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Dedication

Raymond N. Rogers

Ray Rogers is a renaissance man. Over his career he contributed to many areas of science, and today, in retirement, he is contributing to the use and training of dogs in search and rescue operations. His early years were plagued with poverty. Born in Albuquerque, NM in 1927, Ray and his family moved to California where his father was hired to run a petroleum refinery. His father died in an industrial accident on Ray's 13th birthday, leaving Ray and his mother in Bakersfield with no means of support in the depression years. Ray took on a number of odd jobs to bring in money; he played the horn in a dance band, ushered at the local theater, and worked in a print shop. Ray had studied Morse code electronics so that when WWII came he readily passed the test to train as a Naval radar technician preparing for the invasion of Japan. The bomb stopped the War, and the GI bill put Ray through the University of Arizona. Ray has fond memories of the U of A. He biked to campus and in transit met a fellow biker in pith helmet and jungle attire, Professor Andrew Douglass, who developed the science of dendrochronology stimulated Ray's interest in archeology. Upon graduation in 1948, Ray's first job was with the Arizona Agricultural Experimental Station. There he built a thermal analyzer (TA) to study soils, and this expertise brought him to the Los Alamos Scientific Laboratory (LASL) at the end of 1951. A few months after, he had been at the lab a man poked his head in the door and asked if he could come in. Ray told him the Director did not need to ask. Norris Bradbury was not only the LASL Director but the President of the NM Archeological Society and Anthropology as well. They became friends with a mutual interest in archeology. It led to many interesting projects, which Norris did not officially ask him to do, but merely suggested might be interesting. Ray loved it. He used his laboratory full of instruments on many ad hoc problems; for example, developing accurate fluorine-dating methods to examine the Midland (TX) Folsom skull; pottery analyses; examining the Shroud of Turin, and even rapidly determining the liquid in the core of a golf ball to save a child's eyesight.

Ray and Joan Janney

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Ray was hired at LASL to assess the dangers of graphite-modified reactors explosives. He built a micro-scale DTA and found surprisingly that the graphite moderator in a reactor could store roughly the energy of black powder. In 1952, he started doing energetic materials research in earnest. He began studying HMX, and he determined kinetics constants for its decomposition and safety limits for its applications. The group proposed HMX for use in nuclear weapons and large solid-propellant motors, leading ultimately to large-scale production. Mort Kamlet and Joe Dacons of the Naval Ordnance Laboratory sent LASL a sample of their first TATB. Ray was impressed with its amazing stability. He and Louis Smith proposed several applications for TATB, which today is the standard ''insensitive high explosive.'' During the height of the cold war effort, Ray was the group leader of the explosives research and development group at Los Alamos. He published many papers on the kinetics and mechanisms of thermal decomposition of energetic materials. In 1980, he left the energetic materials group to work in innovative nonnuclear war technologies and later in intelligence and counter-terrorism. In all these fields, Ray has found unique ways to apply thermal analysis, but much of this work is still classified. Ray's best-known thermal analysis work is his pioneering use of DSC, modified Henkin, and cook-off experiments to determine the thermal stability of explosives. His publications in these areas remain the cornerstone in the field. Today, Ray lives on the beautiful Kwagee Mesa with Joan, his wife of 15 years, and his dog Brenda. Joan and Ray worked together for many years, and now they and Brenda are an active team in search and rescue efforts.

Richard S. Miller

Until his retirement in 1998, Dr. Richard S. Miller was the preeminent national leader in energetic materials basic research. His career spanned 25 years, the last 9-years of which he served as the Chief Scientist in the Mechanics and Energy Conversion Division at the Office of Naval Research (ONR). Dick developed and aggressively pursued an internationally-renowned energetic materials program, which spanned the gamut from the fundamentals of molecular-scale processes to applications-oriented developmental work. He attacked his work with an uncommon passion and focused his programs to provide significant new capabilities to the Nation. His council was frequently sought from both the fundamental and applied communities. He served on numerous DOD and international advisory panels. Both the Strategic Defense Initiative Office (SDIO) and its successor, the Ballistic Missile Defense Organization (BMDO), named Dick to run its propellant research program. Under Project Reliance, he was assigned the leadership responsibility for basic energetic materials research for all three military services. The DDR&E Strategic Environmental Research and Development Program (SERDP) designated Dick's Clean Agile Manufacturing program—its model project for pollution prevention for energetic materials. He led a number of international initiatives, including a DEA with France, another with Sweden, and the BMDO Score agreement with the UK.

Dick Miller

Dick established the national infrastructure to conduct high quality research in the synthesis and characterization of energetic materials. He initiated a number of fundamental investigations to explore the parameters governing the stability and decomposition processes of energetic materials and patiently supported these difficult investigations. The result is a number of invaluable research tools, such as codes

to predict the temperatures and chemical species evolving from the surface of propellants as a function of time and distance. Dick assembled an integrated team of Navy, academic, and industrial researchers, and provided the vision and leadership, which resulted in the discovery and development of a number of advanced propellant and explosive ingredients. The most renowned—hexanitrohexaazaisowurtzitane (CL-20), 1,3,3-trinitroazetidine (TNAZ), and ammonium dinitramide (ADN)—are in development and finding their way into a number of gun, missile, and undersea weapon programs. These achievements are especially remarkable considering that over the previous 100 years, only four new explosive ingredients (TNT, HMX, RDX, AP) achieved widespread use as Navy propellants and warhead fills.

Under Dick's guidance, the BMDO Advanced Propellants Innovative Science and Technology Program supported the development of oxtane-based, thermoplastic elastomeric (TPE) propellant binders. These have the potential of increasing propellant energy while reducing waste generated in production using current cast-cure technology. The program also advanced processing science, developing better twin-screw extrusion processing facilities. Dick saw this program through to prototype munitions manufacture with a reduced waste stream of up to 90%. Subsequently, he obtained support to demonstrate these materials and processes in the manufacture of warheads, gun-propelling charges, and rocket motors for the Navy's Extended Range Guided Munitions at significantly reduced cost, while maintaining or exceeding performance requirements.

In summary, for over two decades, Dr. Richard Miller has been a dominant figure in the energetic materials community. His efforts have produced numerous technical achievements, which promise to significantly enhance the national defense capability. His tireless advocacy has created a vigorous energetic materials research and development community. In his role as ONR Scientific Officer, Dick gathered together a nationally and internationally recognized team of scientists from the academic, industrial, national laboratory, and defense laboratory scientific communities. Dick's enthusiasm, passion, and energetic leadership welded this diverse team into a national energetic materials basic research program that was coherent, collaborative, and extremely productive. His university research program educated the scientists and engineers who, today, are the backbone of the energetic materials community. While the program was never flush with resources, Dick forged working relationships across a diverse spectrum of sponsors to bring the appropriate resources to bear on tough scientific problems. In times of limited resources, Dick's special achievement was to provide the focus of the community's efforts. All those who had the privilege to participate in his ''Boat Dock'' meetings or in the Gordon Research Conference on Energetic Materials appreciate his inclusiveness and support of competitive ideas. His vision and passionate stewardship of the energetic materials efforts in this Nation were the catalysis for many advances. It is for these reasons that we honor Dick Miller with this edition.