

A Brilliant Mind Leaves an INDELIBLE LEGACY

*A patriot, scientific
genius, and nuclear
deterrence pioneer,
the Laboratory's third
director played a pivotal
role in U.S. policy and
national security.*



Harold Brown (pictured here in the 1950s) was the Laboratory's third director. He passed away on January 4, 2019, at the age of 91.

HAROLD BROWN, Lawrence Livermore National Laboratory's third director, was an intellectual giant. Born in New York City in 1927, Brown displayed a brilliant scientific mind early in life, graduating from the Bronx High School of Science at the age of 15 with outstanding marks. He studied physics at Columbia University, earning his bachelor's degree after just two years and holding the highest academic record of any Columbia undergraduate. Remarkably, he earned both his master's and doctorate degrees by the age of 21.

After a stint lecturing at Columbia and the Stevens Institute of Technology, as well as working at the University of California's (UC's) Radiation Laboratory in Berkeley, California, the Atomic Energy Commission (AEC) recruited Brown to be a research scientist at Lawrence Livermore (then a UC Radiation Laboratory offshoot) in 1952. In those freewheeling early days, Brown later recalled, the Laboratory was loosely organized, but operated under a tremendous sense of urgency to quickly develop new warheads capable of countering increasing Soviet aggression and technological advances. "It was exciting to work with (Ernest) Lawrence and (Laboratory Director Edward) Teller," said Brown during a visit to the Laboratory in 2013. "I learned something from their successes as well as their mistakes. I learned that you can get things done if you work hard enough and your ideas are good enough . . . By and large, we were very young and inexperienced, but we were able to try new ideas. We had the optimism of youth."

At just 31 years of age, Brown became then-Laboratory Director Teller's deputy, and after severe bouts of colitis befell both Teller and Lawrence, the responsibility of leading the Laboratory's weapons program fell squarely on the shoulders of the youthful physicists Brown and Johnny S. Foster, Jr., who would later succeed Brown as Laboratory director. To counter the perceived Soviet advantage of larger nuclear payloads, as Brown wrote in his memoir *Star-Spangled Security*, the U.S. needed to develop lighter, more easily deliverable thermonuclear weapons.

Early in his Laboratory career, in 1954, Brown led the development of a revolutionary lightweight warhead that could be delivered by a missile mounted inside a submarine, a feat thought nearly impossible at the time. The Polaris missile deployed in 1959, a significant achievement coming just two years after the Soviet Union had launched the satellite Sputnik—an event that heightened tensions between the two superpowers. Brown recalled, "Given complete autonomy, we developed the (Polaris) system in about three years by avoiding external nitpicking and sniping, constant reviews, and program revisions. The project succeeded in half the normal time."

Foster says Polaris represented a "heroic effort" by Livermore and Sandia engineers and scientists that tipped the scales of nuclear supremacy in favor of the United States. "It was a marvelous thing," recounts Foster. "We had the superiority in submarines, we had the standoff capability, and

we had the thermonuclear warhead that could be delivered. It was revolutionary, and it made all the difference." Former Laboratory Director Bruce Tarter adds that Polaris helped prove the Laboratory's worth in its early stages and positioned it to eventually become the "creator and owner" of the nation's strategic stockpile in subsequent decades. "It made the Cold War cold," says Tarter. "All of a sudden the U.S. had a collection of nuclear weapons that were unfindable—giving substance to the word 'deterrence.'"

During his time at Livermore, Brown became a proponent of arms control, convinced that limiting the number of delivery systems, rather than constraining the development of weapons technology, was the most important element in maintaining nuclear balance. Working with Teller, he helped establish the AEC's Plowshare Program to explore nonmilitary applications of nuclear energy. He also advised U.S. delegates attending international conferences on the topics of nuclear test detection and test bans.

Former Laboratory Director John Nuckolls, who joined the Laboratory in 1955, remembers working as an assistant to Brown in the Megaton Group (later known as A Division) that designed thermonuclear explosives and experiments. Nuckolls developed computer codes and made calculations for Brown's designs, and the two men worked together on multiple projects, including high-efficiency thermonuclear weapons, designs for a cannon that could fire a projectile into orbit, a new computer code to calculate the effects of underground nuclear explosions, and a below-ground nuclear explosion power plant as part of Plowshare.



Johnny S. Foster, Jr. (left), met Brown while conducting graduate work at the University of California Radiation Laboratory in Berkeley, California, and came to Livermore with him as part of a contingent of postdoctoral researchers who were transferred to the new sister facility. Foster, who would later succeed Brown as Laboratory director, worked closely with his colleague in the 1960s.

Nuckolls remembers his former supervisor as a “shy genius” and a “great teacher.” Nuckolls says, “Harold was very good at encouraging people to do what they thought they wanted to do.”

In 1960, Brown succeeded Teller (at Teller’s recommendation) as Laboratory director, presiding for about nine months during a moratorium on nuclear weapons testing. As director, Brown continued to advocate for the importance of a nuclear deterrent, balancing the role of nuclear weapons with other elements of national security. George Miller, who served as Laboratory director from 2007 to 2011, says that Brown strongly believed the national laboratories should have a continuing role in arms control and nonproliferation, weighing policy goals with technical realities and playing a substantial role in intelligence.

Tarter notes Brown was an “extraordinary early leader” who, along with the Laboratory’s first director Herbert York, Teller, and Foster, set the institution on a course to prominence. He calls Brown a “prodigy,” who succeeded not only because he had a technical mind but because he could also play the political game.



The Polaris missile represents the success of Livermore’s efforts to develop small, efficient thermonuclear weapons that could be carried by submarine. Polaris’s success was critical in establishing U.S. nuclear deterrent capability.

“He could balance all the pros and cons and provide cogent arguments . . . People respected him. He wasn’t just a policy person or someone running a large organization, he was his own intellectual bodyguard, which is pretty rare. He had enough of both sides to make a big impact,” says Tarter.

Brown and his wife Colene, who married in 1953, left Livermore for Washington, D.C., in 1961. Brown moved to the Pentagon, where he served as director of defense research and engineering from 1961 to 1965 under Defense Secretary Robert McNamara, briefing President John F. Kennedy on nuclear weapons. As one of McNamara’s “whiz kids” and the Department of Defense’s third-highest ranking civilian, Brown was responsible for weapons development and cemented his reputation for having both technical expertise and a gift for strategic thinking.

Later, President Lyndon B. Johnson appointed Brown as secretary of the U.S. Air Force, where he assisted in planning for the Vietnam War and helped develop precision-guided weapons. In 1969, Brown became president of the California Institute of Technology (Caltech) in Pasadena, California, where he served for the next eight years and was instrumental in admitting the school’s first female undergraduates.

“Whenever he was given an assignment, he would assess the situation and identify the instant problems, then he would implement corrections for those problems,” says Foster. “Harold also looked at the future of the organization, whether it was at Livermore, the Air Force, or Caltech, and at the same time he would consider his alternative futures. In doing so, he ended up contributing in many ways to different organizations, committees, and advisory groups.”

Brown continued his service to the country as a member of the U.S. delegation to the Strategic Arms Limitation Talks (SALT I), an arms control pact signed in 1972 by President Richard Nixon and Soviet Premier Leonid Brezhnev. In 1973, he became a member of the Trilateral Commission, where he joined leaders from Europe, North America, and Japan to promote political, economic, and security cooperation. Brown later became President Jimmy Carter’s choice for U.S. secretary of defense from 1977 to 1981, the first scientist to hold the position. As secretary, Brown devised a new plan for nuclear deterrence, the “countervailing strategy,” a significant departure from the doctrine of “mutually assured destruction” that had reigned since the earliest days of the Cold War. Brown thought the U.S. should develop the capability, through its delivery systems, accuracy, and intelligence, of responding to a Russian provocation by attacking the country’s nuclear forces and government, instead of its cities and population centers.

Brown’s tenure would see the Russian invasion of Afghanistan, a revolution in Iran that resulted in the capture of 52 U.S. hostages, and the signing of the Camp David Peace Accords. He was the first U.S. secretary of defense to visit China, helping to normalize relations between the two countries.



On March 23, 1962, President John F. Kennedy visited the University of California's Lawrence Radiation Laboratory in Berkeley, California, to express his thanks and appreciation for the important national security work being conducted by the scientists at Livermore and Los Alamos. Brown (far right), who was then director of defense research and engineering at the Pentagon, accompanied the president.

He played a central role in the Panama Canal Treaties and in talks that led to SALT II—a 1979 agreement to restrict Soviet and U.S. missiles and warheads. Although signed by both Carter and Brezhnev, the pact, which Brown saw as vital to a détente with Russia, was never formally ratified by the U.S. Congress and was essentially scrapped after the Soviets invaded Afghanistan. However, the two countries voluntarily adhered to conditions of the agreement throughout the 1980s.

Near the tail end of the Carter Administration in 1980, Brown was involved in planning a rescue of the U.S. hostages held in Iran. Brown called the failed attempt, which resulted in the loss of eight U.S. servicemen, “the worst night of my life.” Faced with pressure to reduce the defense budget, Brown nonetheless oversaw a budget increase, as well as technological advances in ballistic and precision-guided cruise missiles, stealth aircraft, satellite surveillance, and communications and intelligence systems. In his farewell address as secretary of defense, Brown said, “These past four years have been rewarding and challenging. But much has been achieved. Most satisfying of all is that for four years our nation remained at peace despite the world tensions and turmoil that constantly pose challenges to our interests and peace.” President Carter awarded Brown with the Presidential Medal of Freedom in 1981, the highest honor afforded to a U.S. civilian.

After leaving the Pentagon in 1981, Brown began a 30-plus year career in the corporate sector and academia. He taught at the Johns Hopkins University School of Advanced International Studies for several years, and from 1984 to 1992 chaired the school's Foreign Policy Institute. He also became a trustee (and later trustee emeritus) of the RAND Corporation and joined the Center for Strategic and International Studies as a counselor and trustee in 1992. “Apart from his obvious technical contributions, Harold leaves behind a legacy of promoting the integration of science and technology with political and policy goals,” says Miller. “The ability to bring his detailed, logical thought to the interface between those different disciplines was one of his rare skills.” In 1993, President Bill Clinton presented Brown with the Department of Energy's Enrico Fermi Medal, one of the most prestigious awards in science and technology, citing him for his “outstanding contributions to national security, leadership in development of nuclear weapons and in formulating nuclear deterrence policy during the difficult Cold War period, and ongoing counsel.”

Throughout the 1990s and into the 2000s, Brown was a partner at the New York private equity firm Warburg Pincus and served as corporate director for more than a dozen businesses, including Mattel, IBM, and Cummins. Until his death, on January 4, 2019, Brown continued his involvement in government as a member of the Defense Policy Board, which advises sitting secretaries of



Brown (seated at left) visited the Laboratory in 2013 after he published his memoir *Star-Spangled Security*. He met with former Laboratory directors including (clockwise from left) Foster, John Nuckolls, Michael May, Bruce Tarter, George Miller, Michael Anastasio, and Penrose “Parney” Albright (seated).

defense on strategic, military, and international political issues, and participated in various government commissions involving military strategy, intelligence, innovation, and terrorism. Current Laboratory Director William Goldstein says, “From director of this Laboratory, to his years working for Presidents Kennedy, Johnson, Nixon, and Carter, Harold will always be remembered for his leadership, his intellect, and his commitment to the security of our nation.”

Brown’s memoir *Star-Spangled Security* was published in 2012, and the following year he visited the Laboratory to discuss the book. Addressing modern national security challenges, Brown said the greatest threats were internal, warning that the waning notion of U.S. exceptionalism, the increasing gap between rich and poor, and political partisanship could all undermine morale. In the book’s conclusion however, Brown waxed optimistic about

the future of the U.S. as a world leader because of its unique geographic position, natural resources, diversity, and flexible political system.

“We have the ability to address what we must to remain strong and prosperous,” wrote Brown. “It is no small challenge, but we are not a nation of small aspirations. We are a nation of people who get things done. We have brought the flag through perilous fights. Now, it falls on each of us to join in protecting our interests abroad while guarding values that embody the rights and duties of each of us at home. Let’s do it.”

—Jeremy Thomas

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