Mexican Gold Mining Land Remediation Restores Suitable Site Conditions

While mining is a lucrative business venture, it can take an environmental toll on the land. Yet proven successful remediation techniques utilized by experienced erosion control specialists can restore the land back to its original state before mining operations commenced.

Such was the case at El Sauzal Mine, located in the municipality of Urique Chihuahua, Mexico.

The El Sauzal mine's active life ended in 2014 and its closure took place in sections as there was no more gold to mine. Meanwhile, Goldcorp announced the mine had experienced movement in its Trini pit highwall slope and suspended operations as a safety precaution until a geotechnical survey team assessed its impact on the mine's operation.

After its closure, its owners sought environmental restoration of 269 hectares that had been the site of open-pit gold extraction with the goal of curbing laminar water erosion and increasing moisture uptake for the establishment of plant cover.

COREP – an ecological restoration company – successfully bid the rehabilitation and land restoration work needed to restore the site to a suitable condition.

Crews conquer accessibility, weather challenges

From May 5, 2016 to August 24, 2016, COREP team used a variety of erosion control techniques to include the installation of 6,000 linear meters of control wattles and soil conservation and 20,000 meters of coconut erosion control blanket on steep slopes.

Following the soil stabilization, 68 hectares were reforested with more than 60,000 native plants. Goldcorp established a plant nursery onsite and COREP was in charge of maintaining and making sure nursery provide enough plans to cover project. Thanks to Goldcorp and with the help of COREP the nursery was able to supply the needed plants for the reclamation from their onsite. Native grass was dispersed by hand and on parts of the mine that were inaccessible by vehicle and/or equipment, with the hand installation of native seeds on these steep embankments proving to be challenging.

Accessibility was one of the biggest challenges due to the 14-hour travel time between the mine and the town of Chihuahua, necessitating that the COREP crew camped at the project during its entire execution.

Pavel Ornelas, general manager for COREP, says when his company's crew first showed up at the job site, the mine owners were removing their equipment and closing down. In the first two weeks, COREP was able to share the facility, but by the third week the crew was alone at the site with no telecommunications services at the mine.

After the mine was closed, the only means of communication the crews had to outside the mine was via satellite, creating difficulties communicating with the main office.
"We had to camp and used generators for electricity," Ornelas notes. "The conditions were pretty rough, but we had the equipment to make a nice camp. Logistics, coordination – everything had to be perfect to be able to avoid any problems."

Daily rain events proposed a new set of challenges daily to the stabilization of slopes and movement about the site.

Working in soil conditions that ranged from poor to fertile and on slopes of 1:2 and 1:3 proved to be yet another challenge. Soil tests yielded concerning reports, including organic matter of less than 0.8%, nearly no sign of plant nutrients, rocky soil composition and a pH range from 3 to 5. While slopes are under 3%, the lack of the ability of the soil structure to compact or stabilize led to concerns of sheet erosion into the constructed waterways.

"In some areas it was hard to work because of the soil, but thanks to the hydroseeding, we were able to make it work," says Ornelas.

The soil and slope challenges were stabilized through the application of 13.56 hectares of hydroseeding.

The hydroseeding was performed using a 550-gallon machine and extended hoses up to 400 feet because the terrain presented challenges that necessitated the use of a smaller machine to gain access to hard-to-reach areas, says Ornelas.

Erosion control products were sourced from HydroStraw after COREP managers researched options and tested various products. HydroStraw products were chosen for their effectiveness, Ornelas notes.

"COREP worked closely with us to develop a site-specific remediation plan utilizing our All In 1 Bonded Fiber Matrix (BFM) that addressed the previous site activity and degradation of soil organisms and thus the equilibrium of the ecosystem," points out Ron Edwards, HydroStraw president.

Management practices such as mining, tillage and removal of native vegetation that alter the living and nutrient conditions of soil organisms result in a degradation of their microenvironments, he adds.

"In turn, this results in a reduction of soil biotics, both in biomass and diversity," says Edwards. "Where there are no longer organisms to decompose soil organic matter and bind soil particles, the soil structure can easily be damaged by rain, wind and sun.

"This can lead to rainwater run-off, lack of water infiltration and ultimately soil erosion, removing the potential food for organisms – the organic matter of the topsoil. The biological component of the soil is its most important property and when it is reduced, the uppermost layer of the site ceases to be a soil."

The El Sauzal site was an ideal fit for HydroStraw All In 1 BFM as it addresses the biological, chemical, and physical requirements for stabilizing and restoring vegetation on disturbed soil sites as well as controlling erosion during vegetation establishment, notes Edwards.

The porous matrix of the wheat straw encourages water infiltration, enabling the new seedlings to easily pass through the matrix, he says.

"The combination of the wheat straw fibers together with the cross-linked high strength polymer binders provides effective erosion prevention and increased vegetation establishment, making it truly an All in 1 solution," Edwards adds.

Proven techniques and products lead to project success

Despite the challenges, the project proved successful, meeting both government regulatory requirements and client objectives to achieve more than 80 percent of reforestation of the project areas, says Luis Perez, external marketing representative for COREP.

Another driving factor in the success of the project is the involvement and support of the local community surrounding the mine, some of whom were hired to help with the project, notes Jose Luis Romero, COREP Director of Field operations.

A stable vegetation coverage has been strengthened and extended, covering the affected areas and re-establishing the site's previous environment. COREP has been asked to provide project maintenance in the future.

COREP designs and builds sustainable ecosystem restoration systems, design, construction and consulting solutions throughout Mexico and Latin America. Key personnel possess diverse experience constructing and consulting on some of the most complex and challenging restoration projects in Mexico and Latin America.

COREP has completed hundreds of different projects in the environmental field for small to large companies in mining, pipeline construction, oil and gas, engineering and consulting companies as well as for private ranch owners and small communities.

The company's experienced employees assist clients in navigating the regulatory process while minimizing project costs and delivering sustainable restoration solutions.

COREP's areas of expertise include erosion monitoring and assessment; hydroseeding; wattle installation; nursery development; wind and photovoltaic energy; infrastructure and telecommunications; soil improvement services such as surface compaction, drainage methods, pre-compression and consolidation, chemical stabilization, and soil reinforcements, and plant production and reforestation.

Other COREP services include flora rescue and relocation; wildlife management, monitoring, rescue and relocation; conventional process and work for conservation of water and soil (ditch, trenches, vegetative barriers planted on the contour to control soil erosion, re-arrangement of dead plant and vegetal material, gabion dams, stone barrier structures), environmental studies; development of Geographic Information Systems to include mapping of weather, geology, physiography, biodiversity and hydrology; 3-D modeling of land and buildings and design processing algorithms GIS geo-specific to a particular project.