Reclaiming Land With the Aid of Recycled Materials

A Case History - East Texas Surface Mine

Introduction

Successful reclamation of mined lands is an important ecological and economical process. Surface mines across the country follow procedures outlined in federal, state, and local regulatory permits and licenses to ensure compliance with reclamation, water discharge, construction, and air quality regulations. In addition, surface mines are required by federal law (Surface Mine Reclamation Control Act 1977) to return the land to a state that meets or exceeds pre-mining conditions.

Project Area Description

Under the current permit, the project area encompasses 44,106 acres with approximately 12,000 acres in various stages of reclamation. Reclamation of the land to post-mining land uses begins with soil leveling after the natural resources have been removed.

Reclamation Process

Reclamation of the earth's surface includes regrading of the land, which requires surface water drainage networks to be designed and created. Erosion and sediment control plans are vital to the success of reclamation projects whose ultimate goal is the establishment of vegetation.

Erosion and Sediment Control

Land produced as a result of the reclamation process requires proper erosion control to ensure the establishment of permanent vegetation. The process creates hillslopes and various ditches and drainage channels that experience concentrated flows during rainfall events. The areas of concentrated flow need to be lined with turf reinforcement materials, which help the vegetation withstand anticipated shear stresses.

A Versatile Product

American Excelsior Company territory manager Darryl Childers recommended Recyclex® TRM for the various applications that existed at the surface mine because of the product's versatility. Various best management practices (BMPs) have been installed at the mine over the years, but none of the previously installed BMPs were as versatile as American Excelsior Company's Recyclex.

Recyclex is the first turf reinforcement mat (TRM) made from 100% recycled post-consumer goods (green or brown bottles). Recyclex is manufactured with 80% or more of the fibers being 5 inches in length or greater. The fibers are crimped to allow a strong, curled, interlocking fiber matrix, which conforms to terrain details and trains water flow to follow the curled fiber matrix. The unique polyester fibers have a specific gravity greater than one, which means the matrix will not float during a hydraulic event. The fibers also have a memory of 95%, which means the product returns to its original shape after surface loading from either hydraulic events or vehicle traffic.

Vegetation

A seed mixture of Brown Top Millet (*Panicum ramosum*) and Common Bermuda Grass (*Cynodon dactylon*) was used on the reclamation projects at the mine. Brown Top Millet is an annual grass that provides temporary erosion control because of its rapid germination. The Millet is used in conjunction with the slower germinating, perennial Bermuda grass. The vegetation had no problems growing into and through the Recyclex matrix. This is important because vegetation may struggle to penetrate denser and thicker products, which causes the product to be lifted upward. This process is sometimes referred to as product “tenting” and results in the loss of intimate contact between the product and the soil surface. Tenting can also occur from the repeated wetting and drying of certain products. The inherent properties of the Recyclex fiber do not absorb water, thus they prevent tenting caused by repeated wetting and drying.

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Earth Science Division

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RECYCLEX APPLICATIONS

To date, over 2,000 rolls of Recyclex have been installed in various applications at the project site. The product has been used to protect everything from hillslopes to concentrated flow channels. Straw bales were previously used to reduce flow velocity in drainage ways along terraces. The bales were unsuccessful in the loose sandy soil because the water scoured around and under the structures before they were able to reduce flow velocity. In the same drainage way, Recyclex was installed and anchored to the soil with wire staples. The Recyclex was allowed to naturally soil fill from the land area contributing to the drainage way. The fibers on the bottom of the blanket buried themselves into the subgrade to form a "synthetic root system" and the fibers on the topside of the product grabbed the soil particles that moved across it. Natural vegetation became established in the matrix after the seedbed presented itself.

Naturally soil filled and vegetated drainage way.

Recyclex has been extremely successful in ditch bottoms applications at the mine. Other fiber-based products have been previously used in ditch bottoms. A common problem with these installations is the "tiger trap effect" the subgrade is washed out from beneath the product. While no product is immune to this process during extreme events, Recyclex installations have fallen victim to this process much less frequently than other products because of the physical properties of the product's matrix and the continuous intimate contact between the product and subgrade. The real benefit of using Recyclex is that it limits headcutting, which allows time for maintenance before the entire channel erodes away.

Recyclex has been used to replace a rip rap down shoot on the site. The subgrade below the rip rap washed out during a rain storm, so Recyclex was brought in because of its excellent subgrade contact. In this application, the Recyclex was seeded and watered to accelerate the establishment of vegetation. The product or the vegetation would not have survived a heavy rainfall on their own, but together the vegetation reinforced by Recyclex successfully replaced the rip rap.

Roadside ditch bottom protected by vegetated Recyclex.

Drainage channel in the early stages of vegetation.

Drainage channel with fully established reinforced vegetation system.

RESULTS

Recyclex has helped control various erosion and sediment problems by establishing reinforced vegetation. Before Recyclex was used at the mine, two dozers operated to regrade unvegetated reclaimed areas because of soil erosion caused by water. Today, only one dozer is required because of Recyclex's ability to reduce hillslope and channel erosion. The success of the projects at the mine can be attributed to the unique properties and versatility of Recyclex coupled with proper installation.

If you would like to receive more information or consult with one of our Customer Care Center Specialists, please call us toll free at (888-352-9582). PDF download specifications available in the Technical Support Library at www.Curlex.com