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Title: EXPLORING THE LINK BETWEEN MAGMATISM AND CARLIN-TYPE MINERALIZATION: A CASE STUDY AT CORTEZ, NEVADA

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Abstract: Carlin-type gold deposits have been mined continuously for nearly fifty years and their proven and estimated reserves ensure that the state of Nevada will continue to be one of the world's leading gold producers. Since their discovery, numerous field and laboratory studies have attempted to elucidate the mechanisms by which the deposits form; the primary goal is to develop better exploration models. The general characteristics of all Carlin deposits include: the age of mineralization is between 36 and 42 Ma; ore is found primarily in calcareous sedimentary host rocks, sometimes in broad anticlinal features resembling petroleum traps; gold is found in both its native state and in gold-rich overgrowths on pre-existing pyrite, in solid-solution and as inclusions; gold was transported by and precipitated from low salinity aqueous fluids at temperatures on the order of 200°C; precipitation occurred at depths on the order of 2-3 km. Fluid inclusion data from multiple deposits suggest that a mixture of meteoric, magmatic, and metamorphic waters may have transported gold. Paleodepth estimates, based on apatite fission track data, suggest that the ambient temperature of the host rocks was not greater than approximately 100°C at the time of mineralization. The simplest hypothesis for the formation of Carlin deposits involves the degassing of igneous intrusions, scavenging of gold by the gas phase from the melt and adiabatic ascent along pre-existing faults. Testing this hypothesis has been hindered by a near complete lack of magmatic rocks present with ore-stage mineralization in anyone deposit. However, a new discovery at Cortez provides the perfect natural laboratory to test the magmatic hypothesis. Drill core from this new ore body has intersected numerous dikes and sills; the latter have thicknesses up to 100 meters and extending laterally 100s of meters. Additionally, there are numerous magmatic bodies outcropping on the surface. Examination of drill core indicates a strong spatial relationship between the position of sills and high grade ore zones; i.e., thick sills underlie ore-grade rock. Hand and petrographic observations suggest that the si1ls degassed either prior to or after emplacement which indicates that the sills may have acted as both a source of heat and gold. The sills are most likely the

near-surface expression of a much larger unexposed magmatic plumbing system in the Carlin region. Currently, we arc constraining the timing of sill emplacement (Ar/Ar) and doing detailed petrography through individua1 sills to characterize the nature of degassing and alteration. Our poster will present field, bulk chemical and isotopic data from a select group of sills and discussion of the relationship between these magmatic bodies and gold ore.