

Mine Water Used for Irrigation

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Resolution Copper Mining LLC, based in Superior, Arizona, is investigating what may be the largest untapped copper ore body in North America. To safely carry out the investigation, which includes construction of a 7,000-foot-deep shaft, groundwater that has naturally accumulated in the closed Magma underground mine must be removed. Thus, over the next two to three years, Resolution Copper will recover 6,000 to 7,000 acre-feet of water from the closed mine. Rather than simply disposing of it into the surrounding environment, Resolution Copper constructed a treatment plant and gravity pipeline to carry the water 27 miles to the New Magma Irrigation and Drainage District (NMIDD) in central Arizona, where growers will use it for crop irrigation at no cost.

NMIDD signed a memorandum of understanding with Resolution Copper for the water transfer project. Resolution Copper, NMIDD, and the growers are working with the University of Arizona and NewFields Agricultural & Environmental Resources LLC,

a consulting company, to ensure the safe utilization of the water.

Water pumped from the mine is treated in a new 2,500 gallon-per-minute, high-density-sludge lime treatment facility to remove metal ions and adjust the pH. The treatment uses lime and soda ash to raise the pH of the water from around 5.8 to 8.6, causing the metals (primarily iron) to precipitate. The treated water is piped to NMIDD, blended with Central Arizona Project (CAP) water, and introduced to the canal system for irrigation of cotton, alfalfa, sorghum, turf grass, and pasture.

Resolution Copper obtained a dewatering permit from the Arizona Department of Water Resources for removal of 5,000 acre-feet of water per year, an aquifer protection permit from the Arizona Department of Environmental Quality for containment of the sludge at the treatment plant, and a special-use permit from the U.S. Forest Service for portions of the pipeline crossing public land. The mine water is classified as naturally occurring groundwater rather than industrial wastewater, therefore no additional permit was needed for discharge into the irrigation canals.

Managing Salinity

Scientists' greatest water-quality concern regarding the mine water is salinity,

which could impact crop production if not properly managed. The total dissolved solids (TDS) concentration of the water is around 6,000 milligrams per liter (mg/l). All parties involved agreed that a 10:1 blending ratio of mine water to CAP water would provide irrigation water with a TDS concentration of around 1,200 mg/l, which would be safe for irrigating even alfalfa, the most sensitive crop grown in the area.

In all arid irrigation systems, additional water is applied to crops beyond what they need in order to adequately leach soluble salts below the root zone. Based on continuous measurement of flow, knowledge of on-farm irrigation practices, and documentation of irrigated acres, researchers working with NMIDD have determined that the continued application of about 40 percent more water than the crops can consume will prevent soil salinization.

Monitoring the System

To learn more about the effects of the process and to ensure its safety, all water sources (CAP, mine, and blended) are analyzed daily with real-time telemetric monitoring systems. Samples of soil and plant tissue will be collected quarterly to monitor for evidence of impact from the mine water. Finally, researchers are tracking climatic conditions, irrigation practices, farm management practices, and crop-water demand.

The rate of pumping from the mine varies according to irrigation demand, and is greatest in the summer. Based on expected demand, Resolution Copper estimates the mine will be drained in two to three years. After that, pumping will continue at a much-reduced rate to keep the mine open; some of that water will be used for mine operations as development proceeds, and some may continue to be available to NMIDD.

The rate of pumping from the mine can be modified daily to account for changes in NMIDD demand. This flexibility allows careful and timely management of the overall salinity of the irrigation water to within acceptable ranges, thereby protecting the crops and soils as well as optimizing the dewatering of the mine. ■

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ADD Water: Central Arizona's Next Bucket of Water

Matthew Bailey – Snell & Wilmer LLP

Preserving Arizona's Oasis

Central Arizona's image as an oasis in the desert is the result of many historic political, legal, and resource decisions. Although the oasis is not under immediate threat, central Arizona's continuous growth is nonetheless absorbing its currently available water supplies. At some point in the future, demand will exceed supply. Thus, the same visionary water resources management that made central Arizona flush to this point is now needed to cultivate its water future.

The "ADD Water" process seeks to achieve just that. Officially called "Acquisition, Development, and Delivery of Water," ADD Water is increasingly referred to as central Arizona's next bucket of water. Once established, ADD Water will provide a new water supply for water users within the Central Arizona Project's (CAP) three-

county service area. Ultimately, CAP likely will acquire new water supplies from sources such as retired farm land along the Colorado River or treated brackish groundwater in the Phoenix area and distribute it to ADD Water participants throughout CAP's service area.

Project ADD Water

The ADD Water concept originated when various municipal water providers and CAP began discussing a public process for developing a new wholesale water-supply program. These discussions led, in part, to CAP's adoption of its Strategic Plan in 2006. In 2007, CAP applied the Strategic Plan directive to create Project ADD Water.

ADD Water is a CAP-led stakeholder process. Stakeholders, who may join at any time, can be any interested entities willing to participate in the process, such as agricultural interests, industrial users, municipalities, and individuals. Stakeholders meet regularly to develop ADD Water's framework around the

following question: Assuming CAP is to be the primary entity that acquires, develops, and delivers new water supplies for its three-county service area, how should the water be shared and paid for?

To address this question, ADD Water is taking a five-step approach: 1) understand stakeholder interests and information needs; 2) determine, define, and prioritize criteria; 3) generate alternatives; 4) evaluate alternatives against criteria; and 5) develop recommendations to present to the CAP Board. The first and second steps were completed in 2008; some representative criteria include meeting current and future water-user demands in CAP's three-county service area and ensuring ADD Water's financial sustainability. The third step is expected to wrap up by late summer 2009. The remaining steps will begin thereafter.

Collaboration and Consensus

One of ADD Water's greatest innovations is that the stakeholders are working collaboratively through a public process to determine how the program will function. Unlike when Arizona's water supplies were allocated by courts or government agencies, stakeholders now are deciding ADD Water's fate. Perhaps a minor point to some, this change in western water management philosophy cannot be overstated.

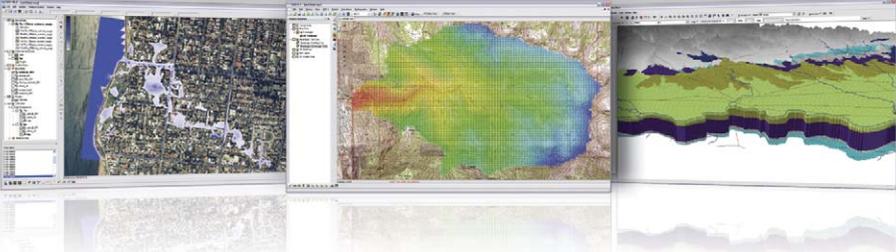
ADD Water's second great innovation is its goal of consensus. Achieving consensus among the views of the myriad stakeholders means decision-making is at times contentious, but this generates healthy debate rather than an adversarial environment. This innovative concept is not often embraced throughout the West.

ADD Water represents a unique opportunity for stakeholders to achieve common goals of determining how to share and pay for central Arizona's next bucket of water. The process is not easy and reflects as many perspectives as there are stakeholders. The inherent struggles and diversity of interests should make for better product, although many long hours of hard work remain. In the end, only stakeholder participation will ensure ADD Water's success. ■

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