THOMAS B. COOK, JR.

1926–2013

Elected in 1981

"Outstanding contributions to the understanding of nuclear weapons effects and to the design of weapons to penetrate nuclear defenses."

BY JOHN C. CRAWFORD
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THOMAS B. COOK, JR. passed away at his home in Pleasanton, California, December 27, 2013, at the age of 87.

Tom was born August 28, 1926, in Rich Pond, Kentucky, the son of Willie Ethel and Thomas B. Cook, Sr. He graduated from Bowling Green High School in 1943, from Western Kentucky State University in 1947 with a bachelor of science in physics and mathematics, and from Vanderbilt University in 1951 with a master's and PhD in physics. In 1944–1946 he also served in the Navy.

He was hired by Sandia National Laboratories in 1951 as a member of the technical staff (MTS). He spent his entire career with Sandia, yet the impact of his leadership and expertise was felt well beyond Sandia in the broad areas of science and national security.

In 1951 Sandia was entering a transition period as its focus changed from nuclear weapon production to the engineering and development of nuclear weapons. Sandia recognized that, to be a competent engineering laboratory, it must develop a sound research base from which to work. Tom was among the first PhDs—and at age 24 the youngest—at Sandia, and thus was at the forefront of this major transition of the laboratory's focus from production to science and engineering.

His technical expertise and management skills were clearly recognized as he quickly assumed increasing responsibilities. He was promoted from MTS to section supervisor in 1955, division supervisor in 1956, and manager of the Nuclear Burst Physics Department in 1959. He was appointed director of physics and mathematics in 1962, and vice president of research in 1967. A year later he was asked to move to California to assume the leadership of Sandia's Livermore Laboratory, a position he held for the next 14 years. He returned to Sandia's Albuquerque location in 1982 as executive vice president and retired in 1986.

Tom's early work focused on understanding the atmospheric environments created during a nuclear explosion. He and collaborator Carter Broyles analyzed atmospheric nuclear burst effects up to altitudes of 100,000 feet, which was quite extraordinary since in those days (the 1950s) 30,000 feet was considered high altitude. (Of course, the Space Age changed that perception dramatically.)

The results were documented in a classified report that defined nuclear burst effects from ground level to 100,000 feet. It was widely used and became known by those in the field as the "Cook Book." The work became increasingly important as Sandia took on the design and manufacture of microelectronics that were tolerant of these nuclear environments, a unique area of expertise that continues to this day at Sandia.

Given his expertise in nuclear explosion effects, Tom subsequently chaired an Air Force Scientific Advisory Task Group that first delineated the problem of gamma-ray transients and their effect on military electronics systems. This concern led to the recognition that the nation needed experimental facilities to simulate the effects of nuclear explosions, so that military systems could be designed for survivability in a nuclear environment. Simulation facilities were built by several technical organizations, including Sandia, and some of them still operate and provide data for nuclear survivability. Recognition of the transient radiation problem also accelerated the nation's (and Sandia's) interest in developing microelectronics tolerant of radiation effects.

In the late 1960s Tom was deeply involved with the US Navy program to develop a new option for deploying nuclear weapons on a submarine-launched ballistic missile (SLBM). The original Polaris SLBM carried a single nuclear warhead on each missile, but with miniaturization and integration of components it was deemed possible to sufficiently reduce the size and weight that multiple warheads might be carried on a single missile, hence the original code name "Pebbles."

Sandia's job was to miniaturize all the arming, firing, and fuzing components and to integrate them with the Lawrence Livermore–designed nuclear package into a small, Navy-supplied reentry body. This required an unprecedented degree of component and system integration. As vice president for research, and subsequently as vice president of Sandia Livermore, Tom was instrumental in applying all of Sandia's new technologies in a tightly focused development program that was tremendously successful. The Poseidon SLBM was deployed in 1972, each missile carrying 10 nuclear warheads.

The SLBM program was (and still is) under the direction of the Navy's Strategic Systems Program Office (SSPO). RADM Robert H. Wertheim was the technical director and subsequently director of the SSPO during this time of intense development of the multiple warhead capability. He recalls his interactions with Sandia and with Tom:

> As a key scientist and manager at Sandia, Tom Cook played an invaluable leadership role during the early development and subsequent evolution of the US Navy's submarine-launched Fleet Ballistic Missile (FBM) system. Our Navy program office design strategy called for minimizing the payload weight for the new small missile by integrating the DOE nuclear warhead and the DoD reentry vehicle structures. This called for unprecedented organizational interfaces and cooperation among the program participants, and was notably provided by Tom and his Sandia teammates. In later more advanced missile models the Navy SP has chosen to extend the integration concept further, and contracts directly with Sandia for development and support of the fuzing subsystems. Tom was named a member of the Strategic Programs Steering Task Group serving the

> SSPO director. He was not only a valued colleague but also a close personal friend.

Tom's influence and contributions extended well beyond the area of national security. In the early 1970s he challenged his people at Sandia Livermore for bold new ways that Sandia could provide technologies that would help solve some of the nation's growing energy problems. Out of these discussions emerged the highly successful Combustion Research Facility (CRF) located on the Sandia Livermore campus. Dan L. Hartley, first director of the CRF, recalls Tom's leadership in establishing the program:

> Tom Cook had come to Sandia Livermore to raise the level of scientific capability and research contributions from the site. I was a great recipient of that effort. As one of the first PhDs in the new wave of his hires there, it was clear from Tom Cook's messages that we were to be bolder in our thinking about what we were doing. As the energy crisis hit, and all the AEC/ERDA/DOE labs were asked to come up with ideas to help, Tom challenged us to come up with big ideas. My research was relatively novel (measuring gas flow concentrations in milliseconds with Raman spectroscopy—a new technique) and Tom had funded my projects handsomely. I proposed to use that technique to measure combustion processes, a key technology in nearly every energy process. I'll never forget presenting my 10-person proposal to him to try my methods in the energy sector, when he responded "Dan, I want you to go for the whole enchilada!" Back to the drawing boards, emerging with a proposal for the National Center for Combustion Research (the name changed many times). I was new to the Washington scene, and our proposal required me to deal with several parts of ERDA and Tom opened the doors for me. He never stole the show, but let me grow in that role.

Throughout his career, Tom was a leader in establishing a world-class research team at Sandia. He clearly recognized the strength of engineering with a solid scientific research base. As vice president for research and then as vice president of Sandia Livermore he was at the forefront of Sandia's efforts to recruit

and develop the appropriate staff. He had a talent for attracting and developing outstanding scientists and engineers, and this was particularly apparent with his move to California.

People respected Tom for the example he set and the dedication to national service he displayed on a daily basis. Miriam E. (Mim) John was one of those who began her career under his guidance and support. Her career at Sandia had many dimensions, but she advanced to follow in Tom's footsteps (after a few years) as vice president of Sandia's California Lab. She had this recollection of Tom and his impact:

> Tom represented everything that has always been the best of what Sandia stands for. He lived the lab's motto of "exceptional service in the national interest." His technical accomplishments were instrumental in establishing the nation's defense strategy, so much so that his peers recognized him with election to the National Academy of Engineering, one of the highest honors in the nation's science and technology community. He was a pioneer in diversity, hiring and nurturing technical women and minorities at Sandia in the 60s and 70s well before other organizations. He also recognized in the 70s the need for Sandia/California to expand its portfolio of programs. A very visible and enduring testament to his foresight is the internationally respected Combustion Research Facility, which he effectively defended in its startup phase from both internal and external challengers while the technical team got it off the ground.

Tom was selected in 1971 to receive the prestigious E.O. Lawrence Award, given by the Atomic Energy Commission to recognize meritorious contributions in the field of atomic energy. His citation read as follows: "For his significant contributions to the study of nuclear weapon effects, for his original work in the translation of this knowledge into advanced technology for peaceful and military uses of atomic energy, and for his outstanding contributions to the nation through his service as an advisor to the Atomic Energy Commission and the Department of Defense on the effects of nuclear detonations."

In 1981 Tom was elected to the National Academy of

Engineering and in 1986 he received the DOE Distinguished Associate Award in recognition of "his outstanding contributions to the Department of Energy's national security and energy missions. As Executive Vice President of Sandia Corporation, his management skills, initiative, and dedication have resulted in significant benefits to the nation's defense and energy well-being." In 1996 he was recognized by Western Kentucky University with its Distinguished Alumni Award.

In addition to these awards, Tom served on many boards and advisory groups; among them were the Defense Science Board Task Force on Vulnerability (chair), Air Force Scientific Advisory Board, Scientific Advisory Group of the Joint Strategic Target Planning Staff, DoD Scientific Advisory Group on Effects, Steering Task Group for the US Navy Strategic Projects Office, and Air Force Penetration Program Panel.

Throughout his long and productive career as a scientist and engineer, Tom Cook retained his focus on service to the nation. He had the foresight to anticipate problems, he had a talent for attracting outstanding people and nurturing their careers to help solve these problems, and he was extraordinarily successful at collaborative efforts across major organizational interfaces. He was an outstanding scientist in his own right, but his impact was even greater because of his unique ability to work with and through other individuals and organizations to achieve major shared goals. He was a true leader.

He is survived by his wife of 66 years, Virginia Preston Cook, and their two children, Dr. Thomas B. Cook III of Princeton, and Shelley I. Cook of Pleasanton.