

Return to geochemistry: multi-scale, geochemistry-driven gold exploration in Nevada using groundwater

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While it is hard to overstate the potential rewards in opening up new covered search spaces, exploration spending will continue to be allocated based on performance. Over the last decade the exploration industry has been a net value destroyer. As the industry transitions to exploring beneath deeper cover, explorers need new tools that improve its value proposition, specifically: lower costs and higher discovery rates.

Exploration is an exercise in scale reduction with a limited budget. From generative exploration to drill-targeting in an emerging camp, explorers need cost-effective tools to answer the necessary questions at each scale of investigation. In the absence of suitable undercover geochemistry tools, explorers have been unable to complete the regional-scale programs that have historically opened up new search spaces, such as the large indicator-mineral sampling programs that opened up northern Canada for diamonds. Instead, explorers have increasingly turned to geophysics to guide early-stage exploration. While geophysics provides important information to domain search spaces, explorers still need geochemical filters that can establish the presence of and vector towards mineralization undercover.

With ultra-trace detection limits, a growing number of deposit-scale studies, and multiple large sampling programs around the world, hydrogeochemistry is becoming an important undercover exploration tool. As groundwater flows through the subsurface, it retains a hydrogeochemistry signature that reflects the lithologies and minerals it encounters, which can produce measurable footprints surrounding mineralization. Because groundwater mixes and flows, hydrogeochemistry footprints are often much larger than those seen in other sampling media, which not only reduces the required sampling density, but also provides direct evidence of and a vector towards mineralization in boreholes that would otherwise be considered barren based on bedrock or overburden sampling alone.

In terms of its scale of application, the focus to date in the literature and within industry has been at the regional scale, where hydrogeochemistry provides a highly selective and relatively low-cost filter to reduce large covered search spaces down to discrete prospects. With tighter sampling density, hydrogeochemistry is also becoming a valuable prospect-scale tool that can provide an otherwise missing scale of information to allow explorers to be more targeted in their use of expensive, conventional drilling, based on discrete, high-contrast concentration gradients over relatively short distances.

Nevada Exploration Inc. has completed the world's largest groundwater exploration program, focused on the large covered basins of north-central Nevada, and is using hydrogeochemistry to identify and advance a portfolio of new Carlin-type gold exploration projects.

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