ABSTRACT

TITLE:	New Insight Into the Controls on Platinum-Group Element Mineralization in the Allard Stock, La Plata Mountains, Southwestern Colorado
AUTHOR(S):	Goncalves, Aaron ; Gonzales, David
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ABSTRACT: The Allard stock is a mass of mostly alkaline felsic to intermediate intrusive rocks that were emplaced ~65 Ma during the formation of the La Mountain laccolithic complex. Formation of the Allard stock was accompanied by zones of mineralization that tend to be concentrated along northeast-trending fractures. Geologic surveys since the 1930s have documented the occurrence of copper mineralization within the stock along with economic concentrations of gold and silver. In addition, anomalous concentrations of platinum-group elements (PGE) have been found in some of the mineralized zones within the Allard stock. The geologic controls and origin of PGE minerals in the stock were previously unknown. One of the main hypotheses tested in this research was whether platinum-group elements were incorporated in other minerals or were distinct phases within the deposits. A detailed petrographic and geochemical investigation of mineralized zones in the Allard stock that were known to contain PGE revealed that platinum-tellurium-bismuth minerals form discrete, late-stage phases in the ore systems. These platinum minerals are spatially associated with magnetite-chalcopyrite-pyrite assemblages within the stock, but the PGE crystallized either on the margins of these iron- and copper-rich minerals or in microfractures in the rocks. PGE mineralization also has a close spatial and temporal relationship with gold and silver as indicated by Quantitative Electron Microscopy scans which reveal native gold and gold-silver telluride minerals in close proximity to the PGE minerals. This research has established that PGE and Au-Ag mineralization in the Allard stock are distinct phases the formed late in the mineralization of the intrusive mass. This style of mineralization is similar to PGE-Au-Ag mineralization in alkaline intrusive rocks in other parts of the world. Our research provides additional insight into the nature of PGE mineralization in these types of deposits.