MANAGING MINING PROJECT GROUNDWATER RISKS

BY BRIAN LUINSTRA, PRINCIPAL CONSULTANT (HYDROGEOLOGY), SRK CONSULTING (AUSTRALASIA) PTY LTD

Although groundwater is an essential component of the production cycle at most mines in Australia, understanding the risks associated with groundwater is often seen as a 'regulatory tick box', rather than a critical factor in a project's feasibility.

At least one-quarter of mining projects in Australia encounter some type of groundwater challenge. Despite this fact, understanding the potential risks from groundwater is not often addressed in the early stages of Australian mining projects. It is common to wait until a project's bankable phase before better understanding the risks of costly delays to the project time line.

This article discusses the major groundwater-related risk factors and illustrates the importance of including a hydrogeological assessment early in the project's exploration phase, ideally prior to commissioning the scoping study. Given the inherent risk and huge costs associated with developing mining projects, reframing our understanding of the value of gathering timely groundwater data is essential to a project's success.

GROUNDWATER RISK FACTORS

Traditionally, mine operators have viewed dewatering, sourcing sustainable water supplies and ensuring minimal environmental impacts on nearby water sources as manageable risks. In today's mining industry, however, increased production rates and the push to mine deeper and further below the water table means that developers need to place a higher priority on addressing these risks.

WATER SUPPLY

The most common and well-understood groundwater risk to a project relates directly to water supply. Mining and processing operations have large water demands, and meeting these demands can be a concern for project developers, particularly for operations located in arid regions. In many climates with low and often highly variable rainfall, groundwater is the only viable source of water for mining and processing; therefore, water supply is typically identified as a major risk to project viability from an early stage.

In more temperate climates, water supply is often overlooked until the later stages of the development cycle, largely due to the belief that a water source will be found; however, even in more temperate climates the effects of rainfall seasonality often make

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surface water systems unreliable water supplies, with groundwater being the preferred option.

The ability of aquifers to produce a reliable water supply is highly variable and dependent to a large degree on area geology. Determining the ability of the local groundwater system to provide a sustainable water supply requires some hydrogeological investigation, which can lead to substantial delays in project time lines if completed later in the planning cycle. It is also important to have a solid understanding of where bore fields will be located before planning project infrastructure.

DEWATERING

The requirement for dewatering in advance of mining is often identified early in the development cycle, but similarly with water supply, risks are often not well understood until late in the project. The primary risk associated with dewatering is thought to relate to ground stability. As part of the geotechnical work completed for most projects, a basic understanding of dewatering requirements should be developed during the scoping and pre-feasibility stages.

The primary task is determining how much dewatering will be required and, most importantly, ensuring that dewatering

stays ahead of mining. The risk of underestimating this task, and the capital and operating expenditure required to establish and operate the dewatering system, are often poorly understood in feasibility studies. Despite dewatering constituting a small percentage of total project cost, this can still significantly impact overall project outcomes.

The risks associated with the disposal of excess water is often overlooked. Unlike mine water supply, where alternative sources can be sought, dewatering water is confined to the area around the ore deposit; it is susceptible to natural water quality impacts that can make its disposal to the environment undesirable or difficult to permit.

USING GROUNDWATER DATA TO DE-RISK PROJECTS

It is not uncommon for projects to fail, or nearly fail, due to unexpected complications related to water supply. Often, these complications could have been anticipated, planned for and overcome if early investigations were implemented during the project planning phase.

In the early stages of project development, there is an opportunity to collect hydrogeological data by utlising drillholes already in place for resource delineation – doing so saves time and cost. Relative to the overall cost of an exploration campaign, the additional cost to record hydrogeological information by converting drillholes to monitoring bores and conducting preliminary hydraulic testing is minor.

Early understanding of water supply requirements and the identification of potential groundwater issues can save costs long term, and can provide valuable guidance on the scope and potential costs of future work. The groundwater data collected from exploration and resource drilling programs can be used to develop preliminary risk assessments for water supply and outline regulatory requirements. The information gathered – and properly interpreted by a professional hydrogeologist – can be invaluable in assessing risks and evaluating the level of detail of the groundwater investigations required for project development. In many low-risk cases, this data will preclude the necessity for additional and expensive groundwater studies.

Despite the awareness of significant groundwater-related risks, many companies still defer addressing these risks until it's far too late in the project development cycle; in some cases, remedial work is not done at all.

CONCLUSION

Few project developers accurately estimate the costs or assess risks associated with groundwater – including supply, dewatering and environmental impacts – before the project's development phase. Water complications and poor understanding of quality and quantity, as well as water costs and consumption, can have significant economic impact on a project. Ultimately, the cost of acquiring this information late in the project will mean higher costs and more time expended. It pays to get in early. AR&I