

# The Weapons Program

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## AUTHORS

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**Richard D. Baker** (*Plutonium*) received a B.S. in chemical engineering from South Dakota School of Mines in 1936 and a Ph.D. in physical chemistry from Iowa State University in 1941. He came to Los Alamos from Chicago in 1943 to join the Chemistry and Metallurgy Division. His research and development on the preparation of plutonium and enriched uranium metal led to the patent for the production of plutonium metal on a multigram scale. Because of the importance and challenge of the materials research, he remained at Los Alamos after the war ended. He was a Group Leader in the Chemistry and Metallurgy Division from 1945 to 1956 and then became Leader of the newly formed Chemistry-Materials Science Division, which was involved in materials research and development for most of the Laboratory's programs. He became Associate Director for Weapons in 1979 and Associate Director for National Security Programs a few months later. He retired from the Laboratory in May 1981 but continues serving the Laboratory as a consultant.



**Merle E. Bunker** (*Early Reactors*) participated in the Manhattan Project as a chemical technician at Decatur, Illinois, where the diffusion-barrier tubes for the Oak Ridge gaseous diffusion plant were produced. He received his scientific training at Purdue University (B.S. in mechanical engineering, 1946) and Indiana University (Ph.D. in nuclear physics, 1950). He joined the Los Alamos staff in 1950, attracted here by the high reputation of the Laboratory, which he learned about from friends already working at Los Alamos, and by a strong desire to live in the West. Immediately after his arrival he participated in the design and construction of the SUPO version of the Water Boiler. He served as Operations Supervisor of SUPO for many years and oversaw its deactivation in 1974. In parallel with his reactor work, he has conducted research on nuclear structure and nuclear transition rates, resulting in over 50 publications. He is currently Leader of the Research Reactor Group, which operates the OWR.

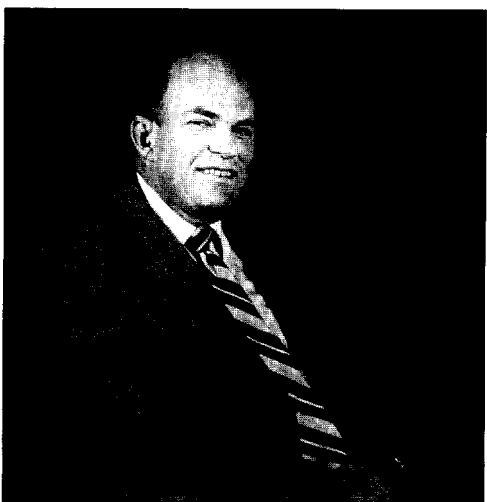


**Bob Campbell** (*Field Testing*) received a B.S. from Purdue University in August 1942. Until July 1947 he worked on field development of underwater ordnance, especially mines, with the Naval Ordnance Laboratory both as a civilian and, from January 1945 to July 1946, as a commissioned officer. He then joined the Laboratory, working first on explosive-driven jets and later on radiochemical samplers for obtaining specimens of bomb debris directly from the fireball. From October 1951 to August 1957, he was Leader of the Test Site Engineering Liaison Group, which saw to it that structures for test equipment and test devices were built according to the needs of the scientific groups. For the next two years he was Test Director for the Rover testing activities in Nevada. He was Assistant and Associate Leader of the Weapons Testing Division from August 1959 to August 1979 and served almost continuously from 1961 to 1982 at various test sites. He is now retired.

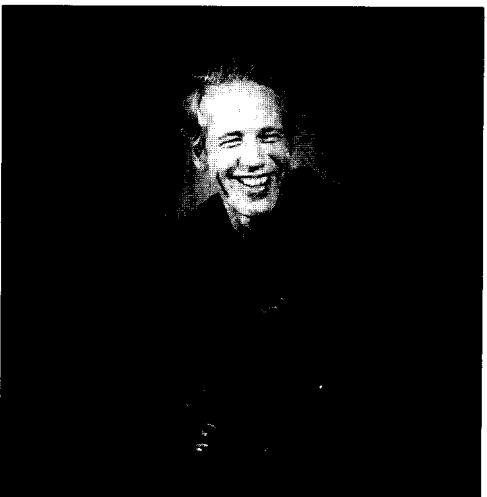




**Ben C. Diven** (*Nuclear Data and Field Testing*). As a graduate student in physics at Berkeley, I contributed to the first year of the war as lecture-room assistant in accelerated physics courses for military personnel. By the end of 1942 I decided I should be in the service like most of my friends and intended to join the Navy. Oppenheimer summoned me to his office and said that if I insisted at least I should go where I could do some significant good and that he would arrange a commission in the Army, the proposed home of all Los Alamos staff. Project Y's militarization did not materialize, but Oppie suggested that I come along anyway. I did. I landed in Albuquerque after my first airplane ride on March 13, 1943, and in Santa Fe I joined John Williams, Hugh Bradner, and Joe Stevenson, the only other Laboratory staff on site. We commuted to the Hill every day to see what strange things were being built from the hurriedly drawn-up plans and reported to Oppenheimer each evening by phone from Santa Fe. Soon supplies and staff began to arrive, but the man who was to coordinate the two wasn't due for some time. Oppie promised me that if I would take on that job in a few months he would find *me* work that was interesting and very educational. He kept his promise, and in the summer of '43 I joined Rossi and Staub's group, which developed instrumentation and measured nuclear data. I switched later to the RaLa experiment on implosion systems and in early '45 to preparation for measuring the reaction history of the Trinity device. In January 1946 I returned to graduate study at the University of Illinois. After receiving my Ph.D. in 1950, I returned to Los Alamos and joined Dick Taschek's group. In 1958 I became Leader of a group in the Physics Division, and in 1977 I retired. I still come into the Laboratory frequently as a consultant to the Physics Division and Test Operations offices,



**Delbert R. Harbur** (*Plutonium*) received his B.S. in metallurgical engineering from the Colorado School of Mines in 1961. He came to Los Alamos in 1963 after working for two years on the Polaris missile system at Lockheed Missiles and Space Co, in Sunnyvale, California. Having learned from his colleagues in the aerospace industry that the way to get ahead was to move from job to job every two years, he came to Los Alamos fully expecting to move on in a couple of years. Instead he found working with the complexities of plutonium—a metallurgist's dream—and the enchantments of northern New Mexico irresistible. He has worked on the development of plutonium alloys for both the weapons and reactor programs and helped in the technology transfer that is responsible for placing the Los Alamos-developed weapons alloys into production. He is now Leader of the Plutonium Metal Technology Group, which deals with various aspects of plutonium metallurgy for the weapons program.



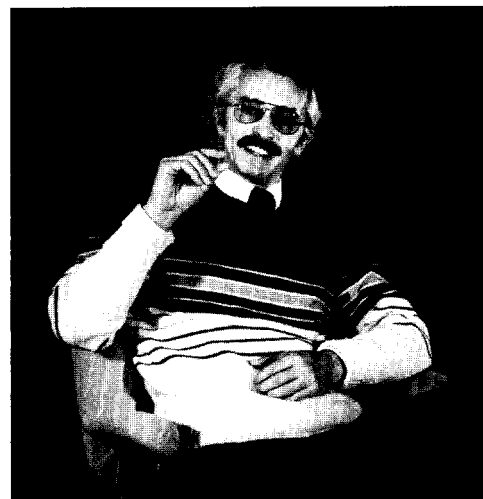
**Francis H. Harlow** (*Computing and Computers*) came to Los Alamos in September 1953 after receiving his Ph.D. from the University of Washington and has been a physicist in the Theoretical Division during his entire employment at the Laboratory. Special interests include fluid dynamics, heat transfer, and the numerical solution of continuum dynamics problems. He was Leader of the Fluid Dynamics Group for fourteen years and became a Laboratory Fellow in 1981. His extensive publications describe a variety of new techniques for solving fluid flow problems and discuss the basic physics and the application to practical problems. Northern New Mexico has served as a strong stimulus to his collateral activities in paleontology, archeology, and painting. Writings include one book on fossil brachiopods and four on the Pueblo Indian pottery of the early historic period. His paintings have been the subject of several one-man shows and are included in hundreds of collections throughout the United States.

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**Siegfried S. Hecker** (*Plutonium*) received his B. S., M. S., and Ph.D. degrees in metallurgy from Case Institute of Technology (now Case Western Reserve University) in Cleveland, Ohio. He first came to the Laboratory from Cleveland in 1965 as a summer graduate student. The main attraction was the mountains, which brought back memories of his childhood years in Austria. During his stay (which incidentally was also his honeymoon) he recognized the great potential for materials science at the Laboratory with its opportunities for basic research and applied technology. Also apparent were the opportunities for winter sports such as skiing, which was a way of life in Austria but difficult in Cleveland. Hence, he returned as a postdoc in 1968 to pursue basic research in metal deformation. That position was followed by three years at the General Motors Research Laboratories. In 1973 he returned again to Los Alamos to pursue basic and applied materials research. His main interests have been in plutonium metallurgy, mechanical behavior of materials, and materials for radioisotopic heat sources. In 1981 he helped to set up the Center for Materials Science at Los Alamos. He is currently Acting Chairman of the Center and Deputy Division Leader of the Materials Science and Technology Division.



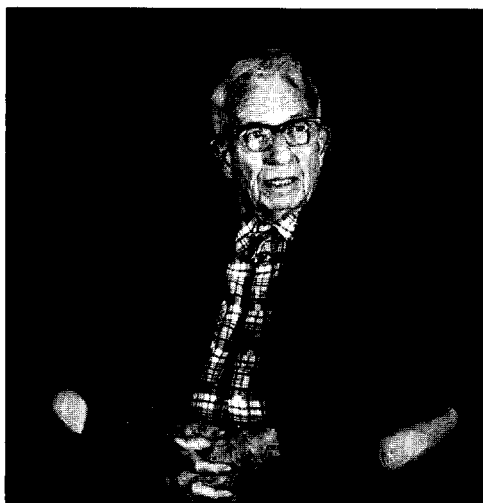
**Raymond E. Hunter** (*Weapon Design*) was born September 4, 1935 in Moultrie, Georgia. He received B.S. and M.S. degrees in physics from the University of Georgia and a Ph.D. in elementary particle physics from Florida State University. He attained the rank of Captain in the United States Air Force with active duty at the Air Force Cambridge Research Laboratories. In 1961 he received the Air Force Research and Development award. Hunter served as head of the Department of Physics and Astronomy and as Dean of the Graduate School at Valdosta State College. He joined the Laboratory in 1965 and is now Assistant Division Leader for Weapons in the X Division Office. In 1981 he received a Distinguished Performance Award from the Laboratory for design of the W76 (Trident) warhead.



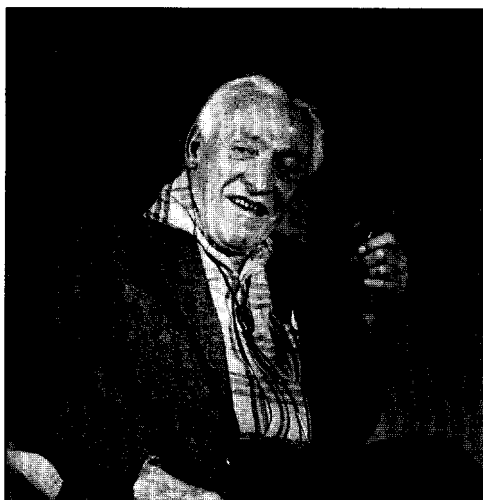
**John W. McDonald** (*Field Testing*) joined the Laboratory's Weapons Design Group in 1952 as a technical writer/editor to prepare instruction manuals for nuclear weapons and their components, manufacturing procedures, and research reports. He later served as Laboratory representative on the Joint Special Weapons Publications Board and was on loan to the Atomic Energy Commission as Technical Assistant in the Papers Branch of the U.S. Office of Participation in the 1958 United Nations Conference on the Peaceful Uses of Atomic Energy in Geneva, Switzerland. He left Los Alamos in 1960 to join the National Science Foundation's Office of Science Information Service. In 1962 and 1963 he was on loan from NSF to the Department of State and was assigned to the U. S. Mission to the United Nations in Geneva, Switzerland, as technical liaison officer for the 1963 United Nations Conference on the Application of Science and Technology for the Benefit of the Less-Developed Areas. Later, as a member of the North Carolina State University Mission to Peru, McDonald served from 1963 to 1966 as technical information advisor to the Peruvian Ministry of Agriculture. Returning to the Laboratory in 1966, McDonald joined Group D-6 (now IS-6) as leader of the technical editorial section and in 1970 joined the Group's classification staff, where he served as Deputy Group Leader and Alternate Classification Officer until joining National Security Programs in 1981. McDonald holds a degree in physics and mathematics from Utah State University and has done graduate work at the University of Utah and the University of New Mexico. His experience also includes eight years on newspapers as copy editor and reporter.



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**John H. Manley** (*Nuclear Data*). I received my B.S. in engineering physics from the University of Illinois in 1929 and a Ph.D. in physics from the University of Michigan in 1934. After teaching physics at several universities, I was persuaded by Leo Szilard to join Arthur Compton's Metallurgical Laboratory at the University of Chicago. Shortly thereafter, in May 1942, Compton asked me to assist Robert Oppenheimer in the experimental part of weapons physics going on at several universities but administered from Chicago. In September Compton, Oppenheimer, and I urged General L. R. Groves to create a new laboratory where all weapons work could be concentrated. That laboratory came into being as Project Y at Los Alamos. I arrived there in April 1945 after working with a contractor on design of laboratory buildings, recruiting personnel, and arranging for four accelerators to be "borrowed" and shipped to the new Laboratory, located, as the recruiting brochure read, "on the shore of a small lake" better known today as Ashley Pond. After investigating the neutron properties of various tamper materials, my group assumed responsibility for blast and earth-shock measurements at the Trinity test. Before retiring in 1972, my Los Alamos duties included the positions of Physics Division Leader and Associate Technical Director. I now serve as a consultant. I served the Atomic Energy Commission for a summer as Deputy Director, Division of Research, as a Senior Responsible Reviewer for declassification, and for four years as Executive Secretary of its General Advisory Committee, chaired by Oppenheimer. In 1958 I was loaned to the State Department as the first Technical Advisor of the U.S. Mission to the International Atomic Energy Agency in Vienna.



**Carson Mark** (*Weapon Design*), a native of Ontario, Canada, pursued his undergraduate studies in mathematics at the University of Toronto and the University of Western Ontario. His graduate work, also in mathematics, was carried out at the University of Toronto. He taught at the University of Manitoba from 1938 to 1943 and from 1943 to 1945 worked at the Montreal laboratory of the Canadian National Research Council. In May 1945 he and George Placzek came to Los Alamos as part of the contingent of United Kingdom scientists collaborating on the Manhattan Project. He joined the Laboratory staff in 1946 and was Leader of the Theoretical Division from 1947 until his retirement in 1973. Currently he is a Laboratory consultant and serves on the Nuclear Regulatory Commission's Advisory Committee on Reactor Safeguards.



**N. Metropolis** (*Computing and Computers*) received his B.S. (1937) and his Ph.D. (1941) in physics at the University of Chicago. He arrived in Los Alamos, April 1943, as a member of the original staff of fifty scientists. After the war he returned to the faculty of the University of Chicago as Assistant Professor. He came back to Los Alamos in 1948 to form the group that designed and built MANIAC I and II. (He chose the name MANIAC in the hope of stopping the rash of such acronyms for machine names, but may have, instead, only further stimulated such use.) From 1957 to 1965 he was Professor of Physics at the University of Chicago and was the founding Director of its Institute for Computer Research. In 1965 he returned to Los Alamos where he was made a Laboratory Senior Fellow in 1980.

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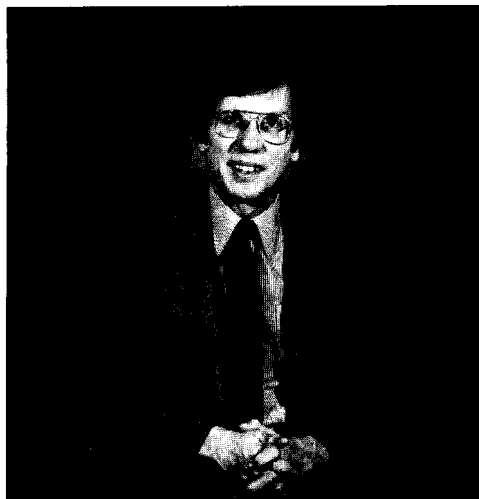
**William E. Ogle** (*Field Testing*) participated in almost every field test of this country's nuclear weapons from Trinity through the tests at the Pacific Proving Ground, in Nevada, and on Amchitka Island in the Aleutians. He participated both as an experimenter—measuring neutron outputs, photoneutron thresholds, electromagnetic pulses, and magnetic fields—and as an administrator up through deputy task force commander. In 1945, with a Ph.D. in physics from the University of Illinois, he began work at the Laboratory on implosion dynamics and neutron outputs. From 1950 to 1955 he helped invent a number of weapons diagnostics, including a neutron “pinhole camera” to image the thermonuclear burn region. He was a delegate to the Nuclear Test Ban negotiations in Geneva in 1959, served on the Greenland auroral measurements expedition in 1959, was commander of several eclipse expeditions, and was the subject of a *Time* cover story in 1962. He was Test Division Leader from 1965 until 1972, when he left the Laboratory to form his own consulting firm. Since 1977 he has been president and chairman of the board of Energy Systems, Inc., headquartered at Anchorage, Alaska and contractor to the Department of Energy and the Defense Nuclear Agency. He currently serves as chairman of the Nevada Test Site Planning Board, the Test Concept Working Group, and the Test Net Assessment Panel. In addition, he is a consultant to the Los Alamos and Lawrence Livermore National Laboratories as well as to the Central Intelligence Agency and is writing a definitive history of nuclear weapons testing.



**Hugh C. Paxton** (*Criticality*). World War II led me away from early experience in nuclear physics consisting of a Ph.D. under E. O. Lawrence at Berkeley (1937) followed by cyclotron technology at the College of France and Columbia University. In 1948 it seemed time to return closer to nuclear physics, and Jerry Kellogg, knowing I had other ideas in mind, said, “Don’t be a fool. Come to look at Los Alamos.” The spectacular southwestern setting hooked me, and Jean and I remain hooked. Here I was established as leader of the critical assemblies group, a position I held until 1975 when the 10-year limitation caught up with me. The next year there was another limit, the mandatory retirement age. As Group Leader I was stimulated by the challenge of clearing the way for accomplished group members to work effectively. Until the end I felt I was where I belonged.



**C. Paul Robinson** (*Overview*). I received a B.S. in physics from Christian Brothers College in 1963 and a Ph.D. in experimental nuclear physics from Florida State University in 1967. In joining the Laboratory right out of school, I was convinced that Los Alamos was this country's top applied science laboratory and was “the place to be.” My expectations were spectacularly confirmed with experimental work in Nevada on the Rover reactor tests. My job as Chief Test Operator there was superb training for all that followed. In 1970 we moved to Los Alamos with the formation of a group to examine new directions for the divisions involved in the Rover program. This work led to the Laser Fusion Program and the formation of the Laser Division. I participated in the development of both a variety of lasers and the first ideas about laser-induced chemistry. During 1973 we created the Laser Isotope Separation Program, and in 1976 I became leader of the new Applied Photochemistry Division. This was an exciting period of interplay among physicists, chemists, and engineers doing state-of-the-art research in fields ranging from laser photochemistry and high-resolution spectroscopy to laser system development and engineering. I am quite proud of the teams of scientists we put together there, as well as the large body of excellent research that resulted. In 1980 Don Kerr asked me to become Associate Director for National Security Programs. The nuclear weapons programs and other defense work at Los Alamos still represent some of the most important technical efforts for our nation's future. One of my chief goals has been to re-emphasize technical leadership of the programs. I am trying to promote activity in wider areas of defense science and technology for the future.



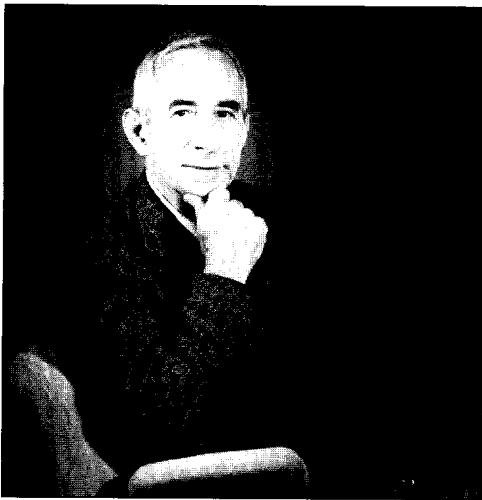
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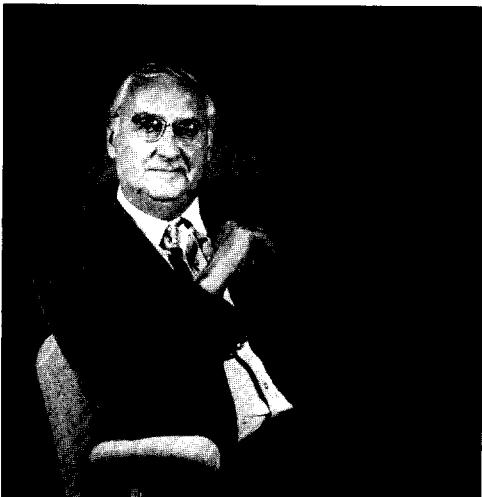
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**Tom Scolman** (*Field Testing*) received his Ph.D. in nuclear physics from the University of Minnesota in 1955. Following the advice of professors and friends acquainted with Los Alamos, he joined the Laboratory's staff in 1956. After working for some years on various aspects of weapons engineering design and production, he became involved in weapons testing, an involvement that has continued to the present. He has directed a record number of tests—over 100—and has participated in all of the underground tests. He is currently the Deputy Associate Director responsible for managing the National Security Programs Test Operations Office.



**Richard F. Taschek** (*Nuclear Data*). I was born June 5, 1915 in Chicago, Illinois and grew up in Darlington, Wisconsin (population 1500). I received a B.A. in physics and mathematics in 1936 from the University of Wisconsin and an M.S. in physics from the University of Florida. I then returned to the University of Wisconsin in 1938 to do research under Gregory Breit on proton-proton and proton-deuteron scattering at low energies. After receiving my Ph.D. in June 1941, I worked for an electrochemical company until the fall of 1942; then I went to Princeton to work on an isotron project for Bob Wilson and Henry DeWolf Smyth. All project personnel and equipment were transferred to Los Alamos early in 1943; my wife, Inez, our six-week-old daughter, Katrine, and I arrived there in May. I was assigned to the electrostatic accelerator group to measure various fast-neutron cross sections. At the war's end I remained at the Laboratory because of its unprecedented research opportunities and because Los Alamos and New Mexico met all my desires as a place to live, play, and work. For some years I performed and guided research that contributed to the Laboratory's reputation during those years as one of the best research institutions in the world. In the years since about 1960, direct participation in research became quite difficult, even though it remained my first love, because of various administrative assignments, including Physics Division Leader and Associate Director for Research. Since my retirement in 1979, I have continued to serve the Laboratory as a consultant.



**Jacob J. Wechsler** (*Weapon Design*) arrived in Los Alamos early in 1944 as an enlisted man in the U.S. Army. He was first assigned to the Physics Division and later to the explosive studies groups of G and M divisions. Before enlisting he had attended Cornell University; he continued his engineering and physics studies at North Carolina State and Ohio State universities while in the service. He returned to Ohio State University in 1947 to teach and do graduate work. Wechsler rejoined the Laboratory in 1948 for the design and construction of the Van de Graaff accelerator and in 1951 returned to weapons engineering, specifically thermonuclear weapons. He participated in many bomb tests and was present for the Trinity, Mike, and early thermonuclear tests. He served the Laboratory in various positions of leadership, including Leader of the Design Engineering Division. Having retired from the Laboratory in February 1982, he now serves as a consultant.