Engineering Geology Applied in The Mining Industry

(Is there really a difference between the engineering geology and mining geology, or is it just semantics?)

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- AEG Past President (2005)
- Co-chair Strategic Outreach Committee
- And a whole bunch else!
How did I get into mining?
QUIZ – Who came first?

- Engineering Geologist
- Mining Geologist
- Fred Flintstone
Our engineering geology roots are in mining.
Early Tunnel Stabilization in a Prehistoric Greek Mine.

Photo Source: www.crystalinks.com
Slope stabilization
~4,000 years old. Great Orme Mine, Llanduno North Wales

Photo Source: https://thesilicontribesman.tumblr.com/
Grime’s Grave Flint Mining Site, ~4,000 BCE, Thetford, England

Photo Source: https://www.landtraces.com/grimes-graves-neolithic-flint-mines
Georg Bauer, *De re metallica*, 1556
Mining Geology or Engineering Geology?
QUIZ – Investigations performed by mining geologists are fundamentally different from those performed by engineering geologists.

- True
- False
Mining Geologists and Engineering Geologists share the same skill sets.
Engineering Geology Subdisciplines

- Geohazards
- Seismology
- Slope Stability
- Hydrogeology
- Environmental Geology
- Rock and Soil Mechanics
- Etc.

Mining Geology Subdisciplines

- Ore Grade Control
- Minerals Exploration
- Slope Stability
- Hydrogeology
- Environmental Geology
- Rock and Soil Mechanics
- Etc.
Roles in Common: Engineering Geologist and Mining Geologist.

- Site Investigation/Geologic Feasibility Study
- Earthwork Design – Cut Slopes and Tunnels
- Ground Control – Slope Stability and Tunnel Stability
- Groundwater - Supply and Control
- Geologic Investigation for Material Properties
- Environmental Compliance

Photo Source: www.palaeos.com
The tunnel doesn’t care what you call yourself.
Do the slopes know the difference?

Photos by the author.
Hydrogeological characterization in a mining setting.
Is there really a significant difference between site characterization for minerals exploration projects and engineering geology projects?
The First Environmental Law in the United States

- Sediment accumulation downstream from mining operations on the Yuba River in the Motherlode of California.
- Flooding due to failure of tailings dam.
- Woodruff vs. North Bloomfield Gravel Mining Company.
- January 7, 1884, Judge Lorenzo Sawyer’s decision.
- Prohibited hydraulic mining in the watershed areas of navigable streams and rivers.
- In 1893, the U.S. Congress passed the Caminetti Act, which modified the judge's ruling somewhat by allowing hydraulic mining in those areas only if a debris-retaining dam was built to prevent the debris from flowing downstream.
QUIZ – Who should investigate and map mine subsidence?

- Engineering Geologist
- Mining Geologist
- Either One
- Both Together
Opportunities to work together.

Would you want an obstetrician performing your brain surgery, or a brain surgeon delivering your baby?
Acid Rock Discharge
Reconstruction of the V&T RR
Subsidence over mine workings.

Photographs by the author.
Big Gun Quarry, Rocklin, California
Adventure Park
Beware of Silos!

(Why it’s important that we talk.)
Cautionary Tales

IF YOU DON’T THOROUGHLY UNDERSTAND MINING, USE A MINING PROFESSIONAL AND DON’T FORGET THAT THERE ARE PROFESSIONS OUTSIDE OF MINING WHO DO WHAT YOU DO.
2013 Manefay Slide

Before July 20, 2011

After May 2, 2013

NASA Earth Observatory image by Jesse Allen and Robert Simmon, using EO-1 ALI data from the NASA EO-1 team. The 2011 aerial photograph is from the National Agriculture Imagery Program (NAIP).
Development after Dredge Mining
Residential Development over an Area of Historic Mining
Is engineering geology actually mining geology, or is mining geology actually engineering geology?
The answer is, **YES**!

*From Calvin and Hobbes by Bill Watterson*