

Memorial to Allen H. Nicol

1907-1986

DAVID B. DOAN

5635 Bent Branch Road, Bethesda, Maryland

Allen Hankins Nicol, an engineering geologist who consulted on major projects in both hemispheres, died the evening of his seventy-ninth birthday on January 22, 1986, after a long battle with the consequences of a crippling stroke suffered in 1973.

An accomplished field geologist with experience in locales from the tropics to the high Arctic, Al Nicol was an expert at organizing raw, unstructured geological information into highly refined forms that had immediate value to engineers as the underpinning for design and construction of major military and civil works. Much of this expertise arose from his unusually detailed understanding of mineralogy, such that petrography, petrology, and alteration characteristics of rocks—almost any rocks—were readily perceivable to him, in physical terms and in terms of engineering consequences. His earliest research involved pioneering work in alkali-aggregate reactions in concrete. He had a gift for orderliness in scientific presentation that hinged on well-crafted sentences commonly as finely engineered as the geological evaluations he produced.



Allen Nicol graduated from Stanford University with a B.Sc. in geology. He was a founder and first president of the San Diego Mineral Society in 1934, and a founder and first vice president of the Sacramento Mineral Society in 1935. He was a Fellow of the Geological Society of America, a certified gemologist, and a member of the American Society of Civil Engineers, the Society of American Military Engineers, and the Geological Society of Washington. He was listed in *Who's Who in the South and Southwest* and in *American Men of Science*. At retirement he was vice-president of The Earth Sciences Group, Incorporated, of Washington, D.C., a mineral exploration company. He is survived by his wife, Dr. Helen O. Nicol of Washington, D.C.; and a daughter from a previous marriage, Mrs. Barbara Laver of San Jose, California; her children and grandchildren; as well as a son, Alan, and a daughter, Judy, from the former marriage.

Al was born in Spokane, Washington, in 1907, the son of Alexander and Lou Hankins Nicol. As a professional engineer, the elder Nicol moved from project to project. The family soon left Spokane for San Diego where young Allen grew up, playing high-school football, hiking, and collecting minerals. After two years at the University of California at Los Angeles, he switched to Stanford, graduating in 1930 at the start of the Depression.

Jobs were scarce, and Al found himself teaching high school chemistry and physics, but that was not what he wanted. A year later he entered graduate school at the University of Michigan but ran out of money and was forced to leave school a month or so shy of his master's degree in 1932. These were the days when future exploration managers and oil-company presidents, fresh out of college, were starting work as janitors and broom-pushers.

Al returned to California and, after a series of odd jobs that he later referred to as the "true depressing part of the Depression," he landed a position as curator of mineralogy at the San Diego Museum of Natural History. As one of his duties he taught a class in mineralogy that gave rise

the organization in 1934 of the San Diego Mineral Society, of which he was elected the first president. At the same time he fielded inquiries from the State of California on certain mineral and geological problems involved in the engineering of new highways through difficult terrain, of which California has plenty. His response to these inquiries was so helpful that in mid-1935 he accepted a "dream job" (for those days) and went to work for the California State Division of Highways in Sacramento. He said later that for the first time he could marshal all of his geology on a daily basis for a steady paycheck.

His work with first-class civil engineers on difficult problems became the foundation of his career. It was exciting on-the-job training in both pure and applied science, with deadlines and budgets such that only team players succeeded. California's heavy rains and snows, hot summers, seismic bumps, and widespread unstable foundation conditions played their respective roles in forcing research into new techniques of testing and design for construction. Thus were born, for example, the California Bearing Ratio (CBR), the Los Angeles Rattler test for soundness and abrasion, the Proctor test for determining optimum moisture for maximum compaction of unconsolidated materials, and others. Al developed an expertise in the application of these and other analytical tools of engineering geology that characterized his work from then on.

Meanwhile, his background in mineralogy sustained the first systematic work on problems involving alkali-aggregate reactions in portland-cement concrete, the subject of his first publication as well as a later paper with T. E. Stanton, possibly the best of the early works on the topic. Allen Nicol invented the sealed-container expansion-bar method for measuring the reactivity of opaline aggregates to high-alkaline cements. While this was going on, and in light of his San Diego experience, he pushed hard and successfully to organize the Sacramento Mineral Society.

After these years with the state of California, planning and frugality paid off. In 1943, Al entered Harvard Graduate School intending to finish his education once and for all, concentrating in mineral chemistry and crystallography. World War II, however, had it otherwise. He entered the U.S. Marine Corps and became an instructor in mapping and cartography at Camp Lejeune, North Carolina, until his age enabled an honorable discharge in the spring of 1945. His new military knowledge, coupled with his background in engineering geology, made him useful to the war effort in a new role: he joined the Branch of Military Geology of the U.S. Geological Survey. Here his contributions were immediate and valuable to the preparation of intelligence studies in support of the final effort in the Pacific against Japan.

With the abrupt ending of the war, Al was posted directly to the Philippines, Japan, and Korea to assess engineering problems and construction materials necessary to postwar rebuilding. As the occupation of Japan began, he showed an unusual ability for rapid reconnaissance and for organizing comprehensive engineering reports amid hectic circumstances, working smoothly under pressure. Back in Washington, D.C., in the spring of 1946, he began building a reputation with the Survey marching that of his work for the state of California.

In the ensuing years he responded to assignments from the Branch of Military Geology, and occasionally the Branch of Foreign Geology, in many parts of the world. The Branch of Military Geology, under the leadership of Frank C. Whitmore, Jr., in the years after World War II, was a highly organized microcosm of the entire Geological Survey. Productivity was high and most of the MGB people genuinely liked each other both professionally and personally. This did not preclude aggressive—even stormy—scientific disagreements in the process of resolving problems in distant places. Geologists with the experience of Al Nicol were critical to this work. Many of us who remember him today met him during these efforts, which ranged from intelligence production in Washington or Tokyo or Heidelberg to extended geologic mapping and engineering evaluation of the Pacific Islands, a quick trip to Iceland or Greenland, or a crash project for the Joint Chiefs of Staff by next Tuesday noon. Al seemed to be everywhere, always ready to assume some of the burden, always welcome, and always available to discuss and advise on any geological problem.

Newly arrived in the USGS Tokyo office in the late 1940s after finishing graduate school, Helen Foster's impression was:

Al Nicol stood out from all of the other geologists in the office. His manner was more like that of a successful businessman, with an air of sureness, competence, and efficiency. No time was wasted ... he seemed to know just what should be done and how to do it. ... he was easy and fun to talk to and very helpful to all who came to him. He set a fine example for the less experienced personnel. ...

As a well-grounded physical geologist, Al's contributions in many instances had little or nothing to do with engineering geology but helped to keep a project moving in the right direction. Other times he worked within field parties to generate engineering-geology maps simultaneously with their production of the basic geology. His "Engineering Geology of Okinawa," with Del Flint and Ray Saplis, is a classic. Similarly, his "Engineering Geology of Saipan" has become a collectors' item. In West Germany he worked well with German geologists and engineers, earning their support and respect during the production of comprehensive engineering geology studies for most of the U.S. Zone.

Over the years, Al Nicol developed what might be called a conceptual archetype of the ultimate engineering geology investigation. It was too much to apply to any single problem or project, but he could draw from it at will, missing nothing. He could format a product, ad hoc, comprising basic geology, sampling, laboratory testing, evaluation of test results, redefinition of geology and soils into mappable units based on their physical properties, and a series of comprehensive analyses of in situ and utilization characteristics, all in a dialect that brought satisfaction and reassurance to the civil engineer. He could stand at the corner of a drift and a cropping 2000 feet underground and advise on dewatering, spalling, overbreak, rockbursts, and stopping procedures, with side comments as to mineral associations and how to mark the ore for the next shoot. Mining engineers regarded him as a geologist who actually understood their problems.

Al's career goal, from the early days in California, had always been independent consulting. In 1957, after 12 years with the Survey, he struck out on his own, providing services to major architect-engineer firms, the United Nations, and one or two research companies near Washington, D.C. Although he proclaimed time and again that the greatest challenge in engineering geology is the high-arch concrete dam (he worked on a number of these in various countries), he devoted much of his time to other types of dams as well as bridges, highways, railroads, airports, harbors, breakwaters, underground works, and inevitably, alkali-aggregate problems. His was a distinguished list of clients, and each had a good opinion of both the man and his work.

Allen Nicol's considerable experience in engineering geology, as well as its military aspects, involved him in unusual types of research of the "think-tank" variety, where he rubbed elbows with physical and social scientists, computer whizzes, former ambassadors, retired generals and admirals, and even a couple of other geologists. He found himself teamed in one instance with a newly retired Marine major-general who was not shy about expressing his admiration for Al's work and his pride that Al, albeit briefly, had been a U.S. Marine. Physicist Edward Girard, a prominent staff member of the Research Analysis Corporation during its heyday in the 1960s put it bluntly and well:

Al was always professional. He found ways to get the job done if it could be done. I refer to military geology embedded in ... operations analysis. When dealing with the well-meaning speculations of amateurs or the desires of the excessively mission-oriented, both of whom abound in the communities of operations and systems analysis, Al was by turns kind, firm, and harsh ... always of good cheer, even in his [later] personal adversity—he was a good man!

At about this time, in 1968, Al joined with a small group of other consulting geologists to form the Earth Sciences Group, Inc., of which he was made vice-president. ESG worked primarily

in mineral exploration involving coal, uranium, and precious metals. His last field work, in the San Augustine Plain of New Mexico in below-zero temperatures, involved drilling for uranium and inspecting drill cuttings under the microscope. Reminiscing over the "scope one day, he mused that the cold didn't bother him so much, and neither did hard work, but that he'd never forget the time in northern Greenland that the polar bear got between him and his helicopter, nor the spitting cobras of Burma, always aiming for a person's eyes.

But there are worse things. Al Nicol suffered a massive stroke in November of 1973 and was not expected to survive it. He did though, aphasic and paralyzed on one side, but able to respond to the ministrations of his devoted wife Helen, and to the conversations of friends. Although unable to speak, he recalled field work, outcrops, and the details of specific geological problems well enough to be of real help if questions were worded appropriately. He displayed a cheerfulness and dignity: a grace, in the midst of incapacitation, that bespoke satisfaction and contentment with his life and work.

On his seventy-ninth birthday his wife and a friend had a little party for him in midafternoon, complete with candies and funny cards. That evening, late, he died.

A professional in the classic sense, Al was broadly educated and experienced, perhaps uniquely for the present day and age. Physically solid and intellectually intrepid, he brooked no gainsaying of the facts nor trifling with the conclusions derived there from. He was a bluff and friendly man with a certain urbane scientific knowledgeability that tended to attract agreement to his usually well-expressed points of view. Because his reasoning was thorough and his writing was clear, he was a refreshing addition to any geological effort; he made disciples of many who labored to refine physical observations into coherent geology, whether for engineering interpretation or other purposes. His counsel was sought and widely respected, leading to many lasting friendships. Work that he produced thirty and forty years ago reads well today, and its quality, by contemporary standards, is undiminished. His nature was to work hard, do more than his share, and be willing to help those who needed assistance. He was secure enough in his own right that he could be generous in sharing, dry and Celtic, could so deflect the routine stress and strain of field work as to lighten the burden for all, a quality not soon forgotten.

According to an old song, in the patois of an earlier part of a century, "A Good Man Is Hard To Find." Allen Hankins Nicol was a good man to his colleagues, to his clients, and perhaps most of all, to his profession. He saw a profound order in the natural world and did his utmost to help others see it as well.

Nothing really good dies.

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