



CLARENCE R. ALLEN

1925–2021

Elected in 1976

“Contributions in evaluating seismicity and fault movements leading to sound engineering practices and codes in earthquake-prone regions.”

BY PAUL C. JENNINGS

CLARENCE RODERIC ALLEN passed away January 21, 2021, at the age of 96. He was born February 15, 1925, in Palo Alto, where his father, Hollis Allen, was attending graduate school. His father became a leading educator and assistant superintendent of schools in San Bernardino and professor at Claremont Graduate School.

Clarence had three siblings: an older brother Roland and two younger sisters, Constance and Margaret. His mother, the former Alfreda Delight Wright, died from complications of childbirth with Margaret’s delivery, when Clarence was in the 6th grade. Several years later his father married Janet Maie Drake. Although much involved with and beloved by his extended family, Clarence himself never married.

After high school he enrolled at Reed College but interrupted his studies to serve in the Army Air Corps during World War II (1943–46), as a navigator on B-29s in the Pacific theater. After the war he returned to Reed and graduated with

The author acknowledges use of information and insights in Clarence Allen’s oral history (*Connections: The EERI Oral History Series, Vol. 10: Clarence R. Allen, Stanley Scott Interviewer*, Earthquake Engineering Research Institute, Oakland, CA, 2002), which complemented, enlarged, and verified his own knowledge and information from other sources.

a BA in physics in 1949. He then earned an MS in geophysics (1951) and PhD in geology (1954), both from the California Institute of Technology. After a year (1954–55) as an assistant professor at the University of Minnesota, he returned to Caltech for the rest of his career, progressing from assistant professor (1955–59) to associate professor (1959–64) and then professor; he became professor emeritus in 1990. He also served in administrative roles, including as interim director of the Seismological Laboratory (1965–67) and acting chair of the Division of Geological Sciences (1967–68). In 1970 he was elected chair of the faculty.

A distinguished scientist, Clarence made significant contributions in several areas, but in particular to the relationship between earthquake seismology and the geology of faults. This is an important scientific topic, but it is also one of great interest to engineers working on earthquake hazard assessment and earthquake-resistant design. Clarence was very aware of this interest and his greatest contribution to engineering was in the way he could assess geological and seismological data and research in terms of its relevance to earthquake performance and engineering design criteria and communicate that knowledge to engineers, owners, and politicians. He was twice asked to speak on this subject to the Structural Engineers Association of California and his efforts were exemplified by his 1995 Distinguished Lecture to the Earthquake Engineering Research Institute.¹

Another important example of this work was his studies of reservoir-triggered earthquakes, a problem brought to attention by the damaging 1967 earthquake associated with the filling of Koyna Dam in India. Clarence's research showed that most, if not all, of the largest reservoir-triggered earthquakes were in areas where there was evidence of geologically recent faulting, a result that showed how to approach this problem.²

¹ Allen CR. 1995. Earthquake hazard assessment: Has our approach changed in light of recent earthquakes? *Earthquake Spectra* 11:357–66.

² Allen CR. 1982. Reservoir-induced earthquakes and engineering Policy. *California Geology* 35(11):248–50.

In addition to communicating relevant scientific results to the engineering community, Clarence served on consulting teams on many major engineering projects, including the proposed Auburn Dam in California, the Aswan High Dam in Egypt, the Seismic Safety Reevaluation of the Diablo Canyon Nuclear Power Plant in California, and projects in New Zealand and South America. I had the privilege of working with him on the Seismic Safety Evaluation of the Proposed Liquefied Natural Gas Facility in Point Conception, California, and can attest to the knowledge and wisdom he brought to these tasks. He was a very effective consultant and was highly respected by his engineering colleagues, including George W. Housner (NAE 1965, NAS 1972), who noted his significant work in improving communication between scientists and engineers.

Clarence also devoted a lot of effort to public service. As chair of the Consulting Board for Earthquake Analysis of the California Department of Water Resources (1965–74) he worked with engineers and scientists, as in 1972 on the Governor’s Earthquake Council (precursor to the California Seismic Safety Commission). He also was appointed to the California State Mining and Geology Board in 1969 and chaired it in 1975. As part of the National Earthquake Hazards Reduction Program, he was among the group that wrote the 1970 *Report of the Task Force on Earthquake Hazard Reduction*, published by the Office of Science and Technology Policy. One of his most important contributions was chairing the National Academy of Sciences committee looking at the initial scientific and engineering lessons from the 1971 San Fernando earthquake.³

Clarence served on a number of other NASEM committees as well, just a few of which are noted here. He was a member (1984–87) and chair (1987–89) of the Committee on Scholarly Communication with the People’s Republic of China, vice chair of the Committee on Advanced Study in China (1980–85), and a member of the Committee on Global and International

³ National Research Council. 1971. *The San Fernando Earthquake of February 9, 1971: Lessons from a Moderate Earthquake on the Fringe of a Densely Populated Area*. Washington: National Academy Press.

Geology (1982–87), Committee for the Symposium on Practical Lessons from the Loma Prieta Earthquake (1992–94), Study of NSF Decisionmaking on Major Awards (1992–94), and Board on Radioactive Waste Management (1985–90).

He chaired the National Earthquake Prediction Evaluation Council (1979–84) and the Earth Sciences Advisory Panel for the National Science Foundation (1967–68). He was vice chair of the American Seismological Delegation to the People's Republic of China (1974), one of the first scientists to visit that country after the Cultural Revolution. He also was elected president of both the Seismological Society of America (1975–76) and the Geological Society of America (1973–74).

Of his many publications, one of particular importance to engineering is *The Geology of Earthquakes*, coauthored with Robert S. Yeats and Kerry Sieh (Oxford University Press, 1997). In his chapter, Clarence brought together his expertise in seismology and geology and his experience in interacting with the public sector to address the assessment of seismic hazard.

He received many recognitions and awards, beginning with the G.K. Gilbert Award from the Carnegie Institute of Washington in 1960. He was elected a fellow of the American Academy of Arts and Sciences in 1974, and in 1976, in a remarkable coincidence, he was elected independently to both the National Academy of Engineering and the National Academy of Sciences. The California Earthquake Safety Foundation awarded him the Alfred E. Alquist Award for public service in 1994 and he received the Harry Fielding Reid Medal from the Seismological Society of America in 1996. In 2001 he was awarded the George Housner Medal by the Earthquake Engineering Research Institute.

Beyond his considerable professional expertise, Clarence's interests in aviation and navigation, acquired during his military service, continued throughout his life. When flying, he strongly preferred to sit by the window, often with air navigation maps, and enjoyed following the course of the plane and studying the geology. He took pride in knowing where the plane was at any time.

Many of his professional and personal activities were deeply influenced by his love of the outdoors. Camping, hiking, and fishing were part of his family activities from early on; after careful planning, his father once took the family from Claremont to Eugene, Oregon, by car without once driving on a paved road! During his lifetime Clarence fished in the Yellowstone area and the High Sierras in California as well as in Colorado, Chile, and Tibet. He often fished with his Caltech colleagues; I enjoyed fishing with him in New Zealand as well as on many day trips to streams in the mountains of Southern California.

In addition to his substantial contributions to the profession, Clarence left a bequest of nearly \$1.6 million to the Seismological Society of America, and a bequest of \$800,000 to the Earthquake Engineering Research Institute, ensuring a robust future for the fields that sustained his intellect and his career.

Many are grateful for the time spent with him and the adventures he brought, and are honored to call him colleague, friend, and family. He is greatly missed.