

# **Finding solutions to the world's pending tellurium supply crisis: Evaluating the potential for Te extraction from an existing Au mine**

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Tellurium (Te) is a technologically critical element that is primarily recovered as a byproduct of the extraction of copper (Cu). Global Te demand is expected to rise to 9000 tonnes/year by 2050 in response to the increased production of solar panels and batteries as the global energy supply is decarbonized, but current global production is estimated at only ~ 500 tonnes/year [1]. In order to meet this increased demand, new and alternative sources of Te must be identified.

Tellurium is commonly enriched in pluton-associated gold (Au) deposits, such as the Pogo Au deposit, Alaska, USA, but is not currently recovered. Here we present the results of detailed elemental composition and mineralogical analysis of samples from the Pogo Mine Mill. Feed ore contains 12 mg/kg Au and 30 mg/kg Te. Tellurium is enriched in the gravity table concentrate (5400 mg/kg) and the flotation concentrate (100 mg/kg). Tellurium enrichment and mineralogy are unchanged from the flotation concentrate to the carbon in pulp (CIP) tailings. Semi-quantitative electron microprobe assessment indicates that much of the Te at Pogo occurs in minerals in the Bi-Te-S ternary system. Minerals with low S contents (joséite-B, sulphotsumoite, and tetradymite) are the most abundant. While Te is highly enriched (~180x) in material from the gravity table with more of the denser Bi-Te-S minerals, the small volume generated would only yield a few kg of Te per year. Targeting the CIP tailings at a lower enrichment (~3x), assuming ~50% Te recovery, could potentially recover 7.5 tonnes of Te yearly due to the larger volume of material, representing a ~ 2% increase in yearly global Te production. At 2021 prices of \$68/kg, the gross revenue would be \$500,000/year. These preliminary results from a single moderate-sized Au mine suggest that byproduct recovery of Te from Au mines could substantially increase U.S. production. Using this approach for similar metallurgical studies of the Te mineralogy and compositions at other Au mines with known significant Te could yield additional targets for recovery.

[1] U.S. Geological Survey, 2022, Mineral commodity summaries 2022: U.S. Geological Survey, 202 p., <https://doi.org/10.3133/mcs2022>.