Management of Alkali leaching based Uranium Tailings at Tummalapalle, Andhra Pradesh, India

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India's uranium production spanning over five decades has matured over all major aspects of the production cycle including mining, milling (based on acid leaching) and tailings management. Presently, more than 50 % of country's uranium resources have been established in South Cuddapah basin of Andhra Pradesh hosted in phosphatic siliceous dolostone rock (more than 40% carbonate). The plant to process the ore from this region was commissioned in Tummalapalle in 2017. The flowsheet for extraction of uranium from this carbonate rock was indigenously developed. The process broadly involves fine grinding of ore, leaching in alkali media (sodium carbonate and sodium bicarbonate solution) under high temperature & pressure conditions followed by filtration, clarification of leached liquor and finally, precipitation of Sodium Di-Uranate. The barren solids generated during the process of filtration are sent in the form of slurry to a well engineered impounded facility called the tailings pond. These tailings contain some unrecovered uranium; dissolved base metals like molybdates, aluminates, phosphates and process water bearing carbonate complexes such as compounds of iron, aluminum, titanium. The pH of the tailing's slurry is maintained at about 11-12.

The tailings pond at Tummalapalle is located in a valley surrounded by hills on three sides. The floor and the inner walls of the tailings pond were engineered to be impermeable to prevent possible leakage of contaminated water into the local aquifer. The embankment is constructed using a downstream method to ensure adequate stability. The channel ways in the pond are strategically placed to allow the flow of excess water into the monitoring pond located on the downstream side. Monitoring wells are placed around the tailings pond to monitor the excursion of contaminants, if any.

Presently, a new method of near surface trench disposal system for long term storage of tailings in dry form is under pilot scale development adjacent to the plant at Tummalapalle.