



CASE STUDY

Project Description

Vale Canada's Copper Cliff operation in Sudbury, Ont., is an integrated mine, mill, smelter and refinery complex in Sudbury.

For over 100 years, tailings from the milling operation have been deposited in the Copper Cliff Central Tailings impoundment. The facility is still active, but approximately 1,300 hectares are inactive and need reclamation work.

Over the decades, Vale has had some success in revegetation, but there are still large areas of bare or sparsely vegetated tailings, which have led to wind-erosion-management challenges. To control dust, Vale uses agricultural equipment to cover the tailings with straw or hay, as well as a chemical dust suppressant. These practices are costly, and they have to be done continuously to maintain an appropriate cover at all times.

In 2012, Vale decided its tailings needed a permanent vegetative cover—not just to suppress dust and reduce erosion, but to improve overall biodiversity. They entered into discussions with Terrapure Organics Solutions (formerly Terratec Environmental) to collaborate on a trial project to apply biosolids on the mine tailings.

Terrapure uses biosolids to revegetate inactive mine tailings area in Sudbury

The Challenge

The biggest challenge was forging a new path for this type of work. Applying biosolids to mine tailings had never been done before in Ontario. Just to get the right permits and approvals took about two years.

Vale Canada and Terrapure worked closely with the Ministry of the Environment and Climate Change (MOECC) to ensure standards compliance. Some of this work included helping to determine what those standards should be. Terrapure was able to contribute to these discussions, leveraging decades of expertise in safe biosolids application to agricultural land.

Once the Environmental Compliance Approval came in April 2014, the team had to figure out the best application method and proper amount to encourage vegetation, which meant a lot of testing and optimizing.

The Solution

At first, Terrapure mixed biosolids into the surface layer of the tailings. Over time, however, the team learned that applying biosolids to the surface, without mixing, allowed for greater rates of application and coverage at a lower cost.



Terrapure also had to experiment with the right tonnage per hectare. After seeding four trial plots with different amounts of biosolids coverage—20, 40, 60 and 80 dry tonnes/hectare—it was determined that 80 dry tonnes was best for seed germination. At the time, it was the maximum allowable application rate.

By the end of 2014, approximately 25 hectares of tailings were amended. Where the biosolids were applied, there were impressive results. Wildlife that had not been seen feeding in the area in years started to return.

In 2015, the MOECC approved an increase in the biosolids application rate to a maximum of 150 dry tonnes/hectare, which was necessary for providing higher organic matter and nutrient levels, and for stabilizing the tailings' pH levels. This approval also increased the cap on the amount of biosolids that could be delivered to the maximum application rate per hectare.

To enhance the program even more, Terrapure and Vale partnered with the City of Greater Sudbury to blend leaf and yard waste with biosolids. By blending these materials, the mixture becomes virtually odourless, its nutrients are more balanced and it allows for a more diverse application.

The Results

As of 2018, Terrapure has successfully covered over 150 hectares of Vale's tailings with municipal biosolids. Vegetative growth and wildlife are well established on all areas where the team applied organics. Just as importantly, this project has diverted more than 25,000 dry tonnes of valuable biosolids from becoming waste in the landfill.

Following the success of the initial trial, the MOECC widened the approval to include all areas of the inactive tailings and a portion of the active tailings. At the current application rate of 150 dry tonnes/hectare, Vale's central tailings facility could potentially require another 195,000 dry tonnes of biosolids. That's more than 30 years of biosolids utilization, at an annual rate of 6,000 dry tonnes of material.

Needless to say, Vale is very pleased with the results, and the relationship is ongoing. In fact, the Vale team is evaluating other sites in the Sudbury area for this type of remediation, ensuring a long-term, environmentally sustainable rehabilitation program.