

In Memoriam

Walter Clement Nason Jr.

1924-2016

by *Walter Clement Nason's family and friends*



Walter "Walt" Clement Nason, Jr. passed away at his home in Arlington MA on January 7, 2016. He was 91. Nason was raised in South Weymouth and Braintree MA and graduated as valedictorian from Thayer Academy in 1941. From there he went to MIT, earning a BS in Chemical Engineering in 1945 and an MS in Mechanical Engineering in 1949. He then worked at Wright-Patterson Air Force Base in Dayton OH on oxygenating pilots at high elevations.

Following Wright-Patterson, Nason worked for Cambridge Corporation, an Arthur D. Little affiliate, where he and two others developed a patented vacuum jacketed container designed to carry liquid oxygen for use in aircraft.

Nason then began his long and satisfying 45-year career as Chief Design Engineer at Process Engineering, Inc., now part of Chart Industries, Inc. (CSA CSM), where he designed cryogenic storage and transport vessels. He thoroughly enjoyed his career in all respects, particularly the good friendships made with colleagues and customers. He was very active for many years with the Compressed Gas Association (CGA), chairing

the old Cryogenic and Low Temperature committee and participating on several others. Many CGA and industry colleagues have continued to ask about him over the years and always had a kind word to offer—and hopefully received one in return.

Nason was an early adopter of computers and was a self-taught programmer. Many remember his contents chart programs and other design related programs.

Nason also thoroughly enjoyed his children, grandchildren, photography, biking, camping, boating and traveling. He loved to learn and was a lifelong student of everything from technology to history and current events.

Nason was the son of Vera Guild Nason and Walter C. Nason. He is survived by Charlotte Ann (Collyer), his wife of 65 years, and his four children. We will miss his spirit and passion for the industry.

.....

Robert John Soulen Jr.

1940-2015

by *Jim Schooley, Don Gubser, Mike Osofsky, Boris Nadgorny, Bill Fogle and Stu Wolf*



Robert John Soulen Jr., known for his love of superconductivity and softball, succumbed to Parkinson's disease on November 19, 2015,

after more than a decade of struggle with the disease. Soulen attended Rutgers University, receiving a BA in physics in 1962 and a PhD four years later. He received the 1976 NBS E.U. Condon Award, the 1979 Department of Commerce Gold Medal (shared with James Schooley) and the 2002 American Physical Society Joseph F. Keithley Award for Advances in Measurement Science.

At Rutgers, Soulen studied under Prof. Peter Lindenfeld and interacted extensively with Prof. E.A. Lynton, Prof. William McLean and Prof. Bernie Serin. The four were known collectively as the Rutgers Superconductivity Group. Under their tutelage, Soulen became a master at making electrical and thermal transport measurements at cryogenic temperatures. This experience led him to accept an offer in the Cryogenics Section of the Heat Division at the National Bureau of Standards (NBS) in 1968.

Soulen, in collaboration with James Schooley, developed a temperature reference device for the range 0.5K to 7K (ultimately to 9K). The device contained five (later six) carefully annealed wire samples all enclosed within sensor coils, thus allowing an operator to monitor all of the individual transitions in one experiment. NBS registered the device as Standard Reference Material No. 767. It proved to be very popular within the cryogenics community and in 1976 even provided five of the eleven reference points for a new provisional international temperature scale created by the International Bureau of Weights and Measures.

Soulen spent some 20 years applying experimental work on noise thermometry performed by the NBS Boulder cryogenics laboratory in the 1960s to the NBS low-temperature program. He collaborated with William Fogle and Jack Colwell to pursue an absolute temperature scale that would extend deep into the millikelvin range. The intention was to marshal all available very-low-temperature methods into one laboratory experiment and therein minimize the level of experimental uncertainty. The team recorded all of the experimental

and theoretical progress in a paper published in the *Journal of Low Temperature Physics*. It included a thorough discussion of a resistively biased use of the Josephson junction and provided much of the basis for the international 2000 Provisional Low Temperature Scale from 0.9mK to 1K.

Shortly after the discovery of high temperature superconductivity (HTS) in 1986, Soulen moved to the Naval Research Laboratory. Soulen wanted to focus more intently on research in HTS, and quickly established a program focused first on vortex dynamics and the unusual behavior of the HTS materials in intense magnetic fields. Then, using his experience in noise thermometry, he turned to tunneling into magnetic and superconducting materials to gain a better understanding of the fundamentals of the superconducting state.

Although Soulen spent the bulk of his career studying superconductivity, one of his major accomplishments in another area led to his most-cited scientific paper. Utilizing his knowledge of superconducting point contacts, he examined spin-polarized transport in magnetic metals. Motivated by a suggestion from Jeff Byers, a theory post-doc in his group, Soulen performed a ground-breaking experiment that observed the transport of superconducting Cooper pairs into magnetic metals (Andreev scattering) that became a standard technique in the study of spin polarization in magnetic metals, including some novel materials called half magnets. Published in the journal *Science*, the paper, on which he was the lead author, has been cited more than 1,000 times.

We will not soon forget his scientific abilities, his friendship, his wit, his passion for life, and his courage in the face of certain death. We grieve for his family, but we rejoice in the life that he led.

William Keller

1925-2015

Compiled from James Hoffer, Ralph Scurlock, Greg Swift and the obituary published in the "Los Alamos Monitor."

William "Bill" Keller, a giant in cryogenic research, passed away from a heart condition on December 31, 2015. Keller earned his PhD



from Harvard in 1948, and after a brief stint at the Ohio State University Cryogenic Lab accepted a position with Los Alamos National Laboratory's (LANL) Low Temperature Physics and Engineering Group in 1950. The group was the first to test a thermonuclear weapon in Eniwetok Atoll. Keller helped develop a temperature scale for $T < 4K$ and soon after began a study of the flow of Superfluid He4 through very narrow slits. He served as chair of the National Science Board Panel on Absolute Physical Quantities and was also chair of the Quantum Fluids Panel of the International Union of Pure and Applied Physics.

Springer Science+Business Media published Keller's "Helium-3 and Helium-4" in 1969, a 400-page magnum opus that is still in print today. James Hoffer, who worked with Keller at LANL, remembers when he first laid hands on an advance copy of the book while studying under Prof. Taconis at the University of Leiden, the Netherlands. "It was September 1968," he said, when a large package was delivered to the graduate student office. "This tome was seen as the new bible of the Taconis group, who mainly studied phenomena in the thermodynamics and transport properties of ^3He and ^4He . Keller himself was venerated as a god, living on a remote mountain in New Mexico."

Hoffer accepted a job at LANL in 1970. It was the same year Keller took over as group leader for the lab's Low Temperature Group, a position he would hold until 1985 when he transferred to the physics division. Under Keller's guidance the group turned out paper

after paper. "As a manuscript editor, he was exceptionally exacting and fearsome," says Hoffer. "I may have learned more about writing from Bill Keller than from all of my college English professors."

In 1973, during the OPEC oil embargo, Keller's group began applying its low-temperature physics and cryogenic engineering talents towards energy R&D. "The embargo triggered the widespread realization that US energy sources were being depleted and imported energy was undependable," says Greg Swift, a former group member. Swift says the fundamental work inspired by this push towards energy research included studies on flux motion, losses and pinning in Type II superconductors; dielectric breakdown at cryogenic temperatures; properties of A15 superconductors (e.g., Nb_3Ge) and the stability of superconductor/normal-metal composites. Applied efforts at the time included the development of DC and AC superconducting power transmission lines, superconducting magnetic energy storage for electric utilities, a car fueled by cryogenic hydrogen and cryogenic distillation purification of hydrogen isotopes for fusion-energy fuel.

Keller retired from LANL in 1989 but continued to be active in the cryogenic community. Together with F.G. Frickwedde and E.F. Hammer, Keller produced a two-volume set called "The History of Cryogenics in the USA" published by Oxford University Press (OUP). Ralph Scurlock, emeritus professor of cryogenic engineering and "sometimes" senior editor at OUP, calls the work a "brilliant and comprehensive history." The set includes detailed examinations of Tripler and his early success and failures; Linde's early steps in the USA; the NBS Washington and subsequent CEL Boulder inputs; space, energy and medical technology, and much more.

In 1993, Keller joined Larry Wheeler, Bruce Moorhead and C. Wolcott Henry to form the Golden Apple Foundation of New Mexico for Excellence in Teaching. Most recently, Keller was a board member of the Santa Fe Science Initiative, promoting scientific literacy in the schools of northern New Mexico. He is remembered for his dedicated contribution to science, his humorous spirit and his determination to better the world. ■