

Mine Water Management

Water Management

Tetra Tech has successfully provided water management plans and detailed water balance modeling services for mining operations around the world. Our team has extensive experience with water management issues in varied environments and extreme climates (arid, tropical, and arctic).

We understand the impact that open pits, underground workings, waste facilities, and heap leach pads can have on surface water and groundwater systems. We can develop site water management solutions and water balance modeling to minimize the initial capital and lifecycle costs of water supply while assisting in regulatory and permitting efforts.

Using state-of-the-practice analytical tools, Tetra Tech provides a broad array of services in support of site water management:

- Evaluation of water source and quality
- Evaluation of mine water needs
- Development of data collection plans and field investigations
- Hydrogeologic system analysis and modeling of underground and open-pit mines
- Water distribution and conveyance
- Site-specific water balance
- Optimization of water usage
- Mine dewatering
- Surface water management
- Floodplain/mixing zone analyses
- Water supply reservoirs and dams
- Process water management
- Water treatment
- International Cyanide Code compliance
- Decommissioning
- Post-closure water management, including pit lake and cover modeling

Process Water Management

Process water is a critical utility in any mining operation—ultra-pure water for boiler feed applications; potable water for drinking; process water for mixing, cleaning, solution makeup, or chemical reactions; and low-grade water for dust suppression. In addition, mining operations are often located in areas that have too much water or not enough water, and either scenario requires careful consideration of process water. To be sustainable, mines are seeking better ways to manage this valuable resource.



Groundwater Resource Development

Tetra Tech has a proven track record of finding clean, sustainable groundwater sources for mining and milling facilities. We provide field investigations, aquifer testing, well development, and complex groundwater modeling. Using predictive modeling, we evaluate dewatering scenarios for mine water needs and the potential impact on neighboring water rights and quality. We use advanced techniques such as geophysics, sinusoidal signals for hydraulic testing, and tracer studies to identify flow paths, especially in the fractured bedrock aquifers typical of mining.

Water Balance

Water management can be a significant cost during operations and a long-term legacy during closure. Predictive water balance models limit risk and retain operational flexibility, allowing for long-term planning and operational adjustments for optimal results. Effective mine water balances are the result of understanding process and tailings circuits integrated with climatic data hydrologic data and recycling opportunities. Tetra Tech creates dynamic water balance models for complex systems to support decision making and risk analysis by simulating future performance while quantitatively representing the uncertainty and risks inherent in all complex systems.

Surface Water

Tetra Tech offers solutions to manage surface water across the site. We provide hydrologic and hydraulic evaluations; we design control structures, spillways, irrigation systems, sediment and erosion controls, water supply systems, and natural stream channels; and we perform dam breach and dam safety analyses.

Beneficial Use

Mine water can be used beneficially and to augment conventional water supplies. We have extensive experience in evaluating the beneficial uses of mine water, which include crop irrigation, livestock watering, stream flow augmentation, municipal and industrial uses, and aquifer storage.

Process Fluid Management

Our staff provides rapid and cost-effective assistance with secondary containment requirements for tailings, pregnant solution, acidic drainage, and impacted storm water. We also design overland conveyance systems and gravity or staged pumping.

Tetra Tech is a leading provider of consulting, engineering, program management, construction management, and technical services. The Company supports government and commercial clients by providing innovative solutions to complex problems focused on water, environment, energy, infrastructure, and resource management. With 13,000 employees worldwide, Tetra Tech's capabilities span the entire project life cycle.



Tetra Tech provides clients with practical, economic solutions in sourcing, treating, and recovering water for a mine's sustainable operation.

Engineering News-Record has ranked Tetra Tech #1 in Water Consulting for the 11 years in a row

Also ranked #2 in Treatment & Desalination and #6 in International Water projects

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UK	Swindon, Wiltshire
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Active Mine Water Treatment

Tetra Tech is well versed with all types of water treatment, including membrane, chemical, aeration, and thermal treatment solutions. We provide economical, practical water treatment solutions that meet specific water management needs. Our specialists are highly experienced in providing designs for removing common mine water contaminants such as arsenic, heavy metals (antimony, manganese, and iron), and dissolved salts (sulfate, sodium, chloride, fluoride, ammonia) and providing innovative solutions for meeting more challenging water treatment needs.

We have experts in all phases of mine water treatment plant design—from water chemistry experts who conduct desktop treatability analyses and pilot-scale testing to engineers who are experts in designing, building, and commissioning all aspects of treatment facilities and providing training for owners in the use of their new equipment.

Passive Mine Water Treatment

A variety of passive treatment systems that do not require continuous chemical input and take advantage of naturally occurring chemical and biological processes to treat contaminated mine waters have been developed. Tetra Tech is skilled in assessing such systems and selecting the right system on the basis of water chemistry, flow rate, local topography, and site characteristics.

International Cyanide Code

Tetra Tech assists mines in safely managing the cyanide used in leach solutions to recover gold and in complying with the International Cyanide Management Code. Through advanced modeling, design, and treatment solutions, Tetra Tech can assist gold mines in complying with this voluntary initiative.

Specifically, Tetra Tech can help mines to manage their cyanide process solutions and waste streams to protect human health and the environment through the development of a Probabilistic Water Balance model (PWB) to assess risk.

Achieving Success

Tetra Tech's end goal is to develop a treatment solution that is customized specifically for each site based on a multitude of factors, such as water quality, site conditions, existing facilities, capital costs, schedule, life of mine, annual operation and maintenance costs, and permit limits.