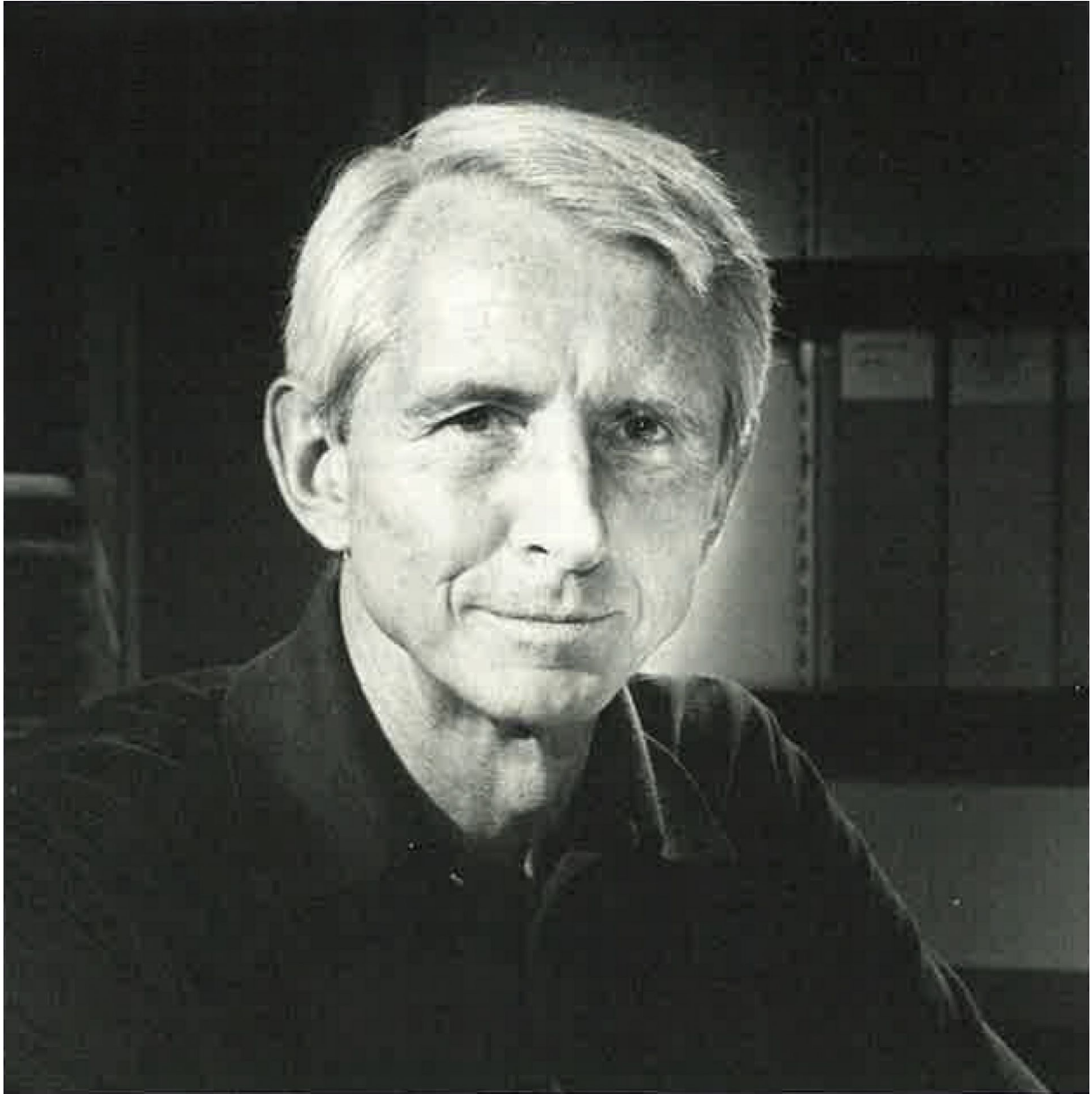


Joseph M. Hendrie – A Fond Remembrance

(March 18, 1925-December 26, 2023)

To those of us who knew Joe, even prior to his appointment as Chair of the U.S. Nuclear Regulatory Commission (NRC), it is an understatement to say that he was a larger-than-life member of the nuclear science and technology enterprise. He was best known to the broader community for two major accomplishments: the design and construction of the High Flux Beam Reactor (HFBR) at Brookhaven National Laboratory (BNL) and the creation of the Standard Review Plan (SRP) for the U.S. Atomic Energy Commission (AEC). In addition to the products of these endeavors becoming major fundamentals to their respective communities, they were uniquely Joe. The Safety Analysis Report for the High Flux Beam Reactor was written essentially single-handedly by him. This was true of the Standard Review Plan as well, which became the key safety review document for the NRC as it performed safety reviews for the growing number of power reactor applications in the U.S. His deep technical knowledge of nuclear engineering and his extraordinary management skills made this possible.



Joseph M. Hendrie

Joe's early days at BNL were devoted to developing advanced nuclear and non-nuclear concepts and devices during the 1950s and 1960s. These ranged from pulsed fast reactors to concrete pressure vessels. As funding priorities in the USA changed during those years, so did the programs at BNL. The loss of these programs brought tears to Joe's eyes, but it also led him to focus more broadly on areas with funding

opportunities. It was the time when energy generation and use became more prominent to the nation and indeed worldwide.

During the same period, because of the proximity on Long Island to much surrounding water, Joe perfected his skills as an accomplished recreational sailor at the Bellport Bay Yacht Club. Joe was an avid Thistle (a high-performance one-design racing sailboat) sailor. He sailed Kelpie #617 in the Bellport Thistle fleet, and the competition was keen and the banter among competitors, spirited by Joe, was always witty. Because of his natural leadership abilities, he served as Commodore of the yacht club in 1966 and 1967. He is still affectionately remembered at the club. Upon learning of his death, they have wished him "Fair Winds and Following Seas." I note that Joe was not the only famous nuclear scientist to sail Long Island waters. Albert Einstein sailed on the Peconic Bay in 1939 while vacationing on the north fork in Cutchogue. [See attached pictures: Joe's Thistle class boat followed by Einstein's standing in his boat.]



Thistle Sailboat



Einstein on Peconic Bay, Long Island, 1939

Joe is the co-inventor of the High Flux Beam Reactor which was in operation at Brookhaven National Laboratory from 1965 to 1996. The reactor provided very intense external beams of thermal neutrons. Accordingly, thousands of researchers in the materials and life sciences benefited from the use of Joe's invention. The reactor became a machine to emulate and indeed, the high flux reactor at the Institut Laue Langevin in Grenoble is based on the HFBR design. Joe's abilities as a reactor physicist, engineer, and administrator were devoted to the development of this reactor from 1958 to 1965. As the leader of this effort at Brookhaven, he performed key engineering analyses and made important design decisions. He conducted the safety analysis and wrote the Final Safety Analysis Report, and then defended it before the appropriate regulatory authorities. In his book on the early history of BNL, "Making

Physics,” Robert Crease describes Joe as the J. Robert Oppenheimer of the HFBR. Crease remarked that Joe combined a deep appreciation of engineering, a thorough knowledge of physics, and the ability to motivate and inspire his team. While the patent for the HFBR names five co-inventors, one of them, Herb Kouts, declared openly at BNL that it was Joe’s reactor. [See attached photo of the five BNL co-inventors of HFBR at patent ceremony. Left to right: Jack Chernick, Julius Hastings, Joe Hendrie, Clarke Williams (Department Chair-presenter of patent royalty stipend), Kenneth Downes, Herbert Kouts]. In 1988, the American Nuclear Society (ANS) named the High Flux Beam Reactor a Nuclear Historic Landmark, in part for the “elegant simplicity of its design” which “contributed to the HFBR’s record of high availability and long, useful life.” The reactor was shut down after a small amount of tritium, which posed no health risk, was detected in the groundwater on the site. The tritium was traced to the spent fuel pool of the reactor, which did not have a steel liner. Joe had commented to me and to others that he wanted to install a liner, but the funding was not available for this design feature when he was involved with the design and construction.



Co-inventors of BNL HFBR

Joe's first major accomplishment for the U.S. Atomic Energy Commission was the development of the Standard Review Plan during the period 1972 to 1974 for the licensing of commercial nuclear power plants. The Standard Review Plan and the technical excellence of the regulatory staff are lasting testimony to his pioneering influence. Roger Mattson, a former senior manager at NRC noted that he watched in awe as Joe oversaw the drafting of detailed specifications for technical review of license applications that became the SRP, writing many of the sections himself when his technical subordinates were not up to the task, and personally editing the lot. That significant effort has stood the test of time and served the nation well. AEC Chair Dixie Lee Ray cited Hendrie when he completed his term in 1974 as Deputy Director for Technical Review at the Commission: "Your dedication to the public interest, your leadership, and your sound judgment are held in high esteem by all with whom you

have been associated in the Atomic Energy Commission.” Further, Chair Ray notes: “Not only have you personally provided highly regarded guidance in developing positions and policies concerning urgent safety issues, but you have also demonstrated outstanding managerial talents in substantially upgrading efficiency and competence in the Technical Review area in the Regulatory process.”

Another senior NRC manager from that era, Robert Budnitz, noted that one of the most important documents that Joe wrote (or supervised the writing of) was WASH-1250. This was an overarching document that would explain to the public how power reactors were designed and regulated to assure that they were safe enough. WASH-1250 was issued first in draft form and then later as a "FINAL DRAFT", but never finalized. It led, ultimately, to the writing of the Standard Review Plan.

It was one of Joe's most stellar accomplishments, according to Budnitz. The fact that WASH-1250 was never issued as a FINAL was due to controversies among the NRC Commissioners as to whether they wanted to endorse formally some of the practices and decisions that WASH-1250 documented.

Joe served as Commissioner and Chair of the U.S. Nuclear Regulatory Commission from 1977 to 1981. This was a challenging period for Joe, the nation, and the world. The accident at Three Mile Island (TMI), Unit 2, received wide media attention and public concern. In the now distant view of that event, it can be said that Joe proceeded in a cautious and deliberate manner to ensure that appropriate actions were taken to ameliorate the ensuing events. Roger Mattson noted that Joe was in the thick of things throughout the response to events at TMI, as most people knew. Mattson further noted that he and Joe and the rest of the NRC staff who went to the island were exhausted by the time they returned to their offices in Bethesda. They had little time to rest as Congress and the White House began hearings into the matter in the summer of 1979. In the fall they had to respond to recommendations in a major report by the Kemeny Commission on reforms for the nuclear enterprise. Accordingly, the NRC staff team who developed the response did not sleep for three days of drafting their responses. Mattson noted that Joe did not sleep for those three days either. He checked on the team's work

every few hours around the clock to see how they were doing and to offer encouragement. He did not tell them what to say or do, he just made sure they kept going and stayed positive. He was a true leader.

Another senior manager at NRC, Ashok Thadani, remarked that Joe was a very accomplished person. Thadani had the opportunity to work with him soon after he joined the agency and then again during and after the accident at TMI. He noted that Joe was a true gentleman and safety focused.

Joe served as President of ANS in 1984. He provided inspired leadership to the Society at a critical time. He represented the organization well in the world arena of other nuclear organizations. He brought stature and knowledge to all those who sought direction on the future developments in the nuclear enterprise. Thanks to his efforts, nuclear technology faces a vibrant future in areas of medical technology, industrial applications, and power generation.

Joe is also the recipient of several awards and prizes. Among numerous fellowships and honors, he received the AEC's E.O. Lawrence Award in 1970 for his outstanding contributions to the physics and engineering of versatile research reactors and for important contributions and recognized leadership in promoting the safety of large power reactors. Joe was made a Commander of the Order of Leopold II by King Baudouin of Belgium in 1982. The award was made in recognition of his contribution to the furtherance of friendship between Belgium and the U.S. Joe was the 1998 recipient of the ANS George C. Lawrence Pioneering Award for having made outstanding pioneering contributions to the field of nuclear safety. To reaffirm his eminent status in the nuclear technology arena, Joe's outstanding service in developing and guiding the peaceful uses of nuclear energy, ANS (jointly with the Nuclear Energy Institute) bestowed upon him in 1994 the Henry DeWolf Smyth Nuclear Statesman Award for statesmanlike contributions to the many aspects of nuclear energy.

He is a long-term member of the National Academy of Engineering and has served in various technical capacities for the Academy. He is a Fellow of the American Nuclear Society and a registered professional engineer in New York and California. He has

served on the Board of Directors of electric utility companies with nuclear power programs as well as numerous advisory groups and committees to government and industry.

Upon completing his term at the NRC in 1981, he returned to Brookhaven as a senior scientist to pursue research interests and to advise others, worldwide, on developments in nuclear technology. In the late 1990s, I had the privilege of being chair of the department that Joe once led. Whenever I commiserated with him on challenges that I had with government officials in D.C. that he knew from his time, he would typically say to me: relax, they will be gone soon. I was honored to provide a celebratory event at BNL with our staff for his retirement in 1996 at which we congratulated him for a career well done.

Joe stayed active in the program of the Long Island section of ANS over the past few years and supplied wise input, clever wit, and endless charm during the monthly meetings of our section. We are fortunate to have benefitted from his wisdom, kindness, and advice up until his last days. He will be missed.

Robert A. Bari

Senior Scientist Emeritus, Brookhaven National Laboratory

Fellow, American Nuclear Society