

# Memorial to Clifford Alan Kaye

## 1916–1985

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Clifford Alan Kaye was an uncompromising scientist and an outstanding geologist. He possessed an unusually finely honed sense of scientific observation and investigation which, combined with a highly principled code of personal conduct, made Cliff unusual in many respects. He did not seek the limelight, but gave generously of his time and energy to all who would strive to know more of the impact of geology on cities. While he was so very accessible, few came to know Cliff closely; we doubt that anyone knew him intimately.

Cliff, born on Manhattan Island, 26 October 1916, was the son of a Russian-Jewish lawyer. He enjoyed recalling his childhood days, playing in Central Park on prominent outcrops of Manhattan Schist and Fordham Gneiss; these experiences provided the beginnings of his life's work—the understanding of the influences of geology on the development of cities.

During undergraduate studies in geology at Cornell University (B.A., 1938), he published his first paper, "The Stratigraphy of New York City and Vicinity," an early start to a productive career. After a year at the University of California–Berkeley, Cliff spent six months with the Union Oil Company of California. This was followed by a year at Harvard University; he took no degree, as the management of the department was not to his liking. Cliff's withdrawal from formal academic work also signaled the beginning of his lifelong commitment to intensive self-education in all facets of geology, as well as art and history.

On departing Harvard, Cliff joined the U.S. Army Corps of Engineers in August 1941, filling the position of Syracuse District Geologist, at a junior level. Cliff's own assessment of his first professional assignment was, "Laid out all foundation exploration for district projects (dams, airfields, depots, hospitals, etc.), assigned and supervised soil testing, reviewed results and made reports on foundation conditions (all this as a P-1!)."

March 1943 saw Private Kaye in a different role with the Corps. By June 1944, he was a sergeant-grade military geologist at the Intelligence Division, Chief of Engineers, European Theater of Operations. He was stationed successively at London, Rennes, Paris, and Versailles, while making terrain studies for individual military objectives in the American sectors of France and Germany. On one occasion in Paris, Cliff was invited to a home dinner of roast beef and mashed potatoes, certainly an accomplishment for a French family under near-starvation conditions. Discovering a cockroach in the meal, the always-sensitive Cliff discreetly covered the insect with potatoes and gulped it down. At war's end, Cliff returned to Paris, where he lived for six months—not nearly enough time, as he would remark later. In May 1946, having served with Edwin B. Eckel in Europe, he was recruited by Ed for the U.S. Geological Survey's newly formed Branch of Engineering Geology.

In 1946–1947, Cliff was a field partner of R. W. "Dick" Lemke; they mapped seven 15-minute quadrangles in northeastern Montana and northwestern North Dakota for the Missouri River Basin Development program. Dick recalls his delight in working with Cliff, who provided a continuous flow of challenging, stimulating ideas. Here Cliff developed the concept of tabular map-legend engineering geologic descriptions, now widely used.



In August 1947, Cliff accepted an assignment under the direction of Julius "George" Schlocker, to begin a project to map the geology of San Francisco, for which he recruited into the USGS former World War II military geology colleague Manuel "Doc" Bonilla. Cliff worked on the Fort Baker peninsula and outcrops and subcrops in the downtown area.

In 1949, Cliff began six years of intensive work on the Survey's Puerto Rico project, culminating in landmark reports on the geology of the north coast and the city of San Juan. He also provided counsel to Commonwealth agencies, particularly for siting of dams and tunnels.

With his work in Puerto Rico completed, Cliff was relocated in 1955, this time to Boston. His initial assignment was to evaluate erosion of sea cliffs on the Massachusetts coast. The Hub City, with its geologic complexity, cultural heritage, and urban amenities, was too alluring; he expanded his work to include the geology of the basin, as an extension of LaForge's 1932 work.

In 1957, Cliff formed and managed an intensive training course in engineering geology for the Federal Housing Administration. This, and his later intergovernmental consultations, showed his wide range of abilities. From 1962 through 1965, he assisted the National Park Service in its initial coastal stabilization projects at Cape Cod and Fire Island. In 1974 and 1975, he served as a member of the Land and Water Commission of Martha's Vineyard, and discovered a Cretaceous sedimentary sequence, thrust by the ice sheet over glacial deposits. From 1974 through 1979, Cliff was a member of the Seismic Advisory Committee for the Massachusetts Building Code. His highly regarded USGS Bulletin 1476 (published as a Bicentennial handbook, in 1976) is a masterfully woven blend of the geology and history of Boston.

Cliff's specialties were: (1) stratigraphy and structure of the Boston Basin, (2) glacial and surficial geology and archeology of the basin, (3) nature and structure of the drumlin tills of Boston, (4) sea-level fluctuations of the Massachusetts coastline, (5) coastal erosion of southeastern Massachusetts, (6) glacial stratigraphy of Martha's Vineyard and Nantucket Island, and (7) several facets of petrography and paleontology of the basin. His lectures on these subjects were widely sought. Cliff was comfortable in bringing geology to educated listeners. His Boston harbor ferry trip narration was a favorite with the New England Section of The Association of Engineering Geologists, which Cliff joined in 1973.

This wide spectrum of subjects on which Cliff published is indicative of the breadth of his geologic interests. He was a familiar sight at foundation excavations in Boston, his field book filled with detailed sketches of the complex stratigraphic and structural relationships soon to be destroyed or covered by concrete and steel. Bedrock interpretations were gleaned from visits to water tunnels of the Metropolitan District Commission and the subway tunnels of the Metropolitan Bay Transit Authority, to excavations, and on studies of soil samples, rock core, and logs of more than 30,000 foundation borings, to which he applied his fine understanding of petrographic stratigraphy. These interpretations were made against the worst of all geologic odds: the Boston basin is virtually devoid of natural outcrops north of the Charles River.

Cliff's office was a mecca for New England engineering geologists and geotechnical engineers. He could "boil down" a geologic problem for engineers with speed and simplicity. Although Cliff retired officially in 1981, he continued his work with undiminished intensity until the day of his death. He loved to deal with those who applied the geology that he'd unravelled, and to learn of their findings. His most visible legacy is the "reborn" Boston, a city of skyscraper offices, apartments, and condominium buildings. He disdained supervision, often chose his own research topics, and was eventually forced to fight for his own support and survival in a USGS increasingly insensitive to such independent individuals. His last ten years of work saw him shunted to a miniscule office at the Water Resources Division, near North Station, with only part-time secretarial help. Cliff continued to produce fine work of high utility, although with digressions to provide local technical assistance.

Cliff died unexpectedly at his Boston apartment, on 9 December 1985, a volunteer worker on his

final Boston basin summary paper. His private life was little known even to his closest friends. Among his many facets were his love of local history, and his extensive collection of rare books and works of minor European and American artists of the 16th through 19th centuries; many were restored superbly by Cliff, who was also a gifted art conservator. The paintings had been acquired with a discriminating eye over a period of three decades.

Cliff is survived by his wife, the former Aleida Verhoog, of Rotterdam, Holland, whom he married in 1949, and two children: Peter, of southern California, and daughter Louise, of New York City.

Those who were privileged to see a bit of the inner man will long remember Cliff as the most universal of scientists, an extraordinary person who dealt—always on his own terms but in gentle ways—with the passions and pressures of mankind. His work is representative of the best of the USGS. It will prove to be of the finest quality—work that will stand the tests of time and hard scrutiny.

Clifford Alan Kaye was a benchmark of intellectual sensitivity and integrity. He produced superb works of science, of lasting benefit to mankind. We enjoyed his society immensely, and along with many colleagues, shall profoundly miss his presence.

Cliff's bibliography is extensive, covering 71 publications. It is characterized by a rich variety of subjects. We cite below three particularly outstanding contributions in each of nine fields, to show the breadth of Cliff's research. A copy of the complete bibliography is available upon request from either of the authors of this Memorial.

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