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Memorial

William L. Quaide, 1927–2004

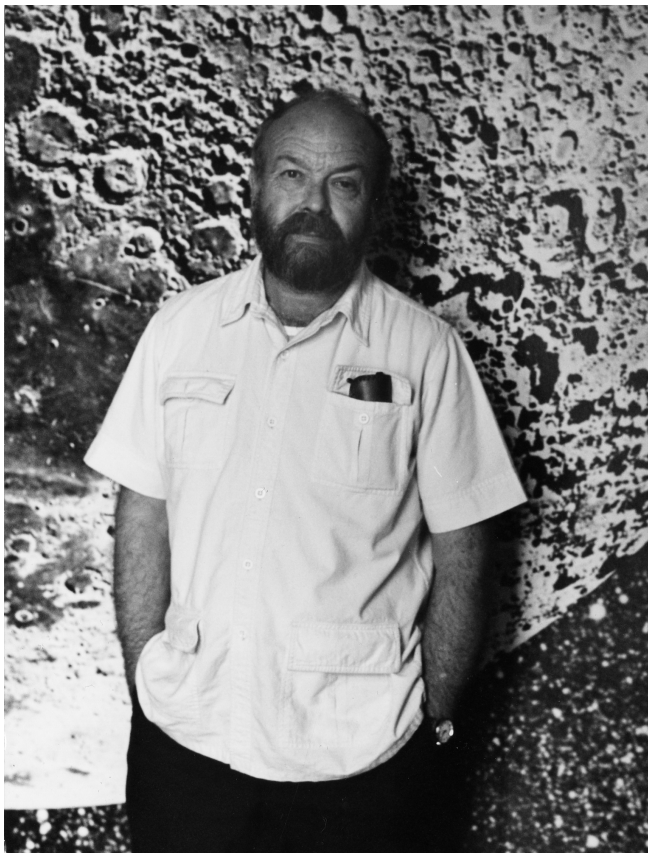
William Lee Quaide ("Bill" to everyone who knew him), a NASA planetary scientist and program manager for almost three decades, died at age 77 of cancer on November 10, 2004, in Virginia. His NASA career spanned 29 years, the last 16 of which he spent at NASA Headquarters in Washington, D. C., first as program scientist for Planetary Geophysics and Geochemistry in the Solar System Exploration Division and later as chief of that division's Planetary Science Branch. In these positions, he played a major role in preserving the original Apollo science programs in the post-Apollo age by helping to convert them into the broad, rigorous, high quality, durable, and exciting efforts that continue today.

Born in Arkansas, Bill grew up near San Diego, California. He served in the Navy from 1944 to 1946, then entered the University of California at Berkeley, where he obtained three successive geology degrees, culminating in a Ph.D. in 1956. After seven years as a teacher, researcher, and museum curator at Pomona College, San Jose State University, and the University of California at Berkeley, he joined the NASA Ames Research Center in Sunnyvale, California in 1963, just in time to begin his career in the happy scientific frenzy of the Apollo program.

Bill quickly became one of the few workers in the new field of impact cratering. At that time, six years before the launch of Apollo 11, craters were a major concern in NASA and a major focus for scientific activity. The origin of lunar craters, whether by impact or by volcanic processes, was the subject of extensive scientific study and debate. More critical were the issues of how lunar craters had shaped the surface materials: could astronauts land on the lunar surface, survive, and walk around on it?

With his colleagues Donald Gault and Verne Oberbeck, Bill explored these questions, in the process helping to create in the Ames Research Center one of the prime institutions for the study of impact cratering. Bill and his colleagues were assisted by a unique and amazing piece of equipment: the Ames Vertical Gun Facility, which could fire small projectiles at high velocities to make experimental impact craters, whose formation and characteristics could be recorded and studied in real time. The facility still exists and is in full-time operation, now being used to carry out cratering experiments that would have seemed incredible in the early days.

Bill and his colleagues studied lunar craters from a combined perspective of science and engineering, blending theory, experimentation, and careful examination of pre-Apollo lunar imagery. Their conclusions about the lunar surface and its composition were in direct opposition to the more speculative but better known proposal of Tom Gold: that the lunar surface material consisted of a thick layer of fine dust that might swallow the spacecraft and the astronauts if they tried to land on it.



William Lee Quaide (photo courtesy of Mrs. Evelyn Quaide).

Bill and the others painstakingly measured the morphology of small lunar craters, then used the crater shapes to demonstrate that the lunar surface did consist of a layer of fragmental rubble, pulverized over long periods of time by countless impact events. However, this rubble layer was compact, coherent, and, as the Apollo engineers said with relief, "traffickable." The crater shapes also showed that this layer was only a few meters thick on the lunar maria, and below this layer was more coherent bedrock. Their inferences were solidly established by the subsequent Surveyor and Apollo missions. Both machines and astronauts survived and operated on the surface, the fragmental layer became known

formally as the lunar regolith, and the Apollo 11 mission brought back the first samples of it for laboratory study.

When the first lunar samples came back, Bill was among the large group of scientists who studied them. He drew on his traditional geological background in mineralogy and petrology, not only to describe the mineral and glass fragments, but to identify and explore the unusual high-pressure shock wave effects produced by meteorite impacts. In collaboration with Fred Hörz (now at the NASA Johnson Space Center), he carried out shock experiments and mineralogical examinations to quantify the effects and to establish some of them (e.g., X-ray mosaicism in quartz and feldspar) as unique indicators of shock.

With the end of the Apollo program, Bill moved to NASA Headquarters in 1976 to be program scientist for what was then the Lunar Data Analysis and Synthesis Program. This was a critical time for planetary science in NASA: the Apollo program had ended in 1975, and there were abundant arguments around NASA that the original lunar science programs were no longer necessary and should be terminated. Working under several associate administrators and division directors—far-sighted, active scientist-administrators like Noel Hinners, Ted Flinn, and Geoff Briggs—Bill played a crucial role in preserving, combining, and reorganizing the formerly separate lunar and planetary science programs into a few combined programs that would continue to provide support, excitement, and scientific rewards for planetary exploration during the coming years.

This process involved a major reorientation in the way NASA thought about and carried out ground-based planetary science. The goals of the research efforts were broadened. Poor projects were phased out. A uniform and rigorous peer review process was introduced, based on the National Science Foundation's science panel system. The roles and influence of science advisory committees were strengthened. A special effort was made to ensure that, despite the end of the Apollo program, good lunar science projects continued to be funded in the post-Apollo age. Eventually—and this was one of Bill's most hoped-for and carefully promoted goals—efforts for the long-term scientific study of data returned by individual missions were accepted, approved, and funded.

These changes came none too soon. The golden age of planetary exploration that began more or less with Bill's arrival at headquarters and eventually included Viking, Voyager Pioneer, Venus, and many later missions, demanded very different science programs to support, develop, and interpret these missions and the data they returned. Gradually, over several years after the end of the Apollo program, a new and solid framework of planetary science programs arose to fill the new exploration needs.

Bill's activities in identifying and supporting the necessary changes were as inconspicuous as they were effective. He participated calmly in endless meetings, listened quietly to many different views, remained on easy terms with superiors and subordinates alike, offered good ideas in a low-key manner, and never sought credit for himself as long as the job got done. He had a solid integrity combined with an easy, friendly, and unhurried manner with all. These pleasant traits were combined with an almost supernatural instinct for how the NASA organization and its inhabitants worked and how they could be gently urged to do good things. He had an amazing ability to see the simple, necessary, and obvious things in the fog of NASA bureaucracy. Amid all this, he was well liked by everybody. Another program scientist commented that "you could just walk in on him with a question or a problem and get a clear, straight answer right back, with no fancy b.s. And if he didn't know the answer, he would just tell you so."

While Bill worked amazingly well with the bureaucracy, he neither worshipped it nor was he a slave to it. He never took himself or anyone else too seriously, and his quiet manner and even temper were mixed with and supported by an equally quiet sense of humor. On one occasion, when funds for science travel were cut, a semi-anonymous memo appeared, dryly pointing out the much greater cost savings that could be obtained if the headquarters travel office would simply furnish travelling scientists with a list of sheltered bridge abutments for lodgings and the locations of dumpsters from upscale restaurants for meals and incidental expenses.

Bill's many small steps, along with the work of others both above and below his grade level, gradually accumulated into major positive changes that endure today. Bill came to NASA when the future form—and even the future existence—of lunar and planetary science was doubtful. When he retired in 1992, he left behind a group of stable, active, and exciting research programs. These programs have become accepted as an integral and necessary part of NASA's planetary exploration programs for the future.

Bill received many well-deserved awards for his science and management at NASA, such as a Best Paper Award and an Outstanding Performance Award. The high regard of his scientific peers outside NASA is shown in his receiving the Edward A. Flinn III Award from the American Geophysical Union in 1992, as well as the Harold Masursky Award for meritorious service to planetary science from the American Astronomical Association in 1996. Fred Hörz, a long-time friend and colleague, summed him up excellently: "His integrity and modesty were always a guiding light in my professional as well as personal life. He always had something to say, and he saw the good, if not humorous side of an issue. He simply made people feel good, a rare gift and talent. The world would be such a better place if there were a few more Bill Quaides around. We'll miss him greatly."

Despite his tireless work for NASA, Bill kept a boundary between NASA and the rest of his life, keeping busy with a wide variety of non-science interests: skiing, camping, hiking, travel, and family. His wife Evelyn relates: "Bill leaves an immense and colorful canyon in our lives that fills

daily with retrieved and heartfelt memories: a camper trip across country to Montreal and geoscience meetings, a day spent exploring Bodega Bay, backpacking in the High Sierras, a trip to Houston or one to Hawaii, or many evenings long ago when Bill read to the boys of dinosaurs. It is a remembrance of Bill sharing his knowledge of rocks, space, and the world in an easy manner that was both fascinating and memorable. He gave of himself, and our horizons expanded."

Bill is survived by his wife Evelyn, by two sons Chet and Rustin, and by a sister and granddaughter. He is also survived and commemorated by Asteroid 3876 Quaide, which puts Bill's name into the middle of the solar system he helped us all to explore. His professional heirs are today's large community of younger planetary scientists, who work hard and discover new and wonderful things in the programs that Bill helped to preserve. These programs, the new scientists who enter them, and the exciting discoveries that they make are perhaps Bill's best and greatest monument.

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