted of any crime.

Teller testified that he considered Oppenheimer loyal, but that in a great number of cases, I have seen Dr. Oppenheimer act—I understand that Dr. Oppenheimer acted—in a way which was for me was exceedingly hard to understand. I thoroughly disagreed with him on numerous issues and his actions frankly appeared to me confused and complicated. To this extent I feel that I would like to see the vital interests of this country in hands which I understand better, and therefore trust more. In this very limited sense I would like to express a feeling that I would feel personally more secure if public matters would rest in other hands.

This led to outrage by the scientific community and Teller's virtual expulsion from academic science. Groves, threatened by the FBI as having been potentially part of a cover-up about the Chevalier contact in 1943, likewise testified against Oppenheimer. Many top scientists, as well as government and military figures, testified on Oppenheimer's behalf. Inconsistencies in his testimony and his erratic behavior on the stand, at one point saying he had given a "cock and bull story" and that this was because he "was an idiot," convinced some that he was unstable, unreliable and a possible security risk. Oppenheimer's clearance was revoked one day before it was due to lapse anyway. Isidor Rabi's comment was that Oppenheimer was merely a government consultant at the time anyway and that if the government "didn't want to consult the guy, then don't consult him."

During his hearing, Oppenheimer testified willingly on the left-wing behavior of many of his scientific colleagues. Had Oppenheimer's clearance not been stripped then he might have been remembered as someone who had "named names" to save his own reputation. As it happened, Oppenheimer was seen by most of the scientific community as a martyr to [McCarthyism](https://en.wikipedia.org/wiki/McCarthyism), an eclectic liberal who was unjustly attacked by warmongering enemies, symbolic of the shift of scientific creativity from academia into the military. [Wernher von Braun](https://en.wikipedia.org/wiki/Wernher_von_Braun) summed up his opinion about the matter with a quip to a Congressional committee: "In England, Oppenheimer would have been knighted."

On May 20, 2009, in a seminar at the Woodrow Wilson Institute based on an extensive analysis of the Vassiliev notebooks taken from the KGB archives, [John Earl Haynes](https://en.wikipedia.org/wiki/John_Earl_Haynes), [Harvey Klehr](https://en.wikipedia.org/wiki/Harvey_Klehr) and [Alexander Vassiliev](https://en.wikipedia.org/wiki/Alexander_Vassiliev) confirmed that Oppenheimer never was involved in espionage for the Soviet Union. The KGB tried repeatedly to recruit him, but was never successful; Oppenheimer did not betray the United States. In addition, he had several persons removed from the Manhattan Project who had sympathies to the Soviet Union. Haynes, Klehr and Vassiliev also state Oppenheimer "was, in fact, a concealed member of the CPUSA in the late 1930s." According to biographer Ray Monk: "He was, in a very practical and real sense, a supporter of the Communist Party. Moreover, in terms of the time, effort and money spent on Party activities, he was a very committed supporter".

**Bibliography**

J. Robert Oppenheimer (1904 - 1967), Bibliography

<http://www.atomicarchive.com/Bios/Oppenheimer.shtml>

J. Robert Oppenheimer, Ten Facts about Oppenheimer

<http://www.10-facts-about.com/J.-Robert-Oppenheimer/id/410>

J. Robert Oppenheimer

<https://en.wikipedia.org/wiki/J._Robert_Oppenheimer>

J. Robert Oppenheimer, Biography, Facts, and Figures

<http://www.famousscientists.org/j-robert-oppenheimer/>

[J. Robert Oppenheimer - Academic, Engineer, Physicist](http://www.biography.com/people/j-robert-oppenheimer-9429168)

[www.biography.com/people/j-robert-oppenheimer-9429168](http://www.biography.com/people/j-robert-oppenheimer-9429168)

* [J. Robert Oppenheimer from PBS American Experience](http://www.pbs.org/wgbh/amex/bomb/peopleevents/pandeAMEX65.html)

[www.pbs.org/wgbh/amex/bomb/peopleevents/pandeAMEX65.html](http://www.pbs.org/wgbh/amex/bomb/peopleevents/pandeAMEX65.html)

* [J. Robert Oppenheimer - New World Encyclopedia](http://www.newworldencyclopedia.org/entry/Robert_Oppenheimer)

[www.newworldencyclopedia.org/entry/Robert\_Oppenheimer](http://www.newworldencyclopedia.org/entry/Robert_Oppenheimer)

* [J. Robert Oppenheimer Quotes - BrainyQuote](http://www.brainyquote.com/quotes/authors/j/j_robert_oppenheimer.html)

[www.brainyquote.com/quotes/authors/j/j\_robert\_oppenheimer.html](http://www.brainyquote.com/quotes/authors/j/j_robert_oppenheimer.html)

* [J Robert Oppenheimer Biography of Manhattan Project Director](http://history1900s.about.com/cs/robertoppenheimer/p/oppenheimer.htm)

**history1900s.about.com** › [Wars & Conflicts](http://history1900s.about.com/od/warsconflicts/) › [Cold War](http://history1900s.about.com/od/coldwa1/)

* [About J. Robert Oppenheimer](http://www.english.illinois.edu/maps/poets/a_f/ai/aboutopp.htm)

[www.english.illinois.edu/maps/poets/a\_f/ai/aboutopp.htm](http://www.english.illinois.edu/maps/poets/a_f/ai/aboutopp.htm)

* [J. Robert Oppenheimer - PBS: Public Broadcasting Service](http://www.pbs.org/wgbh/aso/databank/entries/baoppe.html)

[www.pbs.org/wgbh/aso/databank/entries/baoppe.html](http://www.pbs.org/wgbh/aso/databank/entries/baoppe.html)

* [J. Robert Oppenheimer, Atom Bomb Pioneer, Dies](http://www.nytimes.com/learning/general/onthisday/bday/0422.html)

[www.nytimes.com/learning/general/onthisday/bday/0422.html](http://www.nytimes.com/learning/general/onthisday/bday/0422.html)

* [J. Robert Oppenheimer | American Physicist | Britannica.com](http://www.britannica.com/biography/J-Robert-Oppenheimer)

[www.britannica.com/biography/J-Robert-Oppenheimer](http://www.britannica.com/biography/J-Robert-Oppenheimer)

* [Robert Oppenheimer](http://www.nndb.com/people/808/000047667/)

[www.nndb.com/people/808/000047667](http://www.nndb.com/people/808/000047667)

**Robert Oppenheimer**. AKA **Julius Robert Oppenheimer**. Physicist, headed the Manhattan Project. Birthplace: New York City Location of death: Princeton, NJ Cause

[J. Robert Oppenheimer | Institute for Advanced Study](https://www.ias.edu/people/oppenheimer/)

<https://www.ias.edu/people/oppenheimer>