Memorial to Nathan Wood Bass
1893–1979

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Nathan Wood Bass died at the age of 86, September 11, 1979, in Denver, Colorado, after a lengthy illness. He was born June 8, 1893, at Fort Scott, Kansas, the son of Mary Hughes and Nathan Woodford Bass. Wood was the seventh and last member of the Bass family to bear the name Nathan Woodford. Like his father, he opted to delete the “ford” and to be known as Nathan Wood Bass, or preferably, Wood Bass.

Wood is survived by Agnes, his wife of 37 years, and his two daughters: Betty Bass, who is continuing her postgraduate studies, this time as a law student at George Washington University in Washington, D.C.; and Carol Bass, who is employed as Research Environmental Engineer for the Naval Facilities Engineering Command at Alexandria, Virginia.

During summer vacations from grammar and high schools, Wood worked on his uncle’s farm, where he learned a lot about horses, of which he was very fond, and about the handling and maintenance of Model T Fords—training that was to prove invaluable to him later. His love of the out-of-doors and interest in rock outcrops were the principal factors in his decision to study geology at Kansas State University, from which he received a B.S. degree in geology in 1917.

His summer vacations were spent working in the Fort Scott yards, roundhouse, and office of the Chicago, Rock Island and Pacific Railroad. His proficiency in all assigned duties attracted the attention of a visiting official from the head office, who urged Wood to stay with the railroad because he believed that Wood had the potential to ultimately become a top executive of the company. Fortunately for the science of geology, Wood elected to complete his geologic education.

After joining the U.S. Geological Survey in 1917, Wood took time to earn an M.S. degree in geology from George Washington University in 1922, and he did additional graduate work in geology at the University of Wisconsin in 1927.

Wood’s application to the U.S. Geological Survey for employment contained adequate geologic qualifications, but possibly as an afterthought, he stated that he was able to maintain and repair Model T Fords, adding that at least two spare rear axles should be carried at all times. That this valuable trait tipped the scale in his favor is not known for sure, but at any rate he was hired by the Survey in 1917 for classification of public lands in the Rocky Mountain States, beginning in northwestern Colorado.

Although Wood’s natural ability would have carried him far in his chosen profession, he had the exceedingly good fortune to begin his career under the successive supervision of several “giants” of the Survey. His first supervisor was Walter C. Mendenhall, then chief of the Survey’s Land Classification Board, which later became the Conservation Branch, then Division. Mr. Mendenhall, who in 1931 became the fifth Director of the Survey, was a lifelong friend and mentor of Wood Bass.
Wood’s first assignment was to travel by train to Denver, Colorado, pick up a Model T Ford, and drive it over two treacherous mountain passes to his party chief in northwestern Colorado, to assist in classifying the suitability of public lands for various agricultural uses. The steep grades and summer heat caused the car to boil profusely, requiring so many stops for hard-to-find water that it took him two long days to reach his destination. After the first exhausting day, Wood sought food and shelter at a remote ranch house long after the dinner hour. The rancher gladly put him up for the night, but his wife apologized that she had no food left but a large crock of cottage cheese. This saved him from starvation, but Wood hated the stuff the rest of his life.

Thus began Wood’s distinguished professional career that was to span a period of 60 years, mostly with the Geological Survey but partly for private companies or as a consultant.

Although personnel of the Land Classification Board and the Geologic Branch (later Division) were lent back and forth, it is thought that Wood’s first assignments to the Geologic Branch were during the summers of 1921 and 1922 as field assistant to Raymond C. Moore, mapping geology in the remote Kaiparowits region of southern Utah. Wood traveled by train from Washington to Salt Lake City, and thence by a branch line of the Denver and Rio Grande Western Railroad to its southern terminus at Marysvale, Utah. He then traveled by motor stage southward to Panguitch, where he hired a man to drive him by horse and buckboard eastward through rugged wilderness country to Moore’s field camp. Wood’s first expense voucher included a modest claim for the trip by horse and buckboard, which was promptly disallowed by someone in the Section of Accounts in Washington, with the terse admonition: “You should have taken a streetcar!”

In 1924 the Kansas State Geological Survey began cooperative investigations of the oil and gas possibilities of selected areas with the Mineral Fuels Section of the Federal Survey, and Wood was assigned to the project, the first phase of which covered the years 1924 through 1926. That Wood was not only a hard worker but also a fast yet accurate worker is evident from his prodigious accomplishments during the field season of 1924, the results of which were published in Kansas State Geological Survey Bulletins 10 and 11. After the important discovery of oil in Russell County in 1923, which was more than 100 miles west of other Kansas oil fields, in March through June of 1924 William W. Rubey and Wood mapped the geology of Russell County (Bulletin 10); the remainder of the summer’s work by Wood alone was published in Bulletin 11. From July 9 to mid-August Wood mapped the geology of Ellis County, and during a few weeks in August and September he mapped the geology of Hamilton County. The geologic structure of the Dakota sandstone beneath western Kansas was studied and plotted during 3 weeks in October and November, and an isopach map of the salt beds beneath western Kansas was compiled in the office during the winter of 1924/25.

The field work in central and western Kansas resulted in the naming of seven members of Cretaceous formations, most of which were adopted by later workers in Kansas and eastern Colorado, and some of which were used also in New Mexico and Wyoming. Rubey and Bass named the Jetmore chalk and the Fairport chalky shale members of the Greenhorn limestone. Bass alone named, in ascending order, the Thatcher limestone member of the Graneros shale; the Bridge Creek limestone, Hartland shale, and Pfeifer shale members of the Greenhorn; and the Codell sandstone member of the Carlile shale. The Codell and its equivalents later became important oil producers in parts of eastern Colorado and southeastern Wyoming.

Wood spent the field seasons of 1925 and 1926 mainly on a detailed study of the geology of Cowley County, Kansas, the results of which were published in Kansas State
Geological Survey Bulletin 12, but he spent some time in 1925 assisting Marius R. Campbell in mapping coal resources in northwestern Colorado. In Bulletin 12, and in seven subsequent reports of the State and Federal Surveys and in journal articles, Wood made an important contribution to the science of geology—the recognition and delineation of the shoestring sands beneath Cowley County and nearby counties in Kansas and Oklahoma—notably in Greenwood and Butler Counties, Kansas, and in Osage County, Oklahoma. These sands, many of which were prolific bearers of high-grade oil, occur at depths of about 2,000 feet in the Pennsylvianian Cherokee shale. Thus Wood was among the first to develop the theory of accumulation of oil and gas in stratigraphic as well as structural traps.

In 1927 Wood left the cooperative program in Kansas and spent the field seasons of 1927 and 1928 mapping the Ashland coal field in southeastern Montana, assisted by, among others, Charles B. Hunt, an undergraduate from Colgate University. Charlie described himself as the greenest rookie ever, who had never ridden a horse and didn’t know the difference between a stadia rod and an alidade. As mentioned earlier, Wood worked hard in the field, and he expected the same dedication from his assistants, but Charlie found the work challenging, won his spurs the first year, and so was invited back for the second season. Charlie and all the later able assistants of Wood Bass have been eternally grateful for the excellent training they received from Wood. Years later, Wood introduced Charlie at a meeting as the lad who had to be taught on which end of the horse to fasten the bridle, and Charlie admits, “He was so right!”

Charlie recalls that to speed up the work, Wood used to prod his horse into a brisk trot with the tips of the tripod, which he carried on his shoulder, until one day when the horse turned around and kicked the offending tripod off a high ledge. Wood, who had a keen sense of humor and enjoyed a good joke whether it was on him or others, laughed long and hard and enjoyed telling this story on himself; however, he eased up on the prodding.

In 1928 Hugh D. Miser became chief of the then Mineral Fuels Section of the Geologic Branch, which later became the Fuels Branch of the Geologic Division. As Wood Bass had been working on mineral fuels for most of his career, he thus came under the supervision of Miser, and later also of Miser’s deputy, Arthur A. (Art) Baker, who in 1953 became Administrative Geologist and in 1957 Associate Director of the Survey. Like Mendenahll before them, these two talented geologists and administrators had a profound and lasting influence on Wood.

In 1929 Wood resigned from the Survey to become district geologist in Kansas for the Pure Oil Company, under chief geologist Ira H. Cram. Wood asked Charlie Hunt to join him as his assistant, but Charlie decided to remain with the Survey. When Ira Cram was asked recently about Wood’s performance for Pure Oil, Cram said simply, “Wood was a helluva good geologist.”

In 1931 Wood left the Pure Oil Company, returned to the Survey, and resumed work on the cooperative program with the Kansas State Geological Survey. This time he headquartered in Wichita, where the major oil companies had their district offices. Among other things, he prepared a detailed report on the origin of shoestring sands in Greenwood and Butler Counties, Kansas, which was published as Kansas State Geological Survey Bulletin 23.

Sometime after Wood left the cooperative program for work in Oklahoma, he was replaced by Wallace Lee, another member of the Mineral Fuels Section. In corresponding with Wood he had trouble remember Bass’s first two initials, until the day he hit upon a foolproof solution. “Why, of course,” he said to me, “N. W. is the abbreviation for northwest.” After that, Wood received letters and cards addressed to S. E. Bass, S. W.
Bass, N. E. Bass, and sometimes, N. W. Bass. Wood always had a good chuckle over this, for he thought highly of Wallace.

From 1934 to 1937, Wood was assigned to head up the mapping of the subsurface geology of the Osage Indian Reservation as an aid to oil and gas leasing procedures. This included all of Osage County, Oklahoma, except the urban areas, and Wood established his office in Tulsa where most of the oil companies had offices. This major undertaking was jointly supported by the Survey and the Public Works Administration (P.W.A.), which supplied funds during those depression years for hiring many unemployed but competent geologists to assist Wood. The results, published in U.S. Geological Survey Bulletin 900, included a summary of the entire county by Wood and 11 chapters covering groups of promising townships, for most of which Wood was the principal author or coauthor. Records of 17,000 wells were studied as an important part of the project. In a recent letter to me, Art Baker said, "He [Wood] did a magnificent job of organizing and managing the project and getting out the results. He established a reputation for working with the staff assigned to the project, with the officials of the Indian Agency, and with representatives of the petroleum industry. From then on he was recognized as an authority in subsurface work." Wood's report aided materially in the discovery of many additional oil and gas fields on the Osage Indian Reservation, from which the Tribe derived considerable revenue.

At the onset of World War II, according to Art Baker, Wood's performance in Osage County led to his assignment from 1941 to 1943 to a study on behalf of the U.S. Bureau of Mines of the geology of the helium-bearing fields in the western states to serve as a basis for evaluating the country's helium resources. During the first phase of this study—preparation of a structure contour map of the surface rocks of the helium-bearing Model anticline in Las Animas County, southeastern Colorado—Wood and Agnes Rodick of Washington, D.C., were married in La Junta, Colorado, on July 23, 1942. After completion of the project in Las Animas County, the field work and the honeymoon were continued in the Four Corners area of Colorado, New Mexico, Arizona, and Utah. Bass collaborated with the Bureau of Mines in obtaining greatly increased production from existing helium wells by treating them with an acidizing process. As a result of his work on these and other projects, including a test drilling program, Wood became the Survey's commodity expert on helium gas.

In 1943 the Basses moved to Denver, Colorado, where Wood opened a new Survey office from which he supervised and conducted regional mineral-fuel investigations for Colorado, Kansas, Oklahoma, and Utah. He assembled and trained a large and competent staff for a wide variety of studies, which included a renewed effort to evaluate the oil-shale and tar-sand resources in Colorado and Utah, mapping the surface and subsurface geology of the Rangely oil field in northwestern Colorado, and work on several coal projects in Colorado.

In addition to his own projects and the supervision of many others, Wood found time to prepare a report on the geology and mineral fuels of four quadrangles in parts of Routt and Moffat Counties, Colorado, which synthesized the work of 13 geologists spanning parts of 43 years, on which Wood had participated in 1925, 1937, and 1940. The large amount of good work thus salvaged was published in 1955 as Survey Bulletin 1027-D.

Undoubtedly the most enjoyable part of Wood's career was in the late 1940s and early 1950s when he headed a packhorse field party engaged in mapping the geology of the old 15-minute Glenwood Springs quadrangle. This included most of the towering White River uplift, the resort city of Glenwood Springs and its famous hot springs, and spectacular Glenwood Canyon of the Colorado River, which cuts through the southern
part of the uplift. In the absence of modern topographic maps, the geology was mapped on aerial photographs and by planetable and alidade, and printed in four parts at a scale of 1:31,680. The results were published in Survey Bulletin 1142-J. Wood and co-author S. A. Northrup, who collected and determined the Paleozoic fossils, named, in ascending order, the Glenwood Canyon and Clinetop algal limestone members of the Cambrian Dotsero Formation, the Dead Horse Conglomerate and Tie Gulch Dolomite Members of the Ordovician Manitou Formation, and the South Canyon Creek Member of the Permian Maroon Formation, and these units have been used by all later workers.

One windy day when Frank Spencer was assisting Wood in measuring a section of the Mesaverde Formation by manning the planetable, and trying to keep up with an impatient and sometimes vociferous Wood Bass, who was handling the rod about 200 yards downwind, Frank muttered quietly to himself, or so he thought, "Grouchy old son-of-a-bitch." That evening at dinner, Wood, with a twinkle in his eye, remarked, "Frank, I resent being called old."

I can back up Frank Spencer's predicament in referring to Wood as being old. For many years a group of us, including Wood, had lunch together at various restaurants near the Denver Federal Center. At one of these luncheons I introduced Wood to a friend, adding that Wood had joined the Survey way back in 1917. I intended this as a compliment, for although Wood was about 80 years old at the time, he looked and acted at least 20 years younger and was sharp as a tack. When we returned to the office, however, Wood took me aside and said kindly, "Stan, I'd greatly appreciate it if you wouldn't mention how long ago I joined the Survey."

We took turns driving to and from these luncheons, and one day when it was my turn I looked forward to showing off my brand new Chevy to the gang. When I dropped by Wood's office enroute to the parking lot, however, he insisted on driving. All my protests fell on deaf ears, so I finally gave in, only to learn on reaching the parking lot that he wanted to show off his brand new Buick. Outfoxed again!

As a very useful byproduct of his work in Glenwood Canyon, Wood erected, near the head of the canyon, poles with flags of yellow or white bunting at the contacts between Cambrian, Ordovician, Devonian, and Mississippian formations. These were especially helpful later during field trips led by Wood or some of the rest of us, and were kept up for many years. Each time I drove through the Canyon I checked their condition and later reported to Wood, and I'm sure others did the same. On his next trip, Wood made suitable repairs or replacements from materials he always carried in the trunk of his car.

Upon his optional "retirement" from the Survey in 1957, Wood Bass was awarded a gold medal and certificate for distinguished service—the highest honor that may be bestowed upon an employee of the U.S. Department of the Interior. He was cited for being an internationally recognized petroleum geologist and for his many fundamental contributions and publications.

After his "retirement" in 1957, Wood began an arrangement with the Carter Oil Company whereby he would spend about half of each year measuring designated stratigraphic sections in areas where he was a recognized expert, which included much of the Rocky Mountain region; he would then be free to act as a consulting geologist during the rest of each year.

While working for Carter in 1958, Wood and his field assistant, John Bredehoeft, got caught in a downpour about 20 miles north of the small town of Blue Mountain in northwestern Colorado. As the country road was on the Mancos Shale, their car naturally got hopelessly stuck in the mud, and after all attempts to free it failed, they began the long walk back to town. After they had covered about 2 miles, who should
come along in a four-wheel drive vehicle but Darsie A. Green, an old associate of Wood's when both worked for the Pure Oil Company. After a gleeful and thankful reunion, Darsie drove them back to the stuck car, pulled it out, and Wood and John made it safely back to town.

By 1961 the Conservation Division of the U.S. Geological Survey greatly expanded its mineral classification program for the leasable minerals on federal lands. The staff was increased by some 30 geologists, half of whom were transferred from the Geologic Division, and the other half were recruited. The most valuable addition to the staff was Wood Bass, who agreed to return to the Survey as a rehired annuitant. Wood was assigned the responsibility of reviewing all mineral classification actions in the Central Region, which included the Rocky Mountain area in which Wood had worked off and on during the preceding 44 years. In 1963 he also salvaged another project from limbo by field checking the maps and notes of Robert P. Bryson on the Moorhead coal field in Powder River, Big Horn, and Rosebud Counties, Montana. After making needed corrections, Wood wrote the report, modestly listing himself as junior author, which was published in 1973 as Survey Bulletin 1338. Wood, H. L. Smith, and G. H. Horn also prepared a report on standards for the classification of public coal lands, which was published in 1970 as Survey Circular 633, and which greatly facilitated the remainder of the program.

During this third tour of duty with the Survey, Wood took a temporary leave of absence in the latter half of 1965 and early part of 1966 to serve as chairman of the Institute of Petroleum Research and Geophysics of the government of Israel, in the hope of discovering petroleum in that country. Wood, his wife Agnes, and daughters Betty and Carol sailed for England on the Queen Mary, and after an automobile tour of Europe, he reported for duty at Tel Aviv. Betty and Carol returned to Colorado in September 1965 to resume their schooling. Like others before him, Wood failed to find oil, however, so after an automobile trip through Spain and a peek at North Africa, Wood and his wife returned to Colorado early in 1966, and Wood resumed his Survey work on mineral classification with renewed vigor. Because of failing health, he retired from the Survey in 1977.

During his 36 years in Colorado, Wood showed abilities that extended far beyond the field of geology. In addition to his Survey work and playing the stock market, Wood designed and served as general contractor for two successive homes in the Montclair district of east Denver, a small but deluxe combined home and motel in Fort Collins, Colorado, and finally the house presently occupied by his widow in Wheat Ridge, Colorado. The Montclair Lodge in Fort Collins contained 19 deluxe rooms and 9 used house trailers on an adjoining back lot, which were rented mainly to married students of nearby Colorado State University. Partly during but mostly after construction of the motel, Wood rented a small apartment in Denver to be nearer his office, while Agnes ran the motel very capably, but he drove back and forth between Denver and Fort Collins on weekends and usually also during the middle of the week. The motel was sold before the family moved into the new home in Wheat Ridge.

Wood was a very fast but expert driver who drove back and forth on Interstate Highway 1-25 at speeds of 80 to 90 miles an hour, when the speed limit was still 70. Luckily he avoided accidents but collected enough speeding tickets that near each year's end he generally had to slow down for brief periods to avoid losing his driver's license. On one drive to Denver he was towing a small 2-wheel trailer containing a davenport that was to be repaired at a Denver shop. All went well, he said, until he glanced at the rear-view mirror and was shocked to find that the davenport was missing. I asked, "Gosh, how far did you have to drive to find a cloverleaf in order to head back north?" He
replied, "Hell, I didn't wait for a cloverleaf. I was afraid somebody might steal my
davenport so I simply made a quick U-turn and drove back north in the southbound
lane." When I asked if he had any trouble swimming upstream against all that traffic, he
said, "Oh, they glared and honked at me, but I missed 'em all and finally spotted my
davenport lying safely in the grass on the west shoulder of the highway. I made another
U-turn and had just finished reloading the davenport when a State Patrol officer stopped
and asked if I needed help. I said, 'No thanks, officer, I was just readjusting the load and
tightening the ropes.' "

Wood was also active in the scientific community. He was president and honorary
member of the Kansas Geological Society and the Rocky Mountain Association of
Geologists, vice-president and honorary member of the Tulsa Geological Society,
honorary member of the American Association of Petroleum Geologists and of the
Colorado Scientific Society, a Fellow of the Geological Society of America and chairman
of the Rocky Mountain Section of the Society, and a member of the American Institute
of Professional Geologists.

Wood was instrumental in effecting an exchange of ideas from various segments of
the geologic profession through the successive initiations of geologic study groups in
Wichita, Tulsa, and Denver. The first meeting of the Denver study club, which later
became known as The Geolly Boys, was held the evening of January 16, 1951, at Wood's
first home in east Denver, and was attended by 13 charter members, of which I was lucky
enough to be included. The meetings were held at each other's homes biweekly from
September through May for many years, then were held monthly. The membership
gradually increased from 13 to 20 or 25, and new members were elected from time to time
to replace those who had died or moved away. The group, which included representatives
of the petroleum industry, private consultants, the Geological Survey, and academe,
discussed a wide variety of geologic problems. Beer and snacks supplied by each host
provided the stimulating energy necessary for the discussions. We often agreed that the
great success of the outfit resulted in large part because Wood decreed that we would
have no constitution, no bylaws, no officers, no dues, no written rules, and very few
unwritten ones. The 20th anniversary party of The Geolly Boys and wives, held the
evening of February 12, 1971, was highlighted by the presentation of an engraved sterling
silver ice bucket to founder Wood Bass, but the 30th anniversary party held on February
21, 1981, was saddened by his absence.

All of Wood Bass's nonbusiness activities were centered around his family. Although
his two girls were born rather late in his life, he had the patience and forbearance that are
usually those of a much younger father. The family had an ideal life during the girl's early
years—semiroughing it on ranches near Glenwood Springs during the summer while
Wood was mapping in the area and returning to the conveniences of city life in Denver
during the winter. A pony pastured beside the first house built in east Denver provided a
welcome tie between their summer and winter life styles, for horses were always available
at the ranches. A heated controversy that generated between Wood and the city over the
pasturing of the pony in an urban area received pictorial coverage on the front page of a
Denver paper. Wood regretfully threw in the towel only after being told by the zoning
board that stables in his residential area had to be constructed of brick.

Wood also refurbished an old miner's cabin along South Boulder Creek, about 50
highway miles northwest of Denver, as a weekend mountain retreat for his family and
friends.

Jack Harrison, a former president of the Colorado Scientific Society, said when
confering honorary membership upon Wood, "Not every scientist is a good scientific
administrator, but Wood Bass has proved his capability in the administrative field also.
More than one USGS geologist has found himself defended mightily to the Washington "Brass" one day, for things he did, then booted in the rear the next, for other things he should have done. The scientific products of the groups that Wood has supervised attest to his accuracy in judgment."

Wood Bass was loved and admired by family and friends alike and is highly respected for his many and fundamental contributions to the science of geology. All who knew him were well aware of his towering mentality, colorful personality, highly developed and sometimes biting wit, and his deep love of life and humanity.

ACKNOWLEDGMENTS

This memorial would not have been possible without the effective help from Wood's widow, Agnes; from John R. Donnell, George H. Horn, and Paul Averitt, authors of the fine memorial to Wood published in the July 1980 Bulletin of the American Association of Petroleum Geologists, from which I have drawn freely; from Flora K. Walker, Wood's long-time secretary and geologic assistant and coauthor, who also typed the manuscript for this memorial; and from a host of colleagues and former supervisors and assistants. Their help in gratefully acknowledged.

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