At a meeting of the FACULTY OF ARTS AND SCIENCES on February 15, 2005, the following tribute to the life and service of the late Harold A. Thomas, Jr., was spread upon the permanent records of the Faculty.

HAROLD A. THOMAS, JR.

BORN: August 14, 1913
DIED: March 26, 2002

Harold A. Thomas Jr., of Cotuit, Massachusetts, died on 26 March 2002. He was born in Terre Haute, Indiana, 14 August 1913. He obtained his bachelor's degree from Carnegie Tech, where his father taught, in 1935. Thomas followed his father in a professorial career and he spent his entire academic life at Harvard, where he earned his master's degree in sanitary engineering in 1937, and his doctor of science degree in 1938 under the guidance of Professor Gordon Fair, whereupon he assumed a teaching position at Harvard. In 1956, he was awarded a Gordon McKay chair as Professor of Civil and Sanitary Engineering. He held that position until 1984 when he stepped down from his formal faculty position and assumed the professor emeritus title. His research and teaching ranged over the fields of civil and sanitary engineering, hydrology, statistics, resource economics, system analysis, and demography.

In 1976, Thomas was elected a member of the National Academy of Engineering. In 1978, the American Geophysical Union honored Thomas by awarding him the Horton Medal for his outstanding contributions to advancing the field of hydrology. Thomas is perhaps unique among the American Geophysical Union's medallists in that he never published a paper in any of the Union's journals, but his research had a major impact on the development of hydrology over the second half of the 20th century. Also, in 1978, he received the Conservation Award from the United States Department of Interior. The award is the highest honor that the Department of Interior can confer on anyone outside the Department.

Thomas was one of the principal members of the Harvard faculty who guided the Harvard Water Program in the late 1950s through the early 1960s. The program was unique in that for the first time it established a working interdisciplinary approach to the development of water resources. It was based in the Government Department and jointly administered by the Economics Department and the Division of Engineering and Applied Sciences. A book summarizing the program, *Design of Water-Resource Systems,* published in 1962 by Harvard University Press, served to energize the management of the nation's water resources and to define the hydrologic research agenda in terms of systems analysis, then a new interdisciplinary philosophy of problem solving. The ideas in the book were first field-tested by the 1962 White

House Panel on the Problem of Waterlogging and Salinity in Pakistan. The program was a major motivating factor in the founding of the journal *Water Resources Research*, that became the major forum for furthering the merging of economic and physical principles for achieving efficient and effective management of the nation's water resources.

Thomas' contributions to hydrology ranged over a number of topics. Among them were flood frequency, water balances, optimal release rules for reservoirs, capacity expansion of water resource systems, impact of technological change on water supply and demand, and environmental control. Several of his papers gave solid footing to older techniques. For example, "Frequency of Minor Floods," a paper he published in 1948, showed that non-parametric statistical methods relaxed the need to make an arbitrary assumption of a particular theoretical probability distribution. His sequent peak algorithm provided an optimal rule for the release of water from a reservoir. Heretofore, hydrologists had used the "mass curve" developed in 1882. Unlike the mass curve, the sequent peak algorithm is not subject to computational ambiguities; it assures an optimal release and has a linear programming formulation.

Perhaps Thomas' most significant contribution to environmental management was "The Animal Farm: A Mathematical Model for the Discussion of Social Standards for Control of the Environment." It was published in the *Quarterly Journal of Economics* in 1962. In the paper Thomas demonstrated for the first time that environmental standards imply a monetary value on human life, health, and well being, and that we cannot set quality criteria for control of the environment without making a value judgment that always takes the form of a cost-benefit ratio. "*To set a criterion is to impute a cost-benefit ratio*," he wrote.

Throughout his career, Thomas never restricted his view of hydrology to purely physical terms. Not far from his thought was the relevance of hydrologic solutions to societal problems. It did not seem to matter to Thomas whether hydrology was a science, an adjunct to a science, or a part of engineering. For Thomas, hydrology was an integral part of the social fabric, our health, well-being, and our ability to control the environment. His published papers and the unpublished notes he contributed to the Harvard Water Program merit reading by those new to hydrology and rereading by his contemporaries. Even though some of the papers are dated, there is still ore to be found, and one can come to appreciate how his deep understanding of problems and issues allowed him to express far-reaching ideas in relatively simple terms.

Within the water community, Thomas was recognized as one of its foremost original thinkers. He was one of the principals who transformed hydrology from a subtopic of Civil Engineering into a discipline with its own intellectual content. He, perhaps more than anyone else, paved the way for integrating hydrology and economics into the broad field of water resources management.

For one who had a long and distinguished career, Thomas published relatively few papers and

books. Nonetheless, his publications tell us a lot about his contributions to science and engineering. However, to fully appreciate his contributions, one has to look at the work of his many students, particularly the work reflected in their early publications that followed from their dissertations. Thomas had confidence in the ability of his students to make their way in the professional world and three of them followed him into the professorial ranks at Harvard. Thomas saw his role as a mentor of finding the ore, but leaving its mining to others.

Respectfully submitted,

Joseph Harrington
Nicholas Matalas
Ralph Mitchell
Peter Rogers, Chair