Total Water Management Solutions for the Mining Industry
Trusted Advisor for Total Solutions

Water is a critical and often scarce resource needed to support mine productivity and expansion. The entire process for mineral processing requires water, and the availability and appropriate management of water is key to sustainable mining practices.

Stewardship of water plays a key role in corporate social responsibility and positive stakeholder relationships. The most successful mining companies carefully and continually assess the value of water to their operations and develop sustainable approaches to water management so that they can continue to meet their overall business objectives into the future.

For more than a century, ARCADIS has provided innovative solutions to some of the most complex water challenges. We involve multidisciplinary teams of technical experts in assessing and developing innovative approaches to water-related challenges. Our resource management solutions achieve operational and environmental objectives while minimizing the total cost of ownership. At ARCADIS, our teams can see beyond the immediate challenge to anticipate how the solution may help solve future challenges associated with the mine life cycle. We can put this expertise to work for your water management issues and related engineering needs from exploration through operations and ultimate restoration of your mine.
Setting the Global Benchmark for Integrated Water Management

Compañía Minera Doña Inés de Collahuasi (Collahuasi), South America

Collahuasi produces copper and molybdenum from three open-pit mineral deposits located in the Andean plateau where water is scarce. ARCADIS is helping the client optimize water use by minimizing losses, increasing efficiency, and developing sustainable water management business practices. ARCADIS conducted a detailed review and assessment of all water-related activities at the mine to develop a “water value” management model to support decision-making at the mine. The model incorporates performance metrics for key water management areas, such as water extraction, transport, distribution, use, reuse, recycling, treatment, and release. Using this model, the client will be able to support the design and implementation of an “Intelligent Control System” to be applied to the entire mine site to manage assets and help develop sustainable action for long-term water and energy management.

Water Consumption Minimized – Positioned for Future Operations

Confidential Client, United States

ARCADIS completed a hydrology and stormwater runoff evaluation at a challenging site in the western U.S. The site’s steep topography made runoff collection difficult, while minimal land was available for impounding runoff. Recognizing that it was critical to “keep clean water clean,” ARCADIS differentiated areas impacted by mining activities from undisturbed areas. Leveraging its hydrologic modeling expertise, ARCADIS estimated runoff from impacted areas such as rock piles, open pit and mine roads, using the program HEC-HMS to model peak flow runoff volumes for various storm events. The model allowed the client to evaluate possible upgrades to stormwater structures, water treatment technologies and tailings disposal methods, ultimately minimizing water consumption and positioning the mine for future operations.

Water Supply Development, Treatment, Reuse and Disposal

With the tough challenges facing the mining industry, it is imperative that water be effectively managed throughout the mine life cycle.

Today, new mines are being developed in remote areas where natural fresh water resources are limited, forcing the needs of the mine to compete with demand from local communities and other established industries. Global regulations are driving higher standards of treatment for mine process wastewater. Lower grade ores are being mined, requiring greater quantities of water for processing.

In response to these challenges, it is essential to ensure reasonable, efficient use of water at every stage of the mine life cycle. ARCADIS professionals can help optimize consumption through best management practices that include optimized water supply and reuse strategies, improved metals recovery, and innovative treatment solutions.

Solutions

- Surface and groundwater characterization
- Water supply modeling and optimization
- Stormwater modeling
- Engineering/design and construction
- Water infrastructure life cycle management
- Site-wide water management
- Innovative technology evaluations and waste management
- Water supply, reuse and conservation

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Capital Project Delivery

Mining companies will spend approximately $12 billion on water infrastructure in 2013, more than triple the $3.4 billion spent in 2009*. This reflects the industry’s heightened concern about environmental issues and social, regulatory, and political risks, and makes effective capital project delivery critical for successful mine performance.

* as stated by consultancy group Global Water Intelligence

ARCADIS has delivered capital projects for some of the world’s largest, most complex facilities. Our multi-disciplinary design capabilities span the complete water cycle; from water supply through transmission, use, treatment, discharge and reuse. By selecting the most cost-effective technologies, we produce efficient designs that minimize both capital and operating expenses. We deliver state-of-the-art solutions through various contracting methods including design-build, EPC, EPCM and CM at risk, providing clients with a single point of accountability – a virtual “one stop shop” that enables us to reduce overall project cost, compress overall schedules, and ensure that design intent is maintained during construction.

Six Month Fast Track New Reverse Osmosis Water Treatment Plant

Confidential Client, Arizona

ARCADIS provided EPCM services for a new reverse osmosis water treatment plant. This is a 1,000 gallons per minute treatment plant designed to remove arsenic, fluoride, and uranium to produce potable water for the mine utility system. We provided services that included the feasibility study, permitting, process design, detailed design, equipment procurement, facility construction, commissioning, operator training, and the preparation of operation and maintenance manuals. Construction activities included procurement of equipment and materials, providing construction trade services for site, concrete, building erection, mechanical, electrical, instrumentation, and construction management. The project was completed within budget and on a compressed six-month schedule.

Safe and Effective Treatment of 500 Million Gallons of Water

Confidential Client, Canada

This closed mine site contains approximately 24 million tons of sulfide mineral bearing tailings deposited over 620 acres, extending 100 yards of the Lynn River in a series of man-made impoundments. ARCADIS developed a work plan to limit dust generation and acid rock drainage by consolidating, capping, and immobilizing the majority of the tailings. In conjunction with the tailings work, a water treatment system was designed and constructed by ARCADIS to treat acidic runoff that was historically collected in a series of impoundments. To date, ARCADIS has managed the treatment of all of the stored acid mine drainage as well as the seasonal runoff (over 500 million gallons of water) in a safe and effective treatment facility. Pumping and piping was also included in this project.

Solutions

- Treatment system design
- Pumping, conveyance, and storage engineering
- Construction administration and oversight
- Procurement support
- Design-build service
Innovative Approach Meets New Strict Discharge Standards, Sustainably
Confidential Client, South America

A gold mine in South America utilizes large volumes of water daily to meet milling process needs. Conventional water treatment plants meet local surface water discharge regulations, but recent changes have made these standards more stringent. To comply with new regulations, ARCADIS geochemists, water treatment engineers, and civil engineers developed a new treatment process that relies on sustainable biological processes to catalyze water treatment. By adding organic carbon, the process transforms nutrients in the water into non-toxic end products, while metals are transformed to low-solubility metal sulfide precipitates which are captured and retained.

The process requires little additional power, relying instead on the action of naturally occurring microorganisms. ARCADIS tested the process at the bench scale, and also developed design of a full-scale treatment system utilizing existing waste rock dumps to construct treatment units. By reclaiming and using areas of the operating mine for water treatment, the innovative biological treatment approach will achieve sustainability goals for energy conservation, re-use of mine property, and creation of innocuous end products.

Sustainable Water Management

With an increasing focus on water reuse and recycling, mining companies must put in place water management plans that include sustainable solutions. Addressing sustainable goals and metrics is a core element of ARCADIS’ business strategy. We understand your motivation and are ready to help you become more effective stewards of your water resources.

Every project is directly linked to the global environment, and we strive to help our clients achieve profitable, sustainable growth while protecting precious land, water and air resources. To this end, ARCADIS simultaneously addresses compliance requirements, corporate stewardship objectives and our clients’ business goals when developing effective water management solutions.

Solutions

- Effluent reuse and recycling strategies
- Technology evaluations
- Bench- and pilot-scale studies
- Waste management strategies
- Treatment to reuse or discharge standards
- Site-wide water balance modeling
- Stormwater management and control
- Mine dewatering evaluations
- Pit lake chemistry prediction
- Acid mine drainage modeling
- Asset management
When faced with balancing seemingly conflicting demands, ARCADIS will help optimize operational performance to lower operating costs and eliminate unwanted distractions from production activities. Clearly, water-related infrastructure doesn’t directly make money for most mining companies. In fact, while these systems are essential to get minerals from pit to port, they are typically viewed as a drain on the bottom line, especially as mine operators face internal pressure to cut costs while complying with new regulatory programs. By providing services from strategic planning through daily monitoring, we help our mining clients minimize liabilities and the significant risks of non-compliance while maximizing profit and productivity. Our experts develop tailored, practical approaches that minimize long-term compliance costs and avoid costly enforcement actions, such as minor operational changes that can yield significant cost savings, and health and safety enhancements that create a better, safer working environment for your employees.

Optimizing Operations

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Optimizing Operations

Solutions

- Asset inventory and condition assessments
- Repair and replacement prioritization
- Operations assistance and efficiency studies
- Operator training
- Energy auditing
- Water supply modeling and optimization
- Desalination studies and design
- Stakeholder engagement, education and outreach
- Water-related permitting and rights

On Time and Compliant Site Closure

Confidential Client, United States
For a former uranium ore processing mill, now a Superfund site, ARCADIS is supporting a groundwater restoration program under a Nuclear Regulatory Commission license and a state discharge permit. Alluvial groundwater flows beneath the mill waste tailings to a collection area, where contaminated groundwater is captured by an extraction well system and pumped to a reverse osmosis (RO) treatment plant. Target contaminants are removed by flushing the alluvial aquifer with fresh well water or water produced from the RO water treatment plant, supporting the client’s long-term goal of restoring the aquifer to upgradient background levels. ARCADIS evaluated this remediation system’s performance, collaborating with the client to optimize site water management strategies. The activities included developing a site-wide water balance model; providing hands-on RO plant optimization services; evaluating alternate treatment technologies; pilot testing strategies to immobilize uranium in the aquifer; and developing a comprehensive 3D geologic model and visualization tool. With targets for improvement identified in site restoration activities, water management, and overall site management, the client can now meet the regulatory agencies’ site closure schedule.
Client-focused, Every Day

For more than a century, thousands of ARCADIS water professionals have helped our clients address their most complex challenges with certainty. ARCADIS is the #1 international design firm for water and within the top ten environmental firms for private clients as ranked by Engineering News Record (ENR).

ARCADIS operates under a true client-focused business model. Under this model, every aspect of ARCADIS’ business revolves around our clients, including our internal management systems, technical resources, and performance incentives. We align our objectives with yours. This allows us to design tailored solutions that meet your needs the way you define them, and execute delivery with the utmost quality, consistency and certainty. As stewards of your investments and objectives, ARCADIS serves as an extension of your staff, maintaining control of your program and bringing your vision into reality.

Safety First

At ARCADIS, safe operations are integral to our definition of success.

Protecting our staff and our clients from injury, illness and other loss requires that we hold health and safety as a core value and an integral part of the solutions we provide to our clients. Our globally compatible, systematic approach focuses on proactive hazard recognition, risk assessment, and control to prevent accidents. We empower staff to “Stop Work” any time they feel it is unsafe to proceed. This empowerment and responsibility is highly supported with education, tools, processes, resources, equipment and standards that allow ARCADIS staff to identify, assess and control hazards in the workplace and at home. Through our behavior based safety systems, we meet and exceed our clients’ health and safety standards.
Creating a Better Tomorrow, Today

Our mission is to improve quality of life by creating innovative and enduring solutions that enhance the built and natural environment. To fulfill our mission, we strive to reach the delicate balance between the creative and the functional, between the innovative and the proven, and between imagination and results.

At ARCADIS, we focus on managing the influence of past practices in the context of future natural resource objectives. With a deep understanding of the nexus between regulatory, technological and environmental drivers, we develop solutions that appropriately balance economic challenges with natural resource sustainability goals. Leveraging our established innovation and thought leadership, we deliver certainty for creative solutions to complex problems in urban, rural, offshore, wetland, river, desert and arctic environments – creating real value for our clients and a legacy of resilient communities with clean land, air and water for our children.
ARCADIS is a leading international company providing consultancy, design, engineering and management services in infrastructure, water, environment and buildings. We enhance mobility, sustainability and quality of life by creating balance in the built and natural environments. ARCADIS develops, designs, implements, maintains and operates projects for companies and governments. With 22,000 employees and more than $3.3 billion in revenues, the company has an extensive global network supported by strong local market positions. ARCADIS supports UN-HABITAT with knowledge and expertise to improve the quality of life in rapidly growing cities around the world.