= Norris Bradbury =

Norris Edwin Bradbury (30 May 1909 ? 20 August 1997) , was an American physicist who served as Director of the Los Alamos National Laboratory for 25 years from 1945 to 1970 . He succeeded Robert Oppenheimer , who personally chose Bradbury for the position of director after working closely with him on the Manhattan Project during World War II . Bradbury was in charge of the final assembly of " the Gadget " , detonated in July 1945 for the Trinity test .

Bradbury took charge at Los Alamos at a difficult time . Staff were leaving in droves , living conditions were poor and there was a possibility that the laboratory would close . He managed to persuade enough staff to stay , and got the University of California to renew the contract to manage the laboratory . He pushed continued development of nuclear weapons , transforming them from laboratory devices to production models . Numerous improvements made them safer , more reliable and easier to store and handle , and made more efficient use of scarce fissionable materiel .

In the 1950s Bradbury oversaw the development of thermonuclear weapons , although a falling out with Edward Teller over the priority given to their development led to the creation of a rival nuclear weapons laboratory , the Lawrence Livermore Laboratory . In later years , he branched out , constructing the Los Alamos Meson Physics Facility to develop the laboratory 's role in nuclear science , and during the Space Race of the 1960s , the laboratory developed the Nuclear Engine for Rocket Vehicle Application (NERVA) . The Bradbury Science Museum is named in his honor .

= = Early life = =

Norris Bradbury was born in Santa Barbara , California , on 30 May 1909 , one of four children of Edwin Pearly and his wife Elvira née Clausen . One sister died as an infant , and the family adopted twins Bobby and Betty , both of whom served in the United States Marine Corps during World War II . Bradbury was educated at Hollywood High School and Chaffey High School in Ontario , California , graduating at the age of 16 . He then attended Pomona College in Claremont , California , from which he graduated summa cum laude with a Bachelor of Arts (BA) in chemistry in 1929 . This earned him membership of the Phi Beta Kappa Society . At Pomona , he met Lois Platt , an English Literature major who was the sister of his college room mate . They were married in 1933 , and had three sons , James , John , and David .

Bradbury became interested in physics , and did graduate work at the University of California , Berkeley , where he was a teaching fellow from 1929 to 1931 , and then a Whiting Foundation fellow from 1931 to 1932 . He submitted a PhD thesis on Studies on the mobility of gaseous ions under the supervision of Leonard B. Loeb , and was awarded a National Research Council fellowship .

As well as supervising Bradbury 's thesis , Loeb , who had served as a naval reservist during World War I , encouraged Bradbury to apply for a commission as a naval reservist . Bradbury 's commission as an ensign was signed by Lieutenant Commander Chester W. Nimitz , who was the head of the Naval Reserve Officer Training Corps at Berkeley at the time .

After two years at the Massachusetts Institute of Technology , Bradbury became an assistant professor of physics at Stanford University in 1935 , rising to become an associate professor in 1938 , and a full professor in 1943 . He became an expert on the electrical conductivity of gases , the properties of ions , and the behavior of atmospheric electricity , publishing in journals including the Physical Review , Journal of Applied Physics , Journal of Chemical Physics , and the Journal of Atmospheric Electricity and Terrestrial Magnetism . He invented the Bradbury @-@ Nielsen shutter , a type of electrical ion gate , widely used in mass spectrometry in both time @-@ of @-@ flight mass spectrometers and ion mobility spectrometers .

= = World War II = =

Bradbury was called up for service in World War II in early 1941 , although the Navy allowed him to stay at Stanford until the end of the academic year . He was then sent to the Naval Proving Ground at Dahlgren , Virginia , to work on external ballistics . Already working at Dahlgren were Loeb and

Commander Deak Parsons .

In June 1944 , Bradbury received orders from Parsons , who was now the Deputy Director of the Manhattan Project 's Los Alamos Laboratory , to report to Albuquerque , New Mexico . Parsons explained that he needed Bradbury to work on the explosive lenses required by an implosion @-@ type nuclear weapon . Bradbury was less than enthusiastic about the prospect , but he was a naval officer , and ultimately agreed to go .

At Los Alamos , Bradbury became head of E @-@ 5 , the Implosion Experimentation Group , which put him in charge of the implosion field test program . In August , the laboratory 's director , Robert Oppenheimer , implemented a sweeping reorganisation . E @-@ 5 became part of George Kistiakowsky 's new Explosives Division (X Division) , and was renumbered X @-@ 1 . At this point , Bradbury was leading some of the most critical work at the laboratory , as it struggled with the jets that spoiled the perfect spherical shape desired for the implosion process . These were examined with a combination of magnetic , X @-@ ray and RaLa techniques .

In March 1945 , Oppenheimer created Project Alberta under Parsons to carry out the Manhattan Project 's ultimate mission : the preparation and delivery of nuclear weapons in combat . Bradbury was transferred to Project Alberta to head the Fat Man assembly group . In July 1945 , Bradbury supervised the preparation of " the Gadget " , as the bomb was known , at the Trinity nuclear test . " For me to say " , Bradbury later recalled , " I had any deep emotional thoughts about Trinity ... I didn 't . I was just damned pleased that it went off . "

= = Director of Los Alamos = =

Oppenheimer submitted his resignation as Director of the Los Alamos Laboratory , but remained until a successor could be found . The Director of the Manhattan Project , Major General Leslie R. Groves , Jr . , wanted someone with both a solid academic background and a high standing within the project . Oppenheimer recommended Bradbury . This was agreeable to Groves , who liked the fact that as a naval officer Bradbury was both a military man and a scientist . Bradbury accepted the offer on a six @-@ month trial basis .

Parsons arranged for Bradbury to be quickly discharged from the Navy , which awarded him the Legion of Merit for his wartime services . He remained in the Naval Reserve , though , ultimately retiring in 1961 with the rank of captain . On 16 October 1945 , there was a ceremony at Los Alamos at which Groves presented the laboratory with the Army @-@ Navy " E " Award , and presented Oppenheimer with a certificate of appreciation . Bradbury became the laboratory 's second director the following day .

The first months of Bradbury 's directorship were particularly difficult . He had hoped that Atomic Energy Act of 1946 would be quickly passed by Congress and the wartime Manhattan Project would be superseded by a new , permanent organization . It soon became clear that this would take more than six months . President Harry S. Truman did not sign the act creating the Atomic Energy Commission into law until 1 August 1946 , and it did not become active until 1 January 1947 . In the meantime , Groves ' legal authority to act was limited .

Most of the scientists at Los Alamos were eager to return to their laboratories and universities , and by February 1946 all of the wartime division heads had left , but a talented core remained . Darol Froman became head of Robert Bacher 's G division , now renamed M Division . Eric Jette became responsible for Chemistry and Metallurgy , John H. Manley for Physics , George Placzek for Theory , Max Roy for Explosives , and Roger Wagner for Ordnance . The number of personnel at Los Alamos plummeted from its wartime peak of over 3 @,@ 000 to around 1 @,@ 000 , but many were still living in temporary wartime accommodation . To make matters worse , the water pipe to Los Alamos froze and the water had to be supplied by tanker trucks . Despite the reduced staff , Bradbury still had to provide support for Operation Crossroads , the nuclear tests in the Pacific .

Bradbury pushed continued development of nuclear weapons to take them from laboratory devices to production models . There were numerous improvements that could make them more safe , reliable and easy to store and handle , and make more efficient use of scarce fissionable materiel . While Bradbury gave priority to improved fission weapons , research still continued on " Alarm Clock

" , a boosted nuclear weapon , and the " Super " , a thermonuclear weapons design . The new fission designs were tested during Operation Sandstone in 1948 . The Mark 4 nuclear bomb became the first nuclear weapon to be mass @-@ produced on an assembly line .

As the future became more certain , Bradbury began looking for a new site for the laboratory away from the crowded town center . In 1948 , Bradbury submitted a proposal to the Atomic Energy Commission for a new $ 107 million facility on the South Mesa , linked to the town by a new bridge over the canyon .

All this time , Bradbury remained nominally a professor in absentia at Stanford . The Los Alamos Laboratory was nominally run under a wartime contract with the University of California , but a clause in the contract allowed the University to terminate the contract three months after the end of the war . The university duly served notice , but Bradbury managed to get it rescinded , and in 1948 the contract was renewed . In 1951 , he became a professor at the University of California .

By 1951 , the laboratory had come up with the Teller @-@ Ulam design , and thermonuclear tests were conducted during Operation Greenhouse . Tensions between Bradbury and Edward Teller over the degree of priority given to thermonuclear weapons development led to the creation of a second nuclear weapons laboratory , the Lawrence Livermore Laboratory .

In later years , Bradbury branched out , constructing the Los Alamos Meson Physics Facility to develop the laboratory 's role in nuclear science . During the Space Race of the 1960s , the laboratory worked on Project Rover , developing the Nuclear Engine for Rocket Vehicle Application (NERVA) . The laboratory demonstrated the feasibility and value of nuclear rocket propulsion .

For many years , Bradbury was responsible for much of the administration of the town of Los Alamos . The town established impressive health and education facilities . Eventually the new technical area was built outside the town , and on 18 February 1957 the security gates were taken down . Finally , the town became an incorporated community and the director 's civic responsibilities ended .

In 1966 , Bradbury was awarded the Department of Defense Medal for Distinguished Public Service for " exceptionally meritorious civilian service to the Armed Forces and the United States of America in a position of great responsibility as director , Los Alamos Scientific Laboratory " . His citation went on to say that " The outstanding international reputation of the Los Alamos Laboratory is directly attributable to his exceptional leadership . The United States is indebted to Dr. Bradbury and his laboratory , to a very large degree , for our present nuclear capability . " He also received the Enrico Fermi Award in 1970 .

= = Later life = =

Bradbury retired as director of Los Alamos Laboratory in 1970 . His successor , Harold Agnew , invited him to become a senior consultant , but Bradbury declined the offer , although he did serve as a consultant for other government agencies , including the National Academy of Sciences , and as a member of the boards of the Los Alamos Medical Center , the First National Bank of Santa Fe , the Los Alamos YMCA and the Santa Fe Neurological Society .

In 1969 the Governor of New Mexico , David Cargo , appointed Bradbury as a regent of the University of New Mexico , but this was a turbulent time for the university . In response to the Kent State Shootings in May 1970 , students and antiwar activist Jane Fonda marched on the home of Ferrel Heady , the President of the University of New Mexico . When he refused to meet with them , the students called a strike . Classes were cancelled , rallies were held and students occupied the Student Union Building . Cargo called in the New Mexico National Guard to remove them , and eleven people were bayoneted . Cargo 's successor , Bruce King , replaced Bradbury and another regent .

In the mid @-@ 1990s , Bradbury accidentally hit his leg while chopping firewood . Gangrene set in , and his right leg was amputated below the knee . It spread to his left leg , and part of his left foot was amputated , leaving him in a wheelchair . The disease eventually proved fatal , and he died on 20 August 1997 . He was survived by his wife Lois , who died in January 1998 , and his three sons . A funeral service was held in Los Alamos , and he was buried at Guaje Pines Cemetery in Los

Alamos .