The resulting system will form an important part of Mira Geoscience's commercial offering of geotechnical hazard assessment solutions starting mid-2016.

Advisory assistance

Ta Li, Vice President, Business Development at **TetraTech Inc** said the company provides full mining lifecycle services from environmental consulting to engineering, project execution, operations support, mine closure and reclamation. Its worldwide staff numbers over 13,000 employees at 300 offices in more than 120 countries on six continents. Expertise covers over 75 related technical fields. "Because of our substantial global presence, we help our clients conceptualise and executive innovative solutions for their most difficult problems. The five principal areas include; water, environments, infrastructure, resource management and energy." The complement of Engineering Services for project development includes completion of pre-feasibility and feasibility studies; development of capital cost estimates in accordance with the Association for the Advancement of Cost Engineering (AACE) Standards and Guidelines; detailed Engineering, Procurement and Construction Management (EPCM); permitting and Environmental Assessments; mine planning and operational support; NI 43-101 Resource Estimation, due diligence, equity and debt financing support.

"Tetra Tech has long term working relationships with major and emerging junior mining companies. Its resume of successful third-party reviews and due diligences has resulted in an excellent reputation among the finance and investing communities. From a strong core of mining practice offices in Golden, Vancouver, Santiago, London and Perth, a leading and sustainable mining practice has emerged for the benefit of the global mining community."

SRK Consulting is well known globally as an independent, multi-specialist consultancy serving the exploration and mining industries worldwide. The company told ***IM***: "We advise clients at each stage of the project life-cycle from exploration to closure. Clients include mining and engineering companies, financial institutions, and public sector organisations. Strong working relationships with regulators and the financing community allow us to help reduce project financing and permitting risks. When supporting clients in buying or selling properties, we deliver balanced, independent valuations and reviews focused on identifying opportunities and risks. For clients at the development stage, we focus on understanding the critical issues to ensure we get the concepts right. And for clients with operating assets, we assist with optimising performance and solving technical challenges."

Recent project examples in terms of independent project reviews include producing competent person reports and valuations for selected assets involved in South32's demerger and providing advisory services to the Senior Lenders team for the Roy Hill project. Recent feasibility studies include for Brazil's 3 Mt/y Tucano gold mine while technical reviews have included a regional structural geology mapping and geophysical interpretation for Coeur Mining's exploration targets in Mexico. In permitting, SRK advises clients in various jurisdictions on modifying permitting for delayed or reduced expansions while maintaining flexibility, complying with environmental and social requirements for closure, and preparing for market improvements. The company has collaborated with operators to improve the performance of their assets, such as for a major private copper mine in Mexico.

Finally moving to mine closure, work includes aiding decision-making on continuing, temporarily suspending, or closing operations in diverse locations and preparing detailed plans for these and restarting activities. As an example, SRK conducted a post-closure groundwater impact assessment for the Olympic Dam underground mining operation.

Water expertise

MWH's services to the mining sector revolve around water, which is a key enabler but a prime culprit when things go wrong and the nexus for interaction with the communities supporting mining. Resa Furey, Market Analyst at MWH states: "New mining projects and on-going operations require regulatory and community approval, a reliable water supply along with dependable measures to manage mine waste and control discharges to the environment. Our most interesting assignments include sharing a limited water supply with a city and neighboring agricultural community; applying multiple accounts analysis and stakeholder dialogue to secure regulatory and community approvals; safety audits for tailings and waste management; program management for closure and relinquishment of mines; and providing solutions to deal with long-term liabilities at mines."

MWH says its professionals contribute to the development of the industry's know-how in each of these areas through knowledge sharing – short courses and lectures – that it offers each year. "Because the MWH mining group is backed by a much broader water engineering service, we are known for bringing ideas and experience from other sectors. This has been beneficial, for example, when we brought mining companies together with other industries from manufacturing to food and beverage and oil and gas, to share approaches to water efficiency and re-use."

MWH says it takes pride in adding value at each phase of the mining lifecycle by providing thoughtful and long-term solutions that promote shared value, improve community acceptance and contribute to the sustainability of clients.

Tackling tailings

Typical tailings disposal options assessments carried out by **Golder Associates** include working within regulatory requirements and standard practices to identify the most economical option while considering intangible items such as long term stability and closure costs. Increasingly, the demands of regulators, NGO's, shareholders and a desire to minimise risk has put pressure on mining companies to adopt best available practices. At the same time, the decline in commodity prices has put increased economic pressure on mining companies.

Chris Lee, Principal - Paste Engineering and Design told ***IM***: "The number of assessments for new mining projects has declined. However, these types of assessments are still taking place with the request frequently originating from operating mines. These assessments evaluate different levels of tailings dewatering; slurry, thickened tailings/paste and filter cake and different disposal methods including underground backfill, co-disposal and into depleted open pits. What is different is that the alternatives that may have been considered too costly in the past are being re-examined due to significant pressure to adopt best available practices."

This requires greater creativity and integration with mining companies to find cost effective solutions that allow mines to address their technical challenges while minimising or reducing tailings management capital and operating costs. "While it may seem impossible to have a better technical solution that also has a lower cost there are a number of ways in which this can be done. Frequently this can be accomplished by broadening the scope of the study to include all areas that have synergies with the tailings management option selection such as the link between tailings disposal and mine backfill. Golder, a global company that provides a comprehensive suite of integrated mining services and which has a wealth of experience in mine waste management, is well positioned to provide these detailed assessments that mining companies can utilise to make the best decision possible when it comes to considering tailings disposal options."

Unbiased client support

Watts, Griffis and McOuat Ltd (WGM) is Canada's longest running independent firm of geological and mining consultants. Headquartered in Toronto, Ontario, with regional representatives in