



Abandoned mine sheet erosion challenges mitigated by HydroStraw's All in 1

At the abandoned Madawaska Mine in Bancroft, Ontario, remaining tailings still hold four million tons of leftover uranium waste, which require long-term management. Golder Associates, a global company providing consulting, design, and construction services in earth, environment, and energy, enlisted the help of Willowlee Sod Farms for the erosion control solutions. Willowlee Sod Farms's erosion control efforts are significantly contributing to the mitigation.

Originally called the Faraday Mine while operational from 1954 to 1964, the mine reopened in 1975 to 1982 under the Madawaska name. During its operation, the mine reached a depth of 473 meters under the surface with a total of 9.4 million pounds of triuranium octoxide harvested. Mined triuranium octoxide is used during the creation of uranium yellowcake, a concentrated uranium powder used in nuclear fuel production. The Canadian Nuclear Safety Commission has reported that groundwater near the Bancroft tailings has been affected by the radioactive waste housed in the tailings site with uranium levels in the water being above the Canadian drinking water standard, notes Kurt Vanclief, president of Willowlee Sod Farms.

Soil contamination also posed a significant problem. Future contamination would lead to serious long-term environmental problems, he says, adding the Encana Corporation monitors the tailings. The final cover of the waste cells is a sugar sand – the native soil in the area – and is in ample supply on uncontaminated areas of the mine site, says Vanclief. Soil tests yielded concerning reports, including organic matter of less than 0.8%, nearly no sign of plant nutrients, more than 90 percent sand soil composition and a pH of 5, he adds. 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. Dust problems on a windy day were another concern which the chosen erosion control methods needed to mitigate. The geographical location of the site makes importing a mineral topsoil an unviable option.



Discussions for the revegetation – which included representatives from HydroStraw LLC – moved from utilizing standard Brillion seeding methods to the need for an improved strategy that addressed the specific sites needs. The client wanted a permanent solution involving erosion control that not only mitigated potential problems but did so in an aesthetically-pleasing manner and minimized maintenance costs, says Vanclief. To get to that goal, the solution was to apply K-Mag potassium-magnesium sulfate fertilizer blend and lime at three tons per acre. The balanced starter fertilizer was applied a rate of 750 pounds per acre. A custom seed mix was developed to offer potential for growth in the low pH environment.

Seed was applied with Brillion seeder during December 2015. HydroStraw All In 1 Bonded Fiber Matrix (BFM) was hydraulically applied at a rate of 5,000 pounds per acre. “That slowed water percolation into the soil and damage from erosion was minimal and less than anticipated,” says Vanclief. “Willowlee Sod Farms was able to formulate a site-specific remediation plan utilizing our All In 1 Bonded Fiber Matrix that addressed the previous



site activity and degradation of soil organisms and thus the equilibrium of the eco-system,” 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 rain water runoff, 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 Madawaska Mine site was an ideal fit for Hydro Straw 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,” he adds.

After erosion control operations were completed in December 2015 and winter set in, the treatment at Madawaska Mine lay dormant until spring of 2016, at which time results exceeded the expectations of project management, says Vanclief. As a result, subsequent trials to evaluate several methods of vegetation establishment in summer and early fall of 2016 were cancelled. A follow-up nitrogen and potash fertilizer was applied.

Project managers are very pleased with the results to generate growth and groundcover on such poor quality soils without the enormous costs of importing additional topsoil, Vanclief says. Various project delays resulted in seeding planned for the fall of 2016 to be conducted in late November, which requires the seed and mulch to remain dormant until the spring of 2017. At that time, significant areas of the project are expected to be completed, with additional areas seeded in fall of 2017. HydroStraw All in 1 will continue to be used for erosion control, says Vanclief.