



ALLAN F. HENRY

1925–2001

Elected in 1985

“For continuous outstanding achievements in the understanding of reactor kinetics and in the development of methods for reactor analysis.”

BY KENT F. HANSEN

ALLAN F. HENRY was born on January 12, 1925, in Philadelphia, Pennsylvania, and spent his childhood in the greater Philadelphia area. He graduated from the Haverford School in the spring of 1942 and enrolled as a freshman at Yale University in the fall of 1942. Due to the exigencies of World War II, he accelerated his education and graduated in January 1945 with a B.S. in chemistry. Because of a high school football injury to his knee, he was ineligible for the military draft. However, he did want to serve, and he enlisted in the American Field Service. In March 1945 he was posted to the China/Burma/India theater as an ambulance driver for General William Slim’s 14th British Army. He served until after the end of hostilities, returning to the United States in December 1945. From his experiences and travels in India he developed a lifelong affection for Indian spices and food.

Allan enrolled in graduate school at Yale in the fall of 1946 and changed his major from chemistry to physics. He completed his master’s degree in 1947 and his Ph.D. in 1950. His dissertation, entitled “Theory of Magnetic Resonance in Nitric Oxide,” was done under Professor Henry Margenau.

After graduation he took a position at the Bettis Atomic Power Laboratory in Pittsburgh. The laboratory was operated by the Westinghouse Electric Company under contract to the U.S. Atomic Energy Commission. The work was devoted to the development of nuclear power for the Naval Reactors Program. Many of the power plants for the nuclear navy were designed at Bettis, including the first nuclear submarine, Nautilus. Allan worked on reactor theory projects and rose to be the manager of the reactor theory and methods group in 1954. He declined further advancement in order to stay deeply involved in research.

Much of the work at Bettis was classified, and it was not until the late 1950s that Allan and his colleagues could publish in the open literature. It soon became evident that they had succeeded in creating a superb approach for the analysis and design of nuclear reactors.

The physics of nuclear reactors is exceedingly complex due to the nature of the fission process, the energy distribution of fission neutrons, the multiple processes by which neutrons interact with matter, and the extreme heterogeneity of reactor cores. There was no hope of analytic solutions to the governing equations, and it was necessary to find approximate techniques that were computationally feasible but also capable of providing accurate representations of the multiple phenomena. Allan and his colleagues invented, tested, and validated methods and procedures that are now the basis of almost all reactor designs for both the military and commercial industries.

Perhaps his most important contributions were in the development of methods for analyzing the kinetics of reactors. Control of reactors is vital for the safety of nuclear plants. However, the processes present in reactors span an enormous range of time constants, ranging from nanoseconds for the birth of some fission neutrons to days and weeks for the depletion of certain isotopes, such as uranium. Allan authored, or coauthored, a series of papers on representation of the multiple phenomena involved in nuclear systems, as well as techniques for quantification of the phenomena.

In 1968 he accepted a position as a visiting professor in the

nuclear engineering department at the Massachusetts Institute of Technology. After a year as a visitor he agreed to remain as a full-time faculty member. He remained at MIT for 30 years before retiring in 1999 due to ill health. He led the reactor physics curriculum in the department and developed his text, *Nuclear-Reactor Analysis* (The MIT Press, 1975), which is still in wide use.

His research centered on mathematical models of reactor analysis and development of tools for the simulation of reactor behavior. He was the principal, or co-principal, investigator on numerous research projects. Over the years he supervised, or co-supervised, 66 master's theses and 72 doctoral theses. In conjunction with his students and colleagues, he authored over 100 refereed articles in the literature. As a consequence, many current methods available in the nuclear power industry for design and analysis are based on the results of Allan's contributions.

Allan was much in demand outside academia. He served as a consultant to the Oak Ridge, Los Alamos, Savannah River, and Argonne laboratories. In addition, he was a consultant to the Atomic Energy Commission, its successors the U.S. Department of Energy and the Nuclear Regulatory Commission. He also consulted for the major reactor vendors, the Electric Power Research Institute, electric utilities, and the International Atomic Energy Agency. Finally, he served as a member of the visiting committees to the nuclear engineering departments at the University of California–Berkeley and the Georgia Institute of Technology.

Professor Henry was honored by the U.S. Atomic Energy Commission in 1967 with its E. O. Lawrence Award. This award is in honor of Professor Lawrence, who was a Noble Laureate. Professor Henry was cited for his significant contributions to research and development in reactor theory. In 1980 he was awarded the Glenn L. Murphy Award by the American Society of Engineering Education for his contributions to nuclear engineering education. In 1992 he was given the Eugene P. Wigner Award by the American Nuclear Society for outstanding advances in nuclear reactor physics. While a

student at Yale, he was elected to Sigma Xi. Dr. Henry was also elected a fellow of the American Nuclear Society in 1960. In 1985 he was elected to the National Academy of Engineering.

For those of us privileged to know and work with him, there were aspects of his person more precious than his scientific accomplishments. He was a person of great personal charm, compassion, and humor. He was a wonderful companion who possessed a wide range of interests and talents that made him a delight to be with. For example, he was an accomplished classical pianist who won several awards in his youth for his artistry. Although he chose science for his career, he retained a love of music throughout his life. He also enjoyed good food, good wine, and good company. A particular pleasure in his life was the theater, and for many years he took semiannual vacations to London for the theater there. He also attended the Shakespeare Festival in Canada each summer.

He grew up in a close-knit family with two older brothers, and they remained very close throughout his life. Together they owned a home on the Jersey shore, and he always spent August there with his brothers, nephews, nieces, and friends. In fact, one reason for his joining academia was for the added freedom in the summers to pursue both theatrical and family interests.

For all of his achievements, Allan remained a modest person who was always respectful of others and their opinions. He retained an almost Victorian politeness and deference to others irrespective of their station in life. He was particularly appreciated by students for his openness, kindness, and interest in their progress. He retained close contact with all of his graduates throughout their careers.

Through a long final illness he retained his sense of humor and his sense of dignity. He faced his mortality with strength and greater courage than his friends, who continue to mourn his passing.

