Memorial to William Thomas Pecora
1913-1972

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Bill Pecora—successively U.S. Geological Survey research geologist, Chief of the Branch of Geochemistry and Petrology, Chief Geologist, Director, and finally Under Secretary of the Interior—died on July 19, 1972. He had undergone surgery for diverticulitis—an intestinal disorder that nearly took his life in 1959. Surviving the initial attack was fortunate indeed, for his contributions during his later years as a scientist-statesman were of great significance to geologic science, to the Geological Survey, to many other public institutions, and to the country.

Bill was born in Belleville, New Jersey, on February 1, 1913, to Cono and Anna Amabile Pecora, the ninth of their ten children. He attended Barringer High School in Newark and remembered his days there with appreciation—so much so that his wife has established an annual award there to be supported by the William T. Pecora Educational Fund. He won the Charles K. Halsey scholarship which enabled him to attend Princeton, where he graduated with honors in geology in 1933. While distinguishing himself as a scholar, he also developed as an athlete. He became intercollegiate Fencing Champion in 1933 and a member of the U.S. Olympic fencing team in 1936. He completed his training at Harvard (where he was Austin Fellow in 1936 and Woodworth Fellow in 1940) and received his doctorate there in 1940, a year after he joined the U.S. Geological Survey.

These few biographical mileposts would be enough to indicate to a stranger that some of Bill's talents were recognized at an early age. But beyond recognition of mere promise, I think most of his teachers and college day friends would testify to full awareness that Bill Pecora had the potential for greatness. Not only was he exceptionally intelligent, but he had other distinguishing gifts—highly articulate and forceful speech; the ability to convulse people with laughter with word, song, or dance; determination, boundless energy and drive; and deeply perceptive judgment. He had a friendly, genuine interest in other people regardless of their station in life. The loyalty his deep personal interest engendered was reciprocal and lifelong and was part of the foundation of his leadership and influence.

Bill was one of a score or so of young geologists recruited by D. Foster Hewett as the clouds of World War II were forming. Hewett's deep foresight led him to recognize in the late thirties the accelerating need for minerals that would soon face the nation, and he was successful in obtaining authorization to begin a Strategic Minerals Program to help set the stage for expanded mineral production. I joined this group in January 1941 and met Bill in a day or two, after moving into the rooming house on G Street

where many of the young geologists stayed while in Washington. What an experience that was! Imagine the life in discussions at work and play in a group composed of Bill Pecora, Wally Cady, Dave Gallagher, Ralph Roberts, Don White, and Warren Hobbs. Bill's capabilities as a geologist were matched by others in that group, but his outstanding qualities of leadership were evident to all.

Bill's assignments over the next several years gave him a broad range of field experience. They included studies of nickel deposits in Alaska, Oregon, and Nevada; and of nickel and pegmatite deposits in Brazil, Venezuela, and Colombia. His work during that period led to the discovery of nine new minerals and to an enlarged understanding of the origin and occurrence of lateritic nickel deposits. He was later honored by his colleagues for his research on nickel when they named a new mineral after him—pecoraite ($Ni_6Si_4O_{10}(OH)_8$), a nickel clinochrysotile. Bill's work in Brazil from 1943 to 1946 contributed not only to expanded mineral production but also to the Brazilian geological community, which paid him tribute in 1967 by electing him a Foreign Member of the Brazilian Academy of Sciences. His rapport with Brazilian counterparts came not only from his friendly, outgoing personality and his interest in their problems, but from his linguistic capability, for he quickly achieved fluency in Portuguese.

In the spring of 1947, Bill met and married Ethelwyn Elizabeth Carter, a lively Kentucky girl then on the staff of the Bureau of American Ethnology. Their honeymoon—not unlike that of many other geologists—consisted of a field season in the Bearpaw Mountains of Montana, where Bill resumed a study of alkalic rocks begun while he was a graduate student at Harvard. Wyn missed a few field seasons because of the birth of their children—William Carter and Ann—but the field was as much a pleasure to the Pecora family as it was to Bill himself.

During the next ten years, Bill led a field party in the geologic mapping of eight 15-minute quadrangles and in petrologic studies of the Bearpaw alkalics and associated mineral deposits. His research illuminated the carbonatite problem and led to a review of world carbonatites that did much to synthesize understanding of their origin and mode of occurrence. Equally notable in his work during this period—and in his service as Chief of the Geochemistry and Petrology Branch from 1957 to 1961—was his contribution to the training and career development of younger associates, many of whom are themselves now distinguished scientists. A related effort was Bill's service as Chairman of the U.S. Civil Service Commission Board of Examiners in Geology from 1947 to 1967—a task he pursued in the broader context of the development of education and training in the geological sciences.

Significant among Bill's contributions as a scientist were those he made to the development of geologic thought, acting as a catalyst in discussion and as friendly critic and adviser to associates. With his good friend, W. W. Rubey, who during the late fifties hosted frequent evening discussion groups in his home, he played an active role in the Washington scientific community in probing deeply into a wide range of geologic and geochemical problems. His incisive analyses of complex problems aided in the development and testing of many hypotheses and have been acknowledged with gratitude by many of his associates. Bill became a generalist, not in the sense of knowing a little about a lot of things but in the sense of being able to understand and to probe deeply into virtually any problem brought to his attention.

Never to be forgotten in this period were Bill's performances in the annual plays of the Washington Pick and Hammer Club and his impromptu renditions in song and dance on many social occasions. It would be trite to say he was often the life of the party, but to say he put warmth, life, and lightheartedness into a gathering–even a scientific meeting–is descriptively accurate.

For a time after the first attack of diverticulitis in 1959, it appeared that Bill would not be able to carry arduous duties, but with characteristic courage, determination, and self-control he soon learned to live with and rise above his affliction. In 1964 he was made Chief Geologist and a year later became the eighth Director of the Geological Survey by presidential appointment. Outstanding as were his achievements as a scientist–recognized by his election to the National Academy of Sciences and the American Academy of Arts and Sciences in 1965–it was in his position as Director of the Survey and later Under Secretary of the Interior that his full and broad potential as a scientist-leader-statesman was realized.

His contributions in those capacities were diverse. In directing the work of the Geological Survey, he was aggressive in developing programs responsive to national needs. For example, he obtained authorization to begin accelerated investigations of gold and other heavy metals to augment domestic supplies. He took the lead in developing the Earth Resources Observation Systems (EROS) program, utilizing remote sensing from satellites and high-altitude aircraft to acquire data about the earth and its resources–a program now yielding remarkable results in the form of repetitive, synoptic imagery from the Earth Resources Technology Satellite I, launched July 23, 1972. What a pity that he could not have lived to see the fruits of his labors toward the development of this capability.

After the Santa Barbara oil spill in 1969, he organized and led the work necessary to revise offshore regulations and obtain the support required for their enforcement. He played an important role in the organization of the work on the National Atlas and initiated the follow-on Geographic Applications Program. He was largely responsible for the establishment of the Survey's National Center for Earthquake Research and for the initial acceleration of the Survey's research on earthquake hazards reduction.

In these and other normal functions of his office, Bill led the Survey with distinction, but his contributions spread to many other areas. As Secretary Hickel became acquainted with Bill's capacities in the months following the Santa Barbara spill, he came to draw on Bill's advice on a wide range of departmental problems. Because of the respect Bill gained in such activities he was able to convince Secretary Hickel of the need to cope with permafrost and other environmental problems before issuing the permit to build the Trans-Alaskan hot oil pipeline. Secretary Morton, who brought about Bill's appointment as Under Secretary in 1971, also relied on his judgment on the difficult resources and environmental problems that face the nation. In his eulogy to Bill at the memorial service at St. Patrick's Episcopal Church, Secretary Morton said, "I turned increasingly to him for guidance on complex matters–some of which touched the very chords of our national life."

Bill's public service extended to countless other institutions and activities beyond the Department of the Interior. He testified at numerous Congressional hearings, where he often played the role of educator on complex scientific and technical problems. He

served on advisory committees to Harvard, Princeton, Rutgers, California Institute of of Technology, George Washington, and Stanford, as well as on advisory committees to the National Science Foundation and the Smithsonian Institution and on intergovernmental committees too numerous to mention.

Many scientific societies also benefited from Bill's participation. He served as President of the Geological Society of Washington, councilor of The Geological Society of of America, President of the Cosmos Club of Washington, D.C., and councilor of the Mineralogical Society of America. He was a member of the Geochemical Society, American Association of Petroleum Geologists, American Institute of Professional Geologists, the Washington Academy of Sciences, the Mining and Metallurgical Society of America, the Society of Economic Geologists, and the American Philosophical Society.

Perhaps his greatest service was in his articulation and communication to the public of perceptive observations about resources, the environment, and science. The following quotations are illustrative:

> Before we sound the note of despair about the limits of our national resources, we must be sure we have reached the limit of the basic resource, man's intellectual capacity. Discovery of natural resources needed by man will require new research techniques, new scientific instruments, and a great deal more information about the earth beneath us. The pace must be accelerated, and no part of the earth can be overlooked. When we say there is no more to be learned, perhaps we can say there is no more to be had. Then we are dead. (Searching out resource limits–1968)

> Somewhere between the attitudes of unconcerned development and total preservation, there must be an acceptable point of balance–one where the ledger records the cost of environmental sacrifices, as well as operations cost–one which permits judicious alteration of the environment where there appears to be net gain. This point of balance cannot be set by legislation. It must be located and kept in focus by continuing dialogue between those concerned primarily with supplying material needs and those concerned with maintaining pleasant surroundings. All of us must encourage and participate in this dialogue if environmental harmony is to be achieved. Above all, we must think things through and not fall prey to slogans or headlines. (Commencement address at Texas Tech–1971)

> I cannot overemphasize the importance of accelerating and expanding research directed toward extension of our domestic energy supplies. All of the solutions we see–identification of new sources, development of technology to permit the use of resources not new economic, abatement of pollution from fuel combustion and power manufacture, and modification and conversion of energy to forms more acceptable for use–all these depend on the successful advance of research and technologic development. (To Subcommittee on Science Research and Development of the House Science and Astronautic Committee–May 10, 1972)

Fortunately Bill Pecora was honored during his lifetime. In addition to the honors already mentioned, he received the Department of the Interior Distinguished Service Award in 1968, the Rockefeller Public Service Award in 1969, an Honorary Doctor of Science degree from Franklin and Marshall College in 1969, an Honorary Doctor of Engineering degree from the Colorado School of Mines in 1970, and the American Association of Petroleum Geologists Public Service Award in 1972. The Pecora Escarpment in Antarctica, Pecora Ridge in the Bearpaw Mountains of Montana, and a street

in Sioux Falls, South Dakota–Pecora Way–were named in his honor. Posthumously, the National Aeronautical Sciences Administration gave him its Distinguished Service Medal for his leadership in earth resource satellite surveys.

In concluding my own eulogy to him, I said, "The nation will honor Bill for his accomplishments as a scientist and a great leader. We, his friends, give thanks for his presence in our lives and for his lasting gifts to each of us." Bill Pecora did indeed give richly of his talents to his friends and associates, to geologic science, and to the public service.

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