The use of an industrial by-product to address an acid and metalliferous drainage (AMD) issue as part of closure planning for a copper heap leach mining operation

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Over the past 25 years Australia has seen a massive growth in production of coal seam gas (CSG), which requires the extraction of significant volumes of groundwater. The chemistry of the extracted water is a function of the geology in the region from which the water is extracted. The extracted water is typically treated using Reverse Osmosis (RO) to produce a treated water stream for beneficial re-use. The RO treatment process also produces a saline waste stream that can be thermally processed to produce a highly saline waste stream and a dry alkaline salt by-product. Managing the disposal or beneficial use of the by-product has been the subject of ongoing investigation.

In recent years, a major CSG producer has commissioned several studies to investigate the potential reuse of the alkaline salt by-product in the mining industry to facilitate the remediation of acidic mine waste materials and acid and metalliferous drainage (AMD). Several studies have demonstrated the potential for the alkaline salt by-product to be successfully used in these activities. Further studies are now underway to look at the use of the alkaline salt by-product as part of rehabilitation plans for a copper heap leach facility. Results from laboratory-scale studies indicate that field-scale neutralisation trials have merit, to harness the alkalinity from bicarbonate and carbonate species present in a concentrated liquid brine version of the alkaline salt by-product, to neutralise the acidity in the heap leach materials and immobilise dissolved metal species through precipitation.

The objective of the trials is to reduce the risk of ongoing poor-quality seepage from the heap leach materials following the application of a soil cover system as part of rehabilitation activities. It is expected that the successful application of the alkaline salt by-product at this mine site will lead to a positive outcome not only for the industry stakeholders and regulators, but for the environment.