Harold Etherington

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1900-1994

By David Okrent

Harold Etherington died on August 2, 1994, at the age of ninety-four. He was a pioneer in the development of the first nuclear submarine power plants and the early boiling water nuclear power plants, and was a major contributor to the safety of commercial nuclear power plants.

Harold was born in London on January 7, 1900. His wife Elesa, who was born in Cumberland, England, on September 22, 1903, died with him.

Harold attended Imperial College of Science and Technology, London, where he was awarded an ARSM (Associate of the Royal School of Mines), first class, in 1921. He also was awarded the B.Sc. Engineering, honors, first class, University of London, in 1921.

Harold worked as the superintendent of LENA Goldfields, Ltd. Steel Plant from 1926 to 1930, as an engineer at A. O. Smith from 1930 to 1932, and as an engineer for Allis Chalmers Manufacturing Company from 1933 to 1942. When he moved to the United States in September 1939 with his wife and son, Geoffrey, the trip was almost fatal. They arrived aboard the oceanliner *Athena,* which had been torpedoed by a German submarine during the voyage, resulting in the death of hundreds of passengers.

Harold worked for Allis Chalmers on engineering development and later on manufacturing from 1942 to 1946. His nuclear experience began in 1946 at Oak Ridge National Laboratory, where he served first as section leader of the Gaseous Diffusion Plant and then became director of the Power Pile Division. From 1948 to 1953, as director of the Naval Reactors Division at Argonne National Laboratory, he made major contributions to the early basic reactor design for the United States Navy's first atomic-powered submarine, the *Nautilus.* From 1953 to 1959 he served as vice-president, Nuclear Products Division, ACF Industries. From 1959 to 1963 he served Allis Chalmers as vice-president and general manager, Atomic Energy Division. In these capacities he led design, construction, and startup of the Elk River Reactor, as well as working on the initial operation of Pathfinder, an integral superheat reactor.

Harold retired from Allis Chalmers in 1963. For most of the period between 1965 and the early 1990s, he served as a member of the Advisory Committee on Reactor Safeguards (ACRS) then as a member emeritus, the only member ever so honored. By law, every commercial nuclear power plant has to be reviewed by the ACRS, prior to both the start of construction and the beginning of operation. A letter report from the ACRS to the U.S. Atomic Energy Commission (and after 1975 to the U.S. Nuclear Regulatory Commission) has to be in the public record before hearings on a construction permit or an operating license can proceed. As a member of the ACRS, Harold played a major role in the formulation of many decisions important to nuclear safety.

Harold was elected to the National Academy of Engineering in 1978, an honor well deserved.

In 1974 Harold was awarded the U.S. Atomic Energy Commission Citation and Gold Medal for his meritorious contributions to the U.S. nuclear energy program. He was a member of the American Society for Mechanical Engineers, the American Rocket Society, the American Nuclear Society, and the American Society for Metals.

Harold was the author of a book entitled *Modern Furnace Technology,* which was published by Charles Griffin, London. The first of three editions appeared in 1938. In 1958 McGraw-Hill published the much-used *Nuclear Engineering Handbook*, for which Harold served both as the editor and a major contributor. Not published formally, but of much fame, was the report "Reactor Physics for Amateurs" by Etherington, a remarkably clear introduction to the subject, one which was illustrative of Harold's depth of knowledge in disciplines other than mechanical engineering.

Harold held one patent on the use of soluble poisons in pressurized water reactors.

So much for Harold's formal technical record. What of Harold Etherington, the man? He was generally a quiet, soft-spoken man with a good sense of humor. I actually began my career at Argonne National Laboratory in 1951 in the Naval Reactors Division, which was headed by Etherington. But I really got to know him through our many joint years of membership on the Advisory Committee on Reactor Safeguards. Harold's amazing breadth of knowledge across the many aspects of nuclear technology, and his ability to see through a complex problem to the key phenomena involved, made him an invaluable member. When the steam-line break problem was brought up without prior warning at the ACRS meeting on the Prairie Island nuclear power plants, Harold was able to perform a back-of-the-envelope calculation within several minutes, which made it clear that a threat to plant safely existed. Similarly, in 1966, the "China Syndrome" issue was brought into the ACRS review of the Indian Point 2 and Dresden 3 nuclear power plants, without benefit of any meaningful estimate of the potential course and consequences of a large-scale core melt. In a relatively few days, Harold provided the other ACRS members with the results of a rough estimate of core and containment behavior. It turned out to be remarkably similar to the description of a core meltdown accident that appeared in the Reactor Safety Study, WASH-1400, nine years later (in 1975).

On issue after issue, Harold's thoughts were sought after by the other ACRS members. He was always constructive, always a gentleman.

Unquestionably, his long tenure on the ACRS is known best for his chairmanship of the subcommittee that prepared the 1974 landmark report entitled "The Integrity of Reactor Vessels for the Light-Water Power Reactors." This was a difficult and controversial subject on which a wide range of strong opinions were held. That report has withstood the test of time.

Let me close by quoting briefly from the letter sent to Etherington in 1986 by then ACRS Chairman David Ward on the occasion of Harold's decision to leave membership on the ACRS.

> "As a member of the ACRS you have, I believe, been the ideal colleague—bright, articulate, and dependable. You are always gentlemanly, but ready with a strong comment when it is needed. You can be counted on to furnish authoritative opinion and information from your broad field of personal expertise, but you also reliably provide balanced mature perspectives on the whole range of Committee deliberations from a deep personal resource of wisdom and common sense."

We who knew him will all miss Harold Etherington.