

# SEG 2024 Conference: Sustainable Mineral Exploration and Development

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## The Benign Nature of Tailings from the Tumas Uranium Project, Namibia: Aligning Environmental Safeguards with Economic Outcomes

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The Tumas project has the potential to produce 3.6 Mlbs of  $U_3O_8$  with a potential Life of Mine (LoM) exceeding 30 years. Uranium mineralization is found within the calcretised sediment fill of the Tumas paleochannel, with carnotite being the primary ore mineral. Geologically, the Tumas deposits exhibit many similarities to the nearby Langer Heinrich mine. Following the Langer Heinrich mine's commencement in 2009, the Tumas project will become the world's second conventional alkaline leach operation. The design of the Tumas processing plant and its economic performance is aligned with protection of the surrounding environment. Alkaline leach solutions offer several advantages for tailing management. The high pH of the leach solution selectively dissolves carnotite while leaving over 99% of the rock mass unaffected. Moreover, concerns regarding mine acid drainage are alleviated since sulphides are not soluble. Advanced membrane technology enables the recycling of a significant portion of the leach agent, thereby minimizing costs. Deep Yellow collaborated with CSIRO to model the interaction between tailing liquor and groundwater. Key findings indicate that when mixed with groundwater, any residual uranium will precipitate as newly formed carnotite in close proximity to the tailing storage facility. Furthermore, the uranium content in the groundwater is projected to decrease below natural levels. Numerical groundwater flow models demonstrate that uranium migration beyond the mining footprint is not anticipated for at least 100 years. Both studies independently confirm the benign nature of Tumas tailings and the safe storage capability within in-pit tailing storage facilities.