

**Projecting Risk into the Future:
Failure of a Geologic Repository and the Sinking of the Titanic**

Rodney C. Ewing
Department of Geological Sciences
Center for International Security & Cooperation
Stanford University

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Abstract. Over one hundred years ago, the “unsinkable” RMS Titanic struck an iceberg in the North Atlantic and sank on its maiden voyage from Southampton, UK, to New York City. This “accident” and others, such as the tragedy at Fukushima Daiichi, can provide insight into the challenges that face the geologic disposal of radioactive waste. In this presentation, I reflect on the essential differences between analyzing the failure of engineered structures vs. a “failed” geologic repository. Perhaps, the most important difference is that for most countries there will only be a single repository, and we will never “see” that repository “in operation,” as the operational phase of a geologic repository comes long after it has been filled with waste and sealed. The time-scales considered for the geologic disposal of radioactive waste place special demands on the analysis of how engineered and geologic systems might fail. As scientists and engineers, we should reflect on the sobering reality of how difficult it is to project the future behavior of a geologic repository over extended spatial and temporal scales that stretch over tens of kilometers and out to a hundreds of thousands of years.

Biography. Rod Ewing is the Frank Stanton Professor in Nuclear Security in the Center for International Security and Cooperation in the Freeman Spogli Institute for International Studies and a Professor in the Department of Geological Sciences in the School of Earth, Energy and Environmental Sciences at Stanford University. Ewing’s research focuses on the back-end of the nuclear fuel cycle, mainly nuclear materials, radiation effects and the crystal-chemistry and geochemistry of radionuclides. He is the past president of the Mineralogical Society of America and the International Union of Materials Research Societies. Rod has written extensively on issues related to nuclear waste and is a co-editor of *Radioactive Waste Forms for the Future* (1988) and *Uncertainty Underground – Yucca Mountain and the Nation’s High-Level Nuclear Waste* (2006). He received the Lomonosov Medal of the Russian Academy of Sciences in 2006 and the Roebling Medal of the Mineralogical Society of America in 2015. He is a Founding Editor of the magazine, *Elements*, which is now supported by 17 earth science societies. He is a Principal Editor for *Nano LIFE*, an interdisciplinary journal focused on collaboration between physical and medical scientists. In 2014, he was named a Founding Executive Editor of *Geochemical Perspective Letters* and appointed to the Editorial Board of *Applied Physics Reviews*. In 2012, he was appointed by President Obama to chair the Nuclear Waste Technical Review Board, which provides scientific and technical reviews of the U.S. Department of the Energy’s programs for the management and disposal of spent nuclear fuel and high-level radioactive waste. He stepped down in 2017.

