
Exemplar mine-site water management - A necessity in an era of climatic variability

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Abstract

In the current mining sector “boom” in Australia, the mining industry faces many water challenges. Early this century, devastating drought forced some mines to close down or reduce operations, curtail growth plans, or to develop expensive water supply infrastructure. Recently, flooding rains have resulted in billions of dollars in lost production, particularly in the black coal industry of Queensland. Many mines are still recovering and have massive mine-affected water inventories that cannot be released untreated to the environment. Some of these mines were suffering from drought conditions only a few years earlier.

Extraction of coal seam gas raises enormous community attention to potential impacts on aquifers and agriculture. However, mine water injection to aquifers is an increasing choice of many miners. Tailings dams are proliferating and require more stringent design and management. Mining, agriculture and environment competition for water resources is intense.

These highly visible mining water issues have gained the attention of State and Federal government regulators and focussed attention on prudent, integrated, “fit for purpose” site-wide mine water management and re-use. Recent changes to the Environment Protection and Biodiversity Conservation Act (1999) attempt to address mine water issues through regulatory change and managing differing expectations from different sections within government. Regulators are dealing with a record number of development applications and how to best assess cumulative impacts of new and existing developments. The Federal Expert Panel to advise on water impacts of major coal mines and coal seam gas is imminent. There are also increasingly strict requirements for more detailed mine closure planning early in the mine life.

Risk management of supply, production interruption or environmental risk is intimately linked to mine-site wide water management and extreme climatic events. The mining industry needs to both understand risks in their current practices and acknowledge and measure the permissible risks. The recent floods in Queensland are a good example, where statutory requirements for risk management associated with water management were perhaps considered more important than underlying commercial risks. These need to be considered separately to make sure both are covered.

Advanced practice in risk management starts with a holistic approach to mining, regardless of production pressures and the timing in the mine life. This includes: -

- recognising and mitigating the mine impact on the local catchment, and local and downstream communities,
- appropriate community consultation strategies and practices,
- constructing mine infrastructure (e.g. diversions) to civil engineering standards cognisant of surface hydrology and climate impacts and pit stability,
- planning and progressively implementing remediation for mine closure with rehabilitation appropriate to local soils, climate and surface and groundwater hydrology,
- addressing AMD at all stages through the mine cycle and mining in a way to neutralise potential AMD problems within the mine waters, and
- water accounting and taking opportunities to beneficiate and recycle/reuse water where possible.

This paper presents an overview of mining water management challenges, opportunities and emerging solutions, strategies and trends addressing these challenges. In a range of brief case studies, integrated methods for managing the site-wide mine water cycle will be critically examined, highlighting the importance of risk management and noting pertinent lessons learned from the broader water industry.

Keywords: mine water management, risk management