



*Robert B. Richards*

## Robert B. Richards

1916-1988

By Karl P. Cohen

Robert Benjamin Richards, a distinguished nuclear engineer who made major contributions to understanding of the nuclear fuel cycle and to the design of thermal and fast-spectrum nuclear reactors during a thirty-six year career with the General Electric (GE) Company, died in San Jose, California, on July 26, 1988, at the age of seventy-one.

Bob was born November 18, 1916, in Scranton, Pennsylvania, and was brought up in that city. He attended Central High School. After graduating in 1934, he became a chemical laboratory assistant at Central for two years, showing an early propensity for chemistry. He received a B.S. in chemical engineering from Pennsylvania State College in 1939, an M.S. in organic chemistry in 1941, and a Ph.D. in organic chemistry in 1946 from the same school. His doctoral thesis was entitled "The Viscosity Properties of Polymeric Solutions." His thesis advisers were Merrell R. Fenske and Grover C. Chandlee. While working toward his doctorate, Dr. Richards did chemical engineering, organic chemistry, and physical chemistry research at the Pennsylvania State College Petroleum Refining Laboratory.

He joined the General Electric Research Laboratory in Schenectady, New York, in 1947. At that time GE had just taken over as operations manager at the Hanford nuclear facility under contract to the Atomic Energy Commission (AEC).

The highest priority program was the development of a replacement process for recovering plutonium from irradiated fuel. The wartime process—coprecipitation of plutonium with bismuth phosphate—was a batch process that did not recover the main component of spent fuel, uranium. Research on the Redox solvent extraction process took place at Argonne National Laboratory, Oak Ridge National Laboratory, and elsewhere. Reduction to practice, as a continuous process in pulsed columns, was to be at Hanford. Bob was transferred to the Hanford Atomic Plant in Richland, Washington, and was soon in the midst of this effort. He held a variety of managerial positions and is credited with major contributions to the technological development of the Redox, Purex, and metal recovery processes. Due to the fog of classification, it is difficult to be more specific, but Bob was manager of separations technology in 1954 and was appointed coeditor of the fuel processing volume of the AEC *Reactor Handbook*.

In 1953 Bob became manager of the pile technology group, with responsibility for the improvement of the Hanford graphite reactors. In 1956 he became manager of the research and engineering operation for the plant's Chemical Processing Department and was directly responsible for all classified chemical engineering design work at Hanford.

Following the revision of the Atomic Energy Act in 1954, which opened the door to civilian atomic power, GE set up a new division in San Jose, California, to produce boiling water reactors (BWRs). Dr. Richards was called down from Richland in 1957 to become manager of engineering.

The challenge facing him was to define the product. BWRs present a great variety of design options. The power chain can be direct cycle, indirect cycle, or mixed. There can be dry or wet (pressure suppression) containment. The geometry and cladding of the fuel elements and fuel bundles must be chosen. The fuel irradiation lifetime must be predicted and the fuel composition (including burnable poison) selected. The number of coolant circulation loops and the type of pumps can vary, as can the number of styles of control drives and auxiliary safety loops.

Many scientists and engineers worked on these issues, but final ratification of the engineering decisions rested with Bob Richards. In his decisions, he was particularly concerned with both the economics and the safety of the product. He sponsored the elaboration of a development program specifically directed at improving BWR economics, and personally participated in companywide nuclear safety reviews.

Dr. Richards was elected to the National Academy of Engineering in 1970. His citations included, among other things, the design of the first commercial nuclear power plant (Dresden I); the first nuclear plant with internal steam separation (KRB); the design and operation of the first nuclear plant with nuclear superheat (ESADA-VESR); and the design of the standardized offerings of GE's BWRs in the range of 500,000 to 1.1 million kilowatts.

In 1968 he became manager for engineering of the Reactor Fuels and Reprocessing Department. In October 1971 he became manager of the Special Fuels Programs with overseas licensing responsibilities for the Nuclear Energy Division. He was appointed manager, international business development, Overseas Projects Department in January 1973. In August 1974 he was appointed general manager of the Fast Breeder Reactor Department, Energy Systems and Technology Division, located in Sunnyvale, California, a position he held until his retirement in 1983. Dr. Richards was a fellow of the American Nuclear Society (ANS), a fellow of the American Institute of Chemical Engineers (AIChE), and a member of the American Chemical Society. He was a past chairman of the Nuclear Fuel Cycle Division of the ANS. He received the 1970 Robert E. Wilson Award of AIChE.

He served on the advisory committees for the Nuclear Engineering Department of Brookhaven, Argonne, and Oak Ridge National Laboratories.

Dr. Richards was a dedicated supporter of the nuclear power industry and of fast-spectrum reactors. He was particularly

fond of pointing out the huge energy resource available to the United States through fast reactors, compared to the reserves of coal, oil, gas, or even U-235.

Until one of his hands was disabled late in life by a shortened tendon, Dr. Richards was a talented and proficient pianist. He was married to Jean Urie and had two children.

