

## Presentation of the 2019 MSA Distinguished Public Service Medal to Rodney C. Ewing

KEVIN D. CROWLEY<sup>1,\*</sup>

<sup>1</sup>National Academies of Sciences, Engineering, and Medicine (retired), Falls Church, Virginia, U.S.A.

The Distinguished Public Service Medal is intended to honor individuals who “have made important contributions to furthering the vitality of the geological sciences ... exclusive of original scientific research.” I don’t know anyone more deserving of this award than this year’s recipient, Dr. Rodney Charles Ewing, the Frank Stanton Professor in Nuclear Security and Professor of Geological Sciences at Stanford University.

Rod is first and foremost an extraordinarily creative and productive scientist, having authored or coauthored over 750 scientific publications and established fruitful research collaborations with scientists in many countries. His substantial contributions to science have already been recognized by MSA: Rod is an MSA fellow and received the Society’s Dana Medal in 2006 and Roebling Medal in 2015 for outstanding scientific contributions and original research in mineralogy. Receipt of the Distinguished Public Service Medal makes Rod MSA’s first “trifecta” medalist.

Eight other scientific societies have recognized Rod’s scientific contributions by naming him a Fellow, including the Geological Society of America, American Association for the Advancement of Science, and the Materials Research Society. Rod’s scientific work has also been recognized by three prominent national academies of sciences and engineering: He received the Lomonosov Gold Medal from the Russian Academy of Sciences in 2006 for scientific contributions to nuclear waste management; elected to membership in the U.S. National Academy of Engineering in 2017 for scientific contributions to the long-term behavior of complex ceramic materials for sequestering nuclear waste; and elected a Foreign Fellow of The Royal Society of Canada in 2009 for work on nuclear waste forms.

Rod’s contributions to the geological sciences go well beyond original scientific research. I will focus this citation on what I consider to be Rod’s three key contributions to further the vitality of the geological sciences, namely his efforts to enhance the communication of geoscience to international scientific audiences and the public, educate the next generation of geoscientists, and apply science and technology to difficult and frequently controversial public policy issues.

As many MSA members already know, Rod is a founding editor of *Elements* magazine, established in 2000 to explore themes of current interest in mineralogy, petrology, and geochemistry. This publication occupies a unique niche in scientific publishing because of its focus on issues of broad scientific and societal interest, for example, climate change and nuclear power, and its aim to communicate about those issues to both expert and non-expert audiences. There was little enthusiasm initially among scientific societies, including MSA, for sponsoring this

publication. It is a testament to Rod’s patient persistence that the magazine was successfully launched and has attained a reader base in over 100 countries, helping to promote the geosciences and improve inter-society communications. Rod told me that he considers the founding of *Elements* to be among his proudest accomplishments.

Arguably Rod’s greatest contribution to furthering the vitality of the geological sciences is through a teaching career that has (so far!) spanned 45 years. He has held distinguished professorships at the University of New Mexico, University of Michigan, and Stanford University and visiting appointments at over a dozen universities in Europe, Japan, and Australia and at two U.S. national laboratories. His teaching and mentoring have touched the lives of thousands of undergraduate students and over a hundred graduate students and postdocs, many of whom have gone on to distinguished careers of their own, further expanding the frontiers of the geological sciences and producing the next generation of scholars and educators.

Rod’s teaching contributions go well beyond traditional course and lab work. For example, he led a multiyear effort while an early-career faculty member at the University of New Mexico to establish the Harding Pegmatite Mine in northern New Mexico as a resource for teaching students and the public about scientifically important mineral associations. Rod worked closely over a period of several years with the mine’s then-owner, the late Arthur Montgomery, to arrange for the donation of the mine to the University of New Mexico; convinced the university to hire an on-site custodian to manage public visitation; and established public-visititation procedures that are still in use today. The mine has been visited by more than 35,000 students and members of the public since the early 1980s.

While on the University of Michigan faculty, Rod also provided leadership for the creation of the Michigan Mineral Alliance. This alliance allowed the University of Michigan’s extensive mineral collection, established beginning in the nineteenth century, to be curated and exhibited at the A.E. Seaman Mineral Museum at the Michigan Technological University.

A major focus of Rod’s research over the past four decades has been on the application of mineralogy and materials science to national and international policy making on nuclear waste management and disposal. His research has greatly improved scientific understanding of the physical, chemical, and radiological properties of materials for sequestering nuclear waste and their behavior in deep geological repository environments. Rod has co-edited three monographs that have been influential in shaping national and international scientific and policy thinking about the long-term safety of geological disposal of spent nuclear fuel and high-level radioactive waste: *Radioactive Waste Forms for the Future* (1988); *Uncertainty Underground: Yucca Mountain and*

\* E-mail: kdcrowley@outlook.com

*the Nation's High-Level Waste* (2006); and *Reset of America's Nuclear Waste Management: Strategy and Policy* (2018).

As a top national expert on scientific aspects of nuclear waste management and disposal, Rod is frequently recruited to apply his expertise to national policy issues. For example, he was nominated by the president of the National Academy of Sciences and appointed by President Barack Obama to serve on the U.S. Nuclear Waste Technical Review Board (NWTRB), an independent federal agency that provides technical oversight of the U.S. Department of Energy's (DOE's) programs to manage spent nuclear fuel and high-level radioactive waste. Rod served on the NWTRB from 2011–2017 and was Board chair during the last five of those years. He led the board through a difficult transition in DOE's waste disposal program, helped mentor new board members and technical staff following a major turnover of agency personnel, and represented the Board in interactions with Congress, DOE upper management, and the public.

The National Academies of Sciences, Engineering, and Medicine have also appointed Rod to membership on several expert committees. He has provided strategic and programmatic guidance to Academies management while serving on the Board on Radioactive Waste Management, Nuclear and Radiation Studies Board, and Board on Earth Sciences and Resources. Additionally, he has served on 11 other expert committees that were created by the Academies to provide scientific and technical advice to federal agencies and the U.S. Congress, including a joint study with the Russian Academy of Sciences on managing spent nuclear fuel and high-level radioactive waste in the United States and Russian Federation.

Appointments to Academies committees are based primarily on scientific excellence, and Academies committee work, all pro bono, is considered an important public service to our Nation. Rod's deep scientific knowledge, ability to work collaboratively across scientific and technical disciplines, and willingness to put his shoulder to the wheel to find consensus on challenging public policy issues have made him a highly effective Academies committee member.

I particularly want to mention Rod's service on the Academies Committee on the Waste Isolation Pilot Plant (WIPP). This committee was created in response to a federal law that gave the National Academy of Sciences a formal role in evaluating DOE's activities relating to WIPP, then a candidate deep-geological repository near Carlsbad, New Mexico, for disposing of plutonium-contaminated wastes from national defense activities.

The committee was composed of leading geoscientists, including Rod, and published several hard-hitting reports that were controversial at the time but arguably saved DOE from making substantial technical and programmatic blunders in its repository development program, thereby contributing to the successful late-1990s opening of the repository.

Rod made numerous intellectual contributions to the work of this committee during his almost 14 years of membership, foremost of which was highlighting the importance of quantifying potential releases of radioactive materials from the repository through an improved understanding of waste forms and their interactions with the repository environment. Rod attained a certain notoriety within the Academies after one of the committee's reports on DOE's proposed program of underground testing resulted in a controversial front-page story in the *Washington Post*. Rod strongly and publicly defended the WIPP committee's findings and insisted that they are communicated accurately to the public.

I had the good fortune to work with Rod on a research project long ago, but I came to appreciate his considerable analytical and collaborative skills while serving as a National Academies Board director and study director. Rod's intellectual curiosity, seemingly boundless energy, and excellent communication and interpersonal skills make him an effective scientific analyst and collaborator. Dr. Chris Stefano highlighted some of these qualities when he nominated Rod for this award: "[H]e would always defer to your expertise if he thought you knew more than him about a subject. He's easily the most brilliant person I've had the honor of working with. Rod is practical, humble, and truly brings out the best in those who he works with."

I can't think of a better way to conclude this citation than by quoting from Michael Hochella's nomination letter for this award: "It is my humble estimation that Rod is one of the top three mineralogists in the world today. I know that my claim is extraordinary, as there are many, many thousands of academic and professional mineralogists, with a large number in positions of great influence and prestige. However, virtually none are as important or as influential as Rod. He not only has [received] just about every award and honor in his field of study, but (more importantly) he has made a difference for many years in the way the United States and the world look at nuclear waste management from a scientific and practical sense."

It gives me great pleasure to present MSA's 2019 Distinguished Public Service Medalist and my dear colleague and friend, Rodney Charles Ewing.