Memorial to Edwin B. Eckel
1906–1989

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Denver, Colorado

and

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The passing of Edwin B. Eckel was mourned by his many friends and colleagues around the world. Ed Eckel, born in Washington, D.C., January 27, 1906, the oldest son of Edwin C. Eckel and Julia Dibblee Eckel, died September 28, 1989, in Lakewood, Colorado. His survivors include sons Edwin G. Eckel of Wallace, Idaho, and Robert R. Eckel of Fresno, California; a brother, Richard Eckel of Banner Elk, North Carolina, 12 grandchildren, and 3 great-grandchildren. He was preceded in death by his wife, LaCharles Q. Goodman, whom he married in 1931; and by another son, C. Richard Eckel.

Ed’s formative years were spent mainly in Washington, D.C., where he attended grade school and high school. He lettered in track at Lafayette College and earned an undergraduate degree there in chemical engineering. To the enhancement of the profession, as it turned out, he switched from chemistry to geology and received a masters degree in 1930 from the University of Arizona. Later he took additional graduate work at the Colorado School of Mines while stationed in Golden with the U.S. Geological Survey. During the course of his varied career, Ed had a positive influence on the lives of the many individuals who profited from his kindly advice and direction, his deep sense of responsibility, and his truly lovable nature. A few of his contributions to society as a scientist and his warmth as a human being are expressed in “Portrait of Ed Eckel” (The Geologist, 1974, v. IX, no. 5). It seems fitting that this evaluation of Ed’s career by a few of his close associates and colleagues be updated and modified here as a lasting remembrance of this great man.

FIRST USGS YEARS, by Robert Yates. The first half of Ed Eckel’s career, beginning when he joined the U.S. Geological Survey in 1930, was devoted to investigations of mineral deposits in the western part of the United States. He produced reports on the brown iron ores of eastern Texas and on the geology and ore deposits of the La Plata district, Colorado, and he helped compile the geologic map of Colorado. In addition, he investigated 36 potential dam sites, scattered throughout nine western and two eastern states, for the Bureau of Reclamation, Army Engineers, Indian Service, Idaho Department of Reclamation, and the Conservation Division of the Geological Survey. These excursions into engineering geology convinced him of the need for more extensive work in the comparatively new field of geology applied to civil engineering and set the stage for the latter part of his career.

In 1939, Ed began the first field study of quicksilver mining districts as a part of the newly created Strategic Mineral Program of the Survey. For the next two years, he worked in the quicksilver districts of the California Coast Ranges and then returned to Washington, D.C., to act as commodity geologist for mercury, a position he held until 1944. Ed’s interest then, as always,
was mainly people and what geology could do for them. When he mapped a mine, his concern was not where the ore came from, but where more ore could be found.

Ed's appreciation of people led to his belief that if you give someone an objective and the freedom to obtain that objective, that person will usually produce. This was the way he ran the mercury program. His success was measured by the fact that all projects undertaken yielded published reports. All geologists under him were firmlyindoctrinated with his philosophy that "the report's the thing." Ed's personal way of writing a report was to take paper and pencil and slump on a sofa, where for several days he mulled over organization and cogitated on emphasis. Finally, when everything was clearly in mind, he moved to the desk and filled sheets of paper in feverish haste.

**INTO ENGINEERING GEOLOGY, by David J. Varnes.** During World War II, Ed was technical representative to Engineer Intelligence in the European and Mediterranean Theaters of Operation. In this capacity he studied the quicksilver industry of Italy and the geology of underground factories in Germany.

He started the USGS Engineering Geology Branch in 1945 and aided in bridging the gap separating engineers and geologists. There was a lack of knowledge—geological as well as engineering—of the mechanics, recognition, and control of landslides; there was little understanding on the part of geologists about facts and observations needed on maps for use by engineers, and engineers did not appreciate how geologic maps could provide background data for their work. Through his own efforts and those of his colleagues, he directed work that brought the two disciplines closer together.

Among the landslide investigations undertaken while Ed was chief of the Engineering Geology Branch were those in reservoir areas (Lake Roosevelt and Ft. Randall Reservoir), in coastal areas (Pacific Palisades, Martha's Vineyard), in urban settings (La Paz, Anchorage, Los Angeles, San Francisco Bay area, several Chilean cities, Rapid City), and in a variety of mountainous areas (southwest Colorado, east-central Utah, Jackson Hole, and the Colorado Front Range). These studies added to our knowledge of this socially and economically important geologic process.

Ed's desire to apply geological knowledge of slope processes to rational engineering practice found expression in 1950 in the formation, under his leadership, of a Landslide Investigations Committee of the Highway Research Board, an arm of the National Research Council. Ed found that highway engineers were "not afraid to ask," and many extended discussions—some heated, some frigid—led to better mutual understanding. Ed's patience, thoughtfulness, fairness, technical knowledge, and sheer industry led the group into a sustained productivity that resulted in the publication in 1958 of Highway Research Board Special Report 29, *Landslides and Engineering Practice*. The work was a major contribution to the literature on landslides and was widely used throughout much of the world.

Through all Ed's work ran the theme of seeking effective human communication and bridging gaps between those who obtain and those who use geological information. To express this we can do no better than to repeat some of Ed's own words—words by which he lived and induced others to follow:

This is the essentially human problem of how to present geologic facts to engineers so that they will understand and use them to maximum advantage. This is a subject in itself, yet one that must be solved. It ranges from the discovery and training of potential engineering geologists, through methods of presenting our data, to research on the psychology of salesmanship. Suffice it to say now that the essence of the problem is the need for *conviction by demonstration*. The geologist and engineer think differently and work differently. The engineer thinks concrete facts and figures, he reasons from *cause to effect*, and he depends very largely on what he can see and measure. The geologist normally reasons from effect to cause, and is perhaps all too
conscious that his is an inexact science. If he is as skillful and brave as he should be, however, and if he has observed and understood enough facts, he should be willing and able to predict the geologic conditions and their meaning to the engineer. If he continues to make such predictions accurately, he will, by demonstration, bridge whatever gaps there are between himself and the engineer. (Presidential address delivered before the Colorado Scientific Society, December 18, 1950).

PARAGUAY PROJECT, by Ernest Dobrovolny. In 1951, the Paraguayan government asked the U.S. State Department for guidance in establishing a geological survey. Ed was selected as technical advisor. After being in the country a short time, he refined his charge of providing advice on the establishment and maintenance of a Department of Geology and Mines to include the related problems of staffing and training engineers and geologists for such a department. He also prepared a report on the geology and mineral resources of Paraguay as a USGS Professional Paper, a report that is still the major reference to the geology of Paraguay.

MINERAL SIDELINE, by Ogden Tweto. At times nearly hidden in the bustle of Ed’s activities was an abiding affection for minerals. This affection had early expression in his first four published papers, all on mineralogical subjects. It did not come into public view again until the publication in 1961 of the 399-page Minerals of Colorado (USGS Bulletin 1114). While he was working in other fields, Ed brought Minerals of Colorado to fruition 30 years after its conception. It was a spare-time labor of love, and for a year or two Ed could be found on weekends in a corner of the USGS library at the Denver Federal Center, relaxing from the cares of the work week by writing on a topic that fascinated him. Few relax so productively.

NUCLEAR INVESTIGATIONS, by W. S. Twenhofel. In July 1956, the U.S. Atomic Energy Commission asked the U.S. Geological Survey for geological and geophysical advice on the feasibility of underground nuclear testing in order to prevent all explosion products, including radioactive material, from venting to the atmosphere. Ed directed Survey investigations before the first nuclear test in 1957, an assignment that fell to him naturally because of his demonstrated leadership in the field of engineering geology.

Ed perceived the underground nuclear test as a challenge for the geological profession, because it included not only the opportunity to apply geological principles to a novel engineering problem, but also the opportunity to investigate the behavior of rock under extreme temperature and pressure.

Before 1957, no large explosions, either nuclear or chemical, had been deliberately contained. On the contrary, large explosions had been designed to break rock to a free surface. Therefore, at the request of the Atomic Energy Commission and with Ed’s guidance, the U.S. Geological Survey designed and conducted two contained chemical explosions at the Nevada test site that provided a calibration scale to predict behavior and effects of the nuclear test made in 1957.

The nuclear test was highly successful; there were no visible fractures on the ground above the explosion, and no radioactivity escaped to the atmosphere. Ed and his USGS co-workers deserve much credit for the painstaking studies that laid the geological groundwork. Since that first test, many hundreds of subsequent underground nuclear explosions have been successfully conducted by the Atomic Energy Commission, and Ed Eckel had a major role in many of them.

In 1958, the United States halted nuclear testing in accordance with a moratorium with the Soviet Union. From 1958 to 1961, the period of the moratorium, Ed returned to his duties as chief of the Engineering Geology Branch. In 1961, when nuclear testing was resumed, Ed was named chief of the Special Projects Branch, newly created to meet the nuclear test requirements of the Atomic Energy Commission and the Department of Defense. Ed directed scores of geologists, geophysicists, and hydrologists working on nuclear investigations during this period. He was responsible for developing a multidisciplinary team approach to earth science problems that was the forerunner of many subsequent successful USGS teams.
ALASKA EARTHQUAKE PROGRAM, by Wallace Hansen. On March 27, 1964, southern Alaska was rocked by one of the greatest earthquakes of all time. President Lyndon B. Johnson declared Alaska a disaster area, and a massive rehabilitation effort was launched by the federal government. Johnson established a blue-ribbon Federal Reconstruction and Development Planning Commission for Alaska, composed chiefly of Cabinet-level officers. Under the commission was a Scientific and Engineering Task Force, with a field team headed by Ed Eckel.

The main charges of the task force were to advise the commission in matters of reconstruction and to recommend needed scientific studies. The field team in turn reported back to the task force, recommended areas and coordinated plans for reconstruction, and established interim zoning and design criteria. Ed's natural diplomacy reaped an abundant harvest of good will, both public and private, toward the program.

Soon after the earthquake, President Johnson asked Donald F. Hornig, his Special Assistant for Science and Technology, to "undertake to assemble a comprehensive scientific and technical account of the Alaskan earthquake and its effects" and in brief, "to enlist the aid of the National Academy of Sciences." Ed was asked to coordinate the ambitious publication effort of the USGS earthquake investigation; the prestigious 8-volume report of the Academy was the ultimate result and, through it, the best documentation of any earthquake in history.

Most of the Survey's contributions to the Academy report were first published separately as a series of Professional Papers, and it was Ed's lot to oversee their preparation. Some 33 papers were published, involving more than 1,150 pages of printed text. Full appreciation of the magnitude of this assignment, however, comes only with the realization that almost 50 authors and co-authors were involved in a high-priority effort—each author fiercely independent and jealous of his prerogatives, in true Survey fashion—to be published by a ponderous USGS publication mill long used to doing things its own way. What began as a trickle of reports soon became a flood.

Ed suffered a serious illness at that time, was hospitalized for surgery, and underwent a long convalescence. He entered the hospital deeply troubled, convinced that he had faltered on a project not yet finished. Ed's conviction was unjustified, of course, but it did reflect his deep sense of moral responsibility.

At the request of Chief Geologist Pecora, I filled in while Ed was recuperating. This job, I quickly learned, involved a lot of phone calls and letter writing, some cajolery, some threats, quite a bit of editing, a little loss of sleep, and complete rewriting of some material—a small sample of the sorts of things Ed had been doing routinely with aplomb for more than a quarter of a century in his varied roles with the Survey. Despite his incapacitation, Ed wrote or co-wrote several chapters dealing with the work of the task force and with various effects of the earthquake on communities, air and water transport, and utilities; he ended the series with the paper Lessons and Conclusions, published six years after the event as USGS Professional Paper 546. In 1971, this paper earned him the coveted E. B. Burwell, Jr., Memorial Award, for outstanding papers in engineering geology, presented by the Geological Society of America.

Ed made extensive recommendations for coping with future earthquakes. Foremost, perhaps, was his conviction of the need for planning and for permanent, at least skeletal, organization. In Ed's words, "the scientific and engineering investigations of the Alaska earthquake were remarkably successful, [but] there was no over-all investigation plan and no real attempt either to coordinate or integrate all the studies." Some of Ed's recommendations have been implemented and others have not, but his thinking clearly helped kindle an awareness of the seriousness of the earthquake threat, of other geologic hazards, and of the need to do something about them.

FROM USGS TO GSA, 1968-1974, by G. D. Robinson. Upon retirement from the U.S. Geological Survey, Ed tackled the job of science editor for GSA, with a staff of editors who had started working for the Society after its headquarters were moved to Boulder in August 1967. The
job involved evaluating manuscripts submitted to GSA and deciding which would be accepted and which rejected. Ed began immediately to cure the problems of the *Bulletin* and the backlog of unpublished manuscripts. He had barely gotten the publication program functioning smoothly when he assumed the additional job of Executive Secretary late in 1970. Ed and I worked over scores of manuscripts—most of them good, a few of them great, and some of them neither. Dealing with the great and good ones was easy enough; the testing of will and character came with the neither.

It was interesting how Ed eased the blow of rejection with words both soothing and sincere; or if the motif was rejection-today-but-try-again-tomorrow, how Ed managed to take the sometimes blunt remarks of reviewers and, with a few deft additions, deletions, and rearrangements, remove the sting while retaining the therapeutic properties of the treatment. To my knowledge he never knowingly accepted a bad paper, though to do so would, on a few occasions, have been the politic course. Bad papers from the great were rejected just as unhesitatingly as those from first contributors, though in distinctly differing terms: with first contributors, often recent graduates offering theses, Ed was the Kindly Uncle; with the great who stumbled, Ed was the Old Buddy, reminding them that you can't win 'em all.

Ed Eckel had a cool, clear eye for his fellow man; he was an accurate judge of character, but he was also the most understanding of men. He was rarely deceived, but he invariably was prepared to give everyone the benefit of all doubt and one more chance.

In 1974, Ed returned to the USGS part time to collaborate on the revised sixth edition of *Suggestions to Authors of the Reports of the United States Geological Survey*. He also served as coordinator for the Survey's Indian Lands program and concomitantly edited innumerable manuscripts for aspiring authors. This work ended in 1984 when his retirement from the Survey became final. Ed's commitment to the Geological Society of America continued until 1982 with publication of Memoir 155, *The Geological Society of America; Life History of a Learned Society*.

Ed belonged to many professional and technical societies and held important offices in several of them. He was a Fellow of the Geological Society of America, and held the following offices: Councilor (1961–1963), chairman of the Engineering Geology Division (1954), chairman of the Committee on Committees (1963), chairman of the Penrose Medal Committee (1962), chairman of the Council Rules Committee (1964), science editor (1968–1970), and executive secretary (1970–1974).

Ed also belonged to the Mineralogical Society of America (Fellow), the Society of Economic Geologists, the Colorado Scientific Society (president, 1950–1951; Honorary Member, 1960), the New Mexico Geological Society (Honorary Life Member, 1947), the Geological Society of Washington, the Highway Research Board of the National Research Council (Department of Soils, Geology and Foundations, three-year term; chairman of the Landslide Committee, 1950–1962). He was an Honorary Fellow of the Geological Society of London and a member of the American Association for the Advancement of Science, the Association of Engineering Geologists (president, 1964–1965), and the Association of Earth Science Editors (Honorary Member, 1972; Editor of the Year, 1973). He also belonged to Sigma Xi, Phi Kappa Phi, and Alpha Chi Sigma.

Ed received many honors and awards during his career, including the following: the USGS Superior Accomplishment Award (1944 and 1946), the University of Arizona Medallion of Merit (1960), GSA's E. B. Burwell, Jr., Award (1971), the Distinguished Practice Award from the Engineering Geology Division of GSA, and the Certificate of Distinguished Service from the Colorado Engineering Council (1974).

The award that perhaps best summarizes Ed's accomplishments and stature as a geologist is the 1965 Distinguished Service Award from the U.S. Department of the Interior, the department's highest honor to an employee. This award states in part,
his... distinctive contributions to science and administrative work, particularly through coordination and integration of several disciplines, have made him an international leader in the field of engineering geology. . . . He has shared his broad knowledge of engineering geology as guest lecturer while participating in a program for providing outstanding visiting geoscientists to universities. He welded together the contributions of practical and theoretical specialists in geology and engineering with the publication of *Landslides in Engineering Practice*. His insight into applied geology led him to undertake and bring to a conclusion the rigorous task of coordinating the disciplines of geology, geophysics, and hydrology and bringing them to bear on problems associated with the Survey's program of underground testing of nuclear devices for the Atomic Energy Commission.

Ed Eckel's bibliography contains more than eighty entries. Although Ed was affectionately known among friends as "Mr. Engineering Geology" for most of his professional life, the following sample of a few key titles highlights something of the breadth of his eclectic interests.

**SELECTED BIBLIOGRAPHY OF E. B. ECKEL**


1939 Geology of damsites on the Green and Yampa Rivers, Utah and Colorado, for the Bureau of Reclamation.


