U.S. House of Representatives
Committee on Natural Resources
Beneath the Surface: Earth MRI and America's Resource Potential

Dr. Elizabeth Holley, Professor, Mining Engineering
Colorado School of Mines

Representative Stauber

As Congress considers reauthorization of Earth MRI, would you agree that the program's next evolution should focus not only on expanding geographic coverage, but also on incorporating complementary higher-resolution geophysical technologies capable of producing more complete subsurface models in areas with the greatest critical mineral potential? Please explain.

The Earth MRI program has been designed to increase geographical coverage of lower resolution geophysical and geological data. This information is needed at the currently planned resolution before a systematic review of critical mineral potential can be completed. Some potential targets for higher resolution data have already been identified through other USGS programs. These target areas could be prioritized for higher-resolution data collection in Earth MRI, including geophysical and geochemical methods. However, this should not detract from the rate of data collection in the already planned program, since ultimately a complete view of mineral potential must be achieved before completing a systematic ranking for follow-up data collection.

Representative Evans

How might advancements coming out of Colorado's cutting-edge quantum research institutions complement mapping tools used by the USGS to enhance geospatial data and strengthen our understanding of mineral resources?

Quantum computing has the potential to accelerate the pace of resource discovery by enabling faster processing of complex data sets. In addition, several quantum technologies are being developed to enable deeper and higher precision geophysical survey methods. Institutions such as Colorado School of Mines are an ideal place for this interdisciplinary R&D, since our long-standing expertise in both mineral resources and quantum create a rich environment for innovation at the intersection of these fields. Despite the potential promise of quantum- and AI-enabled data interpretation, accurate and meaningful interpretation of geological data will long continue to require human expertise. The minerals workforce and institutions that develop that expertise are essential for national security and American competitiveness and must be supported.

Representative Dingell

Dr. Holley, do you all have suggestions for reforms to the program to ensure that this work is being done efficiently, safely, and taking a broad look at our resource potential from mineral potential to mine waste, to geologic hydrogen, and geothermal?

The current structure of the Earth MRI is working well to achieve broader coverage of geophysical and geological data. The program is designed to evaluate potential across multiple resources, including minerals, geothermal, and geologic hydrogen. The program collects the data that underpin interpretations on the resource potential, rather than specifically identifying the resource itself. As spatial coverage increases, targets for follow-up should be identified for higher resolution data collection, including methods that are specific to the potential resource. The current framework of the Earth MRI program involves successful partnerships among the USGS, state geological surveys, industry, academia, communities, and other stakeholders. These partnerships must continue to be prioritized.

Dr. Holley, what do you see as the most important findings from your research into byproduct recovery, and what more can the federal government do to support both you and this research, as well as actually bringing commercially viable byproduct recovery projects online, of course, in an environmentally sound manner?

Byproduct and mine waste recovery of critical minerals holds significant promise for the U.S. to meet a meaningful fraction of its mineral needs. Building on my team's estimates of this potential, the endowment of individual sites must be validated through site-specific sampling in a National Mill Sampling campaign. These data and my team's estimates can be used to rank and prioritize sites where federal investment in byproduct or mine waste recovery can most meaningfully contribute to U.S. supply chains. This impact is likely to be largest for elements where the only a small quantity is needed, such as Ga, Ge, REE, and others. For other elements such as copper where demand is high, the full range of supply strategies will be required, including new mining, imports, recycling, and demand reduction through substitution and efficiency. Selection of the optimal ratio of each supply strategy for each element on the critical minerals list is a complex interdisciplinary exercise, as is the ranking and prioritization of sites for byproduct and mine waste recovery. Federal support of interdisciplinary academic research teams is essential to ensure that the U.S. minerals R&D ecosystem thrives.