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**Environmental Engineering**

**and Earth Sciences**

**EEES Department Seminar**

***2021 AAEES Kappe Lecture***

**Sustainable Mining: Is It Achievable and Can Environmental Engineering Help Get Us There?**

**Dr. David Dzombak**

Hamerschlag University Professor and Head of the Department of Civil and Environmental Engineering, Carnegie Mellon University

Extraction and processing of fuel and non-fuel minerals from the Earth has a plethora of impacts on land, water, air and ecosystems. Reduction and remediation of these impacts long has engaged environmental engineers in research and practice. Application of sustainability principles to mining is inherently challenging, considering the impacts involved and that mining involves removal of finite resources. However, as demand continues for fuel minerals such as coal and non-fuel minerals such as metals, consideration of environmental sustainability is increasingly being incorporated into development and operation of mines.

This talk will examine the environmental sustainability profiles of fuel and non-fuel mineral mining, and efforts that have been undertaken over the past 30 years to improve these profiles. The talk will focus on coal and copper mining in the U.S. as important examples of fuel- and non-fuel mineral mining. Current and evolving mining industry practices and related environmental engineering activities will be reviewed. Approaches for assessing the environmental sustainability of mining operations will be presented and applied to the two cases, with consideration of scale from operations at individual sites to system level.

The meaning of sustainable mining will be explored, as will the potential to achieve sustainable mining for fuel and non-fuel minerals. A framework for assessment of sustainability in mining that includes life-cycle metrics will be put forward. Application of the framework to copper will be presented as an example. The role of environmental engineers in advancing the environmental sustainability of mining will be examined with the audience.

**A person in a suit sitting in front of a bookshelf

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**Bio:** Dr. Dzombak is the Hamerschlag University Professor and Head of the Department of Civil and Environmental Engineering at Carnegie Mellon. He received his Ph.D. in Civil Engineering from the Massachusetts Institute of Technology in 1986. He also holds an M.S. in Civil Engineering (1981) and a B.S. in Civil Engineering (1980) from Carnegie Mellon, and a B.A. in Mathematics from Saint Vincent College (1980). Dr. Dzombak’s research and professional interests include aquatic chemistry; fate and transport of chemicals in water, soil, and sediment; water and wastewater treatment; in situ and ex situ soil and sediment treatment; industrial waste management; abandoned mine drainage remediation; climate change adaptation for infrastructure; water resource sustainability; energy and environment; and public communication of civil and environmental engineering. He has published numerous articles in leading environmental engineering and science journals; book chapters; articles for the popular press; and three books. Dr. Dzombak was elected to the National Academy of Engineering in 2008. Other recognitions include Fellow status in AEESP (2013), WEF (2012), and ASCE (2002); Distinguished Lecturer Award (2011) and Distinguished Service Awards (1999,2015) from AEESP; Distinguished Member (2019), Simon W. Freese Environmental Engineering Award (2014), and the Walter L. Huber Civil Engineering Research Prize (1997) from ASCE; and National Science Foundation Presidential Young Investigator Award (1991).

**2:30 PM**

**Friday, September 17, 2021**

**Online via Zoom**

<https://clemson.zoom.us/j/5783910968>

***Attendance is mandatory for graduate students enrolled in EES 8610, EES 9610, and GEOL 8510.***