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Constraining the Untapped Critical Mineral Potential of Nevada's Heap-Leach Facilities

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Gold, silver, and copper heap leach processing is widespread in Nevada, one of the world's most productive mining regions and the dominant source of gold within the United States. Decades of large-scale operations have generated substantial inventories of leached tailings that still contain significant quantities of unrecovered base, precious, and critical metals, reflecting the selective nature of heap-leach extraction. This study presents a comprehensive statewide inventory of active and inactive heap-leach sites, estimates the statewide tonnage of material on heap-leach pads, and estimates the remaining metal content within these materials. Our research uses reported tonnages from technical reports and newly estimated tonnages derived from LiDAR measurements to indicate that there is more than 4.01 Bt of material on heap-leach pads throughout Nevada. Of the ~4.01 Bt of measured or documented material in Nevada's leach pads, ~3.20 Bt is on active leach pads and ~0.80 Bt is on abandoned legacy leach pads. Our analysis suggests that Nevada's leached tailings contain approximately \$88 billion USD in precious metals at current prices and more than \$15 billion USD in critical metals at 2024 market prices. Reprocessing these tailings could meet or exceed annual United States demand for several critical metals while also reducing environmental liabilities associated with legacy mine waste. However, unlocking this potential will require coordinated technical innovation, supportive regulatory frameworks, and meaningful community engagement to address economic and operational barriers. As global demand for critical metals grows amid supply-chain vulnerabilities, recovering metals from leached tailings offers a strategic opportunity to enhance domestic resource security, reduce environmental risk, and advance more sustainable mining practices.