

Mining in the 21st Century

SME Statement 21st Century Mining bears little resemblance to the mining that took place in the late 1800s and early 1900s. Today, mining is carried out in an increasingly safe, environmentally sound and socially responsible manner thanks to industry's commitment – together with enlightened regulation - to restoring the earth and to returning each miner home safely at the end of the shift, as the results in Figures 1 and 2 below demonstrate.¹

Figure 1. Decline in Mining Fatalities – (1911-2010)

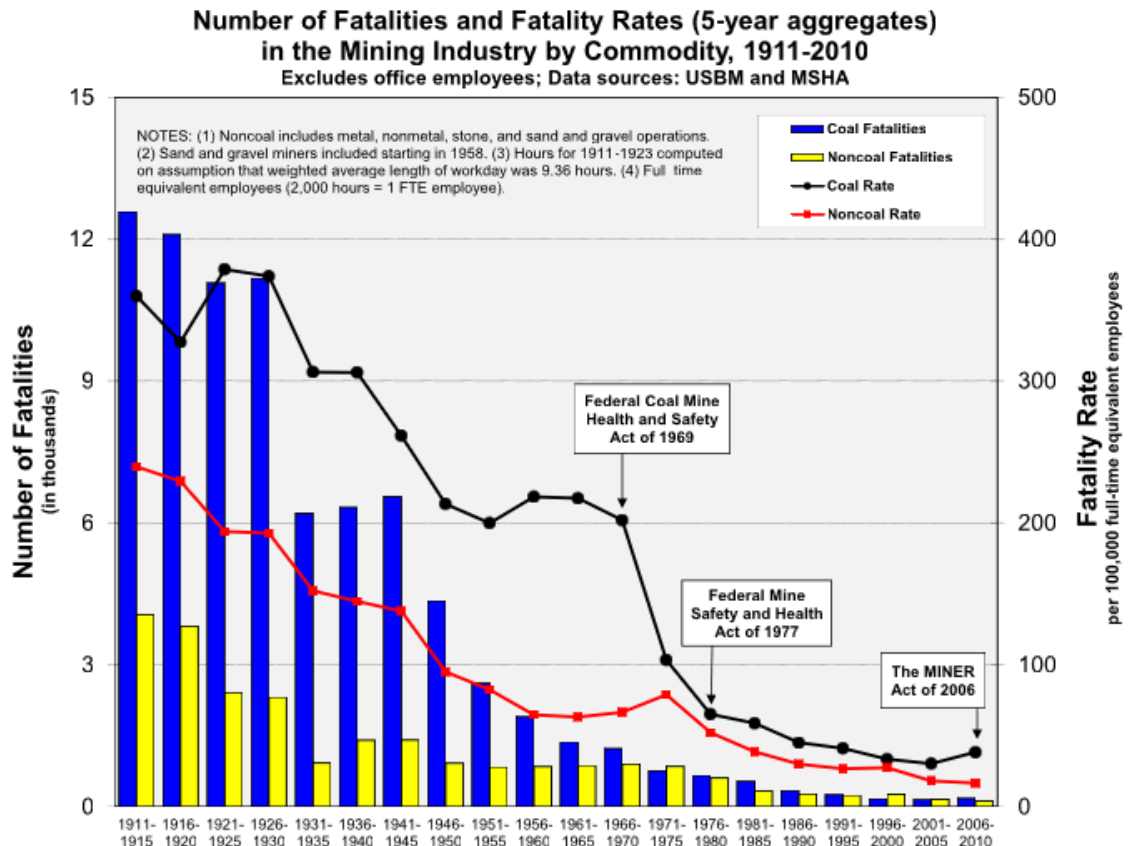
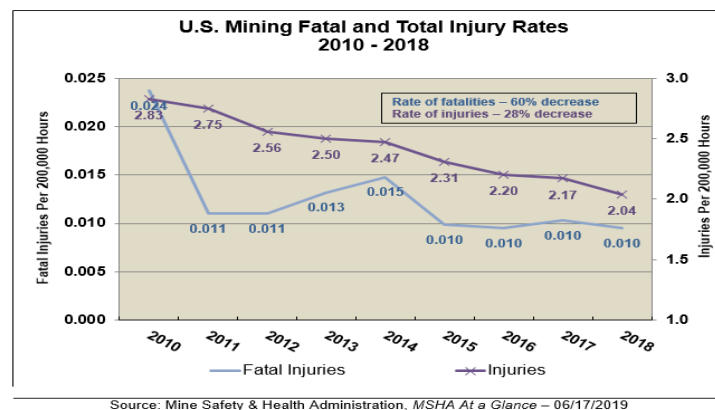


Figure 2. Mine injuries at record low – Continued Improvement since 2010



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Restoring land as closely as possible to its original premining state while protecting the earth, air, water and wildlife have become the principles of mine planning and operation. Although not widely reported, the **industry has restored more than 2.9 million acres** of land since 1978, as depicted in the example from the figure below.

Figure 3. Reclaimed Mine Land--Seneca Coal Mine, Colorado²



Issue

There is a symbiotic relationship between 21st Century Mining and 21st Century Technology. Minerals are essential to modern electronics found in today's vehicles, cell phones, computers, 5G networks and "smart" televisions, just to name a few. Even "green" technologies like wind turbines and solar panels require large quantities of minerals. The relationship goes both ways: Technology also helps reduce mining's environmental footprint and protect its workforce.

Notwithstanding the importance of mining to our daily lives, public awareness of mining is low while perceptions of mining vary and are subject to misinterpretation by the news media, the entertainment industry and others. More educational outreach of the importance of mining and its relationship to high tech applications is essential to the future of mining and to our nation's economic and national security.

Background

Technology in the 21st century is radically transforming mining, resulting in improved productivity, safety and sustainability.

- Mining companies are data driven. Thus, nearly every device in a modern mine has a "smart" component, which enables mines to pinpoint problems before they occur and take corrective action.³
- Three dimensional modeling and virtual reality (VR) help with mine planning, creating artificial software environments that give an advance impression of real-life working conditions in a mine.⁴
- Artificial intelligence (AI) helps mines become more safe, efficient and productive, as machine learning systems can help predict when mine vehicles need maintenance.⁵
- Remote control, autonomous vehicles and robotics technology not only reduce the risks to workers in mine environments, they require a highly trained high tech workforce.

- Drones or unmanned aerial systems (UAS) help reduce costs and enhance safety surveillance in hazardous areas at both surface and underground mines.
- Recycling and re-use of materials help put mining at the forefront of sustainability.

Figure 4. Inside Caterpillar's Virtual Mine



SME Statement of Technical Position

Public awareness of these advances is low. Thus, SME supports the following measures to promote greater social acceptance and awareness of mining in the 21st century:

1. The development of factual and informative minerals and mining education throughout our educational system to foster a properly informed citizenry.
2. The use of traditional and social media, including cost effective public outreach where needed to highlight the link between advanced technologies used in mining and the technologies that support our daily lives.
3. Enhancing public awareness of the impediments to mining, and how these technological advances should help speed the development of a fair, comprehensive and streamlined permit approval process.
4. Demonstrating how modern technologies may be applied in connection with “Good Samaritan” cleanup of sites that were mined and abandoned prior to the enactment of modern reclamation standards.
5. Continued research by government, industry and academia to develop and refine modern mining technologies and improved recycling of extracted minerals where practicable.
6. Development and implementation of public information programs, funded in part by industry and government, to demonstrate how the mining of critical and strategic minerals is vital to our national defense.

¹ Figure 1 - <https://www.ehsinsight.com/blog/audits-and-inspections-why-the-mining-industry-needs-them>

² <https://mineralseducationcoalition.org/mining-minerals-information/reclamation-stories/>

³ *Trends in Modern Mining Technology* (July 11, 2019) <https://www.angloamerican.com/futuresmart/our-industry/technology/trends-in-modern-mining-technology>

⁴ <https://nma.org/2018/08/20/caterpillar-using-virtual-mining-to-improve-real-operations/>

⁵ <https://nma.org/2018/12/14/artificial-intelligence-predicts-when-haul-trucks-need-maintenance/>