



*Кларенс*

# NIKOLAY P. LAVEROV

1930–2016

Elected in 2005

*“For leadership in the uses of uranium and for the direction of national and international programs for the management of radioactive waste.”*

BY BORIS MYASOEDOV, SERGEY YUDINTSEV, AND YURY SHIYAN  
SUBMITTED BY THE NAE HOME SECRETARY

Former vice president of the Russian Academy of Sciences NIKOLAY PAVLOVICH LAVEROV, who is considered in the Russian academic community a legend of geological sciences and is one of the founders of uranium geology research, passed away November 27, 2016, at the age of 86.

He was born January 12, 1930, in Pozharishche, a village near Kargopol, a small town in the Arkhangelsk region in northern Russia. He grew up there in a family with four siblings. His father, Pavel N. Laverov, and mother, Klavdia S. Laverova, did a good job planting the seeds of Nikolay’s future responsibility for his duties and managerial style in science and government service.

He graduated in 1949 from the Mining and Chemical College in Kirovsk (a small industrial town on the Kola Peninsula) and in the same year began his undergraduate studies at the Moscow Institute for Non-Ferrous Metals and Gold, where he met his future wife, Valentina. The couple married in 1952. After completing his undergraduate studies in 1954 he continued at the institute and earned a PhD (1958) in uranium deposit exploration and later his DrSc (1972) in uranium deposit formation.

In 1972 he joined the USSR Ministry of Geology as head of the Department for Scientific and Research Institutes. In 1983

he was invited to the USSR Academy of National Economy, where he served as vice rector. Later he was elected president of the Kyrgyz Academy of Sciences (1987) and moved with his family to Frunze (now Bishkek), the capital of Kyrgyzstan. In 1989 he was designated deputy prime minister and chair of the USSR State Committee for Science and Technology.

From 1988 to 2013 he was vice president of the Russian Academy of Sciences (RAS), and in 1991 he was hired as director of the RAS Institute of Geology of Ore Deposits, Petrography, Mineralogy, and Geochemistry (IGEM).

From 1947 on Laverov was actively involved in field studies as a researcher, technician, engineer, scientist, and chief of research teams and field work groups. His early research focused primarily on exploration of uranium deposits as well as main trends in their formation. He pioneered identification of uranium ore formation in continental volcanic belts connecting uranium ore deposition with the final stage of volcanic activity. His findings were widely used around the world to substantially increase uranium stockpiles, in particular, for nuclear fuel fabrication.

He contributed significantly to integrated exploration of exogenous epigenetic uranium deposits developed by *in situ* leaching techniques, leading to the development of new underground leaching technologies for the mining of uranium and polymetallic ores. He originated radiogeoecological studies in Russia with the idea of using protective properties of the geological environment to prevent pollution of the biosphere by radionuclides from deep underground waste repositories. His innovative approach covered the general problem of radioactive waste disposal in the Earth's crust, migration of radionuclides in underground water and geochemical landscapes, synthesis and investigation of highly resistant waste forms for immobilization of the most dangerous long-lived radionuclides, and prediction of ecosystem evolution.

For 25 years Laverov played a very important role in cooperative efforts between Russian scientists and US scientific organizations and government agencies. In the late 1980s

he and David W. Simpson, of the Incorporated Research Institutions for Seismology (IRIS), launched a large-scale scientific program to create a network of sophisticated seismic stations across the former Soviet Union to monitor underground nuclear explosions.

He set up the Geophysical Service in Russia and, as a result, a number of seismic hazards maps were released for nuclear facilities based on the efforts of the seismic station network. He initiated radiogeochemical mapping of the territory of Russia to facilitate the process of selecting sites for possible accommodation of long-term storage facilities for liquid high-level radioactive waste, solid vitrified waste, and irradiated nuclear fuel. He supported efforts by his IREM colleagues and Schlumberger Limited to develop a new generation of probes for in situ monitoring of radiation in areas of nuclear facility operation.

In collaboration with Rodney C. Ewing (then at Michigan University), Laverov launched a project to study radionuclide migration processes in tuff rocks similar to those in the Yucca Mountain area. With John Ahearne, former chair of the US Nuclear Regulatory Commission, he helped accomplish a number of cooperative projects related to the endpoints of radioactive waste and management of spent nuclear fuel. He fostered the establishment of the US-Russia Bioengineering Center at Argonne National Laboratory to jointly develop cutting-edge biochip production technologies for tuberculosis diagnostics.

In 1993 Laverov led the signing of a memorandum of understanding (MOU) on cooperation between the RAS and the US Department of Energy, and thus facilitated the initiation of a number of joint projects in radiation chemistry, use of depleted uranium, use of low-enriched versus highly enriched uranium, risk assessment at nuclear facilities operated by Russia and the United States, and contaminated sites.

He also paved the way for 20 NASA-RAS bilateral research projects spanning areas such as the monitoring of boreal forests and greenhouse emissions, bioresources of the World

Ocean, climate change and ozone hole observations, and forecasts of seismic events and volcano eruptions in the Caucasus and Pacific areas.

And many new findings emerged from joint projects led by Laverov in the framework of a NOAA-RAS MOU. For example, an assessment of impacts from radioactive contamination in the Novaya Zemlya archipelago due to a sunken nuclear submarine in the area, and two scientific expeditions to the eastern Bering Sea in 2005–06 for the Russian-American Long-term Census of the Arctic (RUSALCA), provided important scientific information.

In addition, with a keen interest in innovative technologies, Laverov encouraged and managed cooperative research projects in applied engineering with corporate partners Schlumberger, ExxonMobil, Chevron, Shell, and Boeing, aimed at developing new ideas, approaches, tools, and instruments for oil and gas exploration and environment protection.

For the US National Research Council, he was appointed a member of the Committee on Disposition of High-Level Radioactive Waste Through Geological Isolation: Development, Current Status, and Technical Policy Challenges (1999–2001), Board on Radioactive Waste Management (2001–05), and Nuclear and Radiation Studies Board (2005–06), and he cochaired the Committee on End Points for Spent Nuclear Fuel and High-Level Radioactive Waste in Russia and the United States (2001–03).

He authored or coauthored over 600 publications, including 28 monographs. The most significant are *Geology of Deposits of Uranium-Molybdenum Ore Formation* (1966; coauthored with B.P. Vlasov, I.M. Volovikova, G.D. Gladyshev, A.B. Kazhdan, I.V. Melnikov, and G.A. Tananaeva), *Conditions for Formation of Uranium Deposits in Volcanic Depressions* (1972; coauthored with V.L. Barsukov, G.D. Gladyshev, V.N. Kozyrev, and B.I. Malyshev), *Evolution of Uranium Ore Formation in the History of the Earth* (1978; coauthored with V.I. Kazansky and A.I. Tugarinov), *Scientific Fundamentals of Uranium Deposit Prospecting and Exploration* (1989; coauthored with B.L. Rybalov, V.I. Velichkin, A.E. Tolkunov, V.N. Levin, V.B. Meshcheryakova,

and B.M. Seltsov), *Underground Leaching of Polyelement Ores* (1998; coauthored with I.G. Abdulmanov, K.G. Brovin, A.K. Disitsin, Y.V. Nesterov, V.V. Novoseltsev, I.N. Solodov, M.I. Fazlullin, V.Y. Farber, and E.M. Shmariovich), *Insulation of Spent Nuclear Materials: Geological and Geochemical Principles* (2008; coauthored with V.I. Velichkin, B.I. Omelyanenko, S.V. Yudintsev, V.A. Petrov, and A.V. Bychkov), and *Space Research and Technology: Expansion of Knowledge About the World* (2014; coauthored with A.A. Medvedev).

Laverov received numerous honors, among them the Badge of Honor (1971), Order of the Red Banner of Labor (1981, 1986), Demidov Prize (1997), Order “For Merits to the Fatherland” of the 1st, 2nd, 3rd, and 4th degree (1999–2008), Lomonosov Gold Medal (2003), Silver Medal of the International Association of Academies of Science (2003), Triumph Prize (2003), Large Gold Medal of the Kyrgyz Republic (2003), Gold Medal of the Armenian Academy of Sciences (2003), Sign of Tsiolkovsky “For active participation in the implementation of the Russian Federal Space Program” (2007), Vernadsky Gold Medal for outstanding achievements in earth science (2012), and Karpinski Gold Medal (2016). And in 2009 he won the Global Energy Prize for “fundamental research and large-scale implementation of methods of surveying, prospecting, and exploiting of oil, gas, and uranium deposits...and [discovery] of the largest provinces of energy minerals.”

In 2005 he was elected a foreign associate of the US National Academy of Engineering. He also received honorary doctorates from six universities in Russia and abroad, and six foreign national academies of science elected him a foreign member.

Nikolay Laverov is survived by Valentina, daughter and son Tatiana and Alexander, granddaughters Natalia, Yelena, and Olga, and great-grandsons Nikolay and Dmitry.