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The Future Mining Workforce: New Pathways, AI, and the Rising Premium on Judgment

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The mining sector is being reshaped by the same technical workforce issues impacting the broader economy, but the details in mining are distinct. The mineral sector depends on deep technical competence, practical field judgment, and a workforce spanning skilled trades, technicians, geoscientists, and engineers. Yet, like many technical industries, mining is struggling to secure enough qualified and work-ready talent across that full spectrum at the right time and place.

The future workforce will be developed differently and beyond the traditional pathways and benchmarks. The era of degree gatekeeping is weakening with structural changes in higher education and the nature of work. Mining will increasingly need to embrace new entry routes, including apprenticeships, nontraditional training models, and lane-shifters entering from adjacent fields. At the same time, strong quantitative capability remains foundational as mining becomes more data-intensive, model-driven, and operationally interconnected.

Artificial intelligence and machine learning are often portrayed as threats to skilled jobs, but in sectors like mining, they serve as valuable tools. When applied effectively, these technologies streamline routine analysis, speed up decision-making, and allow geologists to focus more on complex decisions and challenging problems. In the short term, greater efficiency may lead to fewer entry-level geoscience positions and a temporary slowdown in labor demand compared to industry activity. However, over time, these technologies will likely help address more difficult issues both economically and technically, creating new opportunities and increasing work demand in exploration and development.

The real key is fostering the skills to build on an AI-integrated future, with the combination of strong domain knowledge, quantitative skill, and well-developed critical thinking. This capability set was identified by the geoscience community in Vision and Change and is central to mining's future.