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Carlin-Type Mineralisation at Lookout Mountain in the Eureka District, Nevada, USA

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The Carlin and neighbouring trends in Nevada represent some of richest accumulations of gold on Earth. The Eureka district is located on the southern end of the Battle Mountain-Eureka trend and contains a number of active mines and exploration projects. Recent drilling has identified Carlin-style gold mineralisation in the Lookout Mountain area, situated approximately 10 km SSW of Eureka. The district is underlain by a thick sequence of Cambrian through Devonian sedimentary units that were folded and faulted by the Late Devonian to Early Mississippian Antler Orogeny. Continued deformation into the Cretaceous led to the formation of thrust faults, which themselves were deformed into a series of north-trending folds. Lower Paleozoic calcareous units were complexly folded and faulted as part of a Paleozoic thrust system, placing Cambrian rocks on top of Ordovician and Silurian strata. Basin and range extension and normal faulting subsequently formed the present topography. Lithologies exposed in the South Eureka district include limestone, dolomite, and minor amounts of shale and quartzite with a total thickness of roughly 4.5 km. Tertiary volcanic rocks and Mesozoic and Tertiary intrusions occur locally within the Eureka district. Gold mineralisation at Lookout Mountain occurs along a 5-km, extensively silicified structural zone and is associated with replacement of carbonate and shale lithologies, causing the formation of flat-lying, multi-staged collapse breccias. Carbonate dissolution, iron addition, and the formation of arsenic sulphides and fine-grained pyrite commonly accompany high-grade gold. In this study we combine optical petrography and SEM-based automated mineralogy analysis with clay mineralogy, geochronology, and detailed analysis of breccia textures with the aim to reconstruct mineralising processes and aid the identification of additional lithologies favourable to mineralisation.